SCHOOL DISTRICT OF MANAWA
CURRICULUM COMMITTEE MEETING
AGENDA

Google Meet joining information
Video call link: https://meet.google.com/pok-ndbt-ikh
Or dial: (US) +1 732-820-7557 PIN: 123 740 855#

Date: October 12, 2022 **Time: 5:00 p.m.**

Hybrid Meeting Format (In-person Meeting for Board of Education at MES Board Room, 800 Beech Street & Virtual Components)

Board Committee Members: Hollman (C), Riske, and Fietzer

In Attendance:

Timer: _____ Recorder: _____

1. Consider Endorsing a School-Sponsored Trap Shooting League as Presented
2. Consider Endorsing a High School Robotics Club as Presented
3. Consider Endorsing a High School ESports Club as Presented
4. Consider Endorsing Revised Secondary Science Curriculum Maps as Presented
    a. Chemistry
    b. Physical Science
5. Consider Endorsing Mathematics Curriculum Maps as Presented
    a. Grade 6
    b. Grade 7
    c. Grade 8
    d. Algebra
    e. Geometry
    f. Advanced Algebra
    g. Pre-Calculus
6. Discuss and Recommend Applicable 2022-23 School Year Key Performance Indicators (Information / Action)
7. Curriculum Committee Planning Guide (Information / Action)
8. Next Meeting Date _____
9. Next Meeting Items:
    a. Consider Endorsing English Language Arts Curriculum as Presented
    b. Consider Endorsing Social Studies Curriculum as Presented

c. Consider Evaluation Report on and Recommendation for Club and Organizations as Presented
d.

10. Adjourn

To: Dr. Melanie Oppor, Manawa Board of Education
Fr: Brad Johnson
Date: 10/4/2022
Re: Trap Shooting Memo

A Trap Shooting interest survey was sent out to the sixth grade through senior classes on September 21st. A total of 132 students filled out the survey. 68 or 51.5% of the students expressed interest in Trap Shooting.

At this point, we would like to move forward with approving Trap Shooting as a recognized school-sponsored activity in the School District of Manawa. We have contacted the Manawa Fish and Game Club. They are extremely excited about this opportunity and would take care of financial burdens such as clay targets among other things. They have also offered support of their members to assist with ensuring safety is met at all times and teaching students how to advance their skills.

Chris Tech, Manawa Gun Club Vice President, would be our team's coach if approved, along with Advisors Krystal Draeger and Dan Botting. We would participate in the Wisconsin State High School Clay Target League.

The following is information that will clarify what we need to do to become a school-sponsored activity:

- Five students is the minimum number for a team. There is no maximum number of students that can be on a team. There may be some limitations to team size because of coaching resources and/or shooting range capacity.
- Participants are insured through registration, coaches and volunteers receive a liability insurance policy from the league, there is no additional cost for insurance coverage.
- The League requires formal approval from a school official (AD, Principal, Superintendent, or School Board) and permission to use the high school name for the team. It is recommended, but not required, to offer the athletes a lettering program and recognition in the school's yearbook.
- The League requires one coach for every 10 student-athletes. The League averages one coach for every four student-athletes.
- After a coach adds a team member to the team's roster, a registration invitation will be automatically generated and emailed to the parents to access athlete registration. Parents

will go to the athlete registration website and complete the registration process. All athletes are required to register.

- Students must be in grades six through twelve (or per school team requirements) and possess a league-approved firearm education certificate.
- About $230. The fee varies slightly for each team depending on ammunition and target costs from the team's local shooting range. Some teams may also include uniforms. A $35 fee is paid to the League for administration costs associated with operations, awards and insurance. An annual four-issue subscription to the League's PullUSA Magazine is also included. Some school teams are sponsored by local businesses and organizations to help pay for costs. The State Tournament participation fee is not included in the team cost.
- All student-athletes are required to complete and submit certificates for either one of two League-approved firearm safety certification programs – a state-approved hunter education certificate or the League's SAFE certificate. Teams should verify the firearm safety training certification requirements with the shooting range where they will be conducting League events. View certification details by visiting the firearms safety training page under the Rules section on this website.
- The League is the safest sport in high school. With more than 30,000 student-athletes that have participated in more than 330,000 events that have shot more than 20 million times, there have been no reported injuries since the League started in 2001.
- Competition occurs at the local shooting range. Scores are submitted by the coaches on the League's website and compared against other schools' scores within the conference.
- The League allows teams to shoot up to two days a week (including weekends) which provides most participants the flexibility to work around practices and games of other sports and/or activities.
- Senior student-athletes who are pursuing post-secondary education in environmental sciences or natural resources can apply for a scholarship available from the League.
- Clay target shooting is an Olympic sport that is identified as an "activity" or "club" at the high school level. In most cases, a high school identifies their "sports" as a varsity sport officially recognized by the state high school athletic/activities association.
- This is the only activity that complements the school district's mission; provides equal opportunity to all students; is safe and affordable for families; and there is no funding, facilities, or maintenance required for the school.
- Although the League follows similar beliefs and operations as the state high school athletic/activities association, this is not a sanctioned sport. That's why teams are designated as an activity or club. The League's goal is to have the state high school athletic/activities association recognize and support a State Tournament similar to other high school sports. This is typically achieved with a high number of participation of member schools, a track record of success, and a formal presentation and approval from the state high school athletic/activities association's board of directors.

- No administration assistance is required because coaches manage the entire team and the League provides online resources and guidance to manage the team. Transportation to the shooting ranges is arranged by students, families, and coaches.
- This information among other information was found at: http://wiclaytarget.com/about-us/frequently-asked-questions/

2022-23 School District of Manawa
Proposed District-Sponsored Clubs and Activities

The following is a listing of two clubs I would like to make available in the School District of Manawa. Participation is voluntary and will occur outside of the regular school curriculum.

Competitive Extracurricular Clubs and Activities:

HS Robotics Club

Advisors: Ms. Wright
Meeting Location, Date, & Time: Planning and introductory meetings will begin in September when participants will meet and discuss Vex Competitions. Students will work as a team to build 2 robots and practice for tournaments that take place from December through February. Meetings will occur in Ms. Wright's classroom and practices will occur in Ms. Wright's Fablab. Practices are held before school, during prep time, during lunch, or after school by group consensus. Participants must attend team meetings and practices with the team advisors to be able to participate in the tournaments. Tournaments are held at schools in Wausau, Appleton, Neenah, Menasha, Green Bay, etc.

Mission and Purpose: The mission of the LWHS Robotics Club is to help provide team-building opportunities for students while improving their computer programming and engineering design skills. By working with peers in a nonjudgmental zone, students will build their confidence, and share their talents in a supportive atmosphere. The program is open to all high school students. Participants choose their own categories and deliver speeches, readings from pieces of literature, or small group dramas in front of peers and for evaluation from a judge. The LWHS Robotics Club will work with the Robotics Education & Competition Foundation to participate in VEX Robotics Competitions, following their rules, and attending various state competitions through this organization. There is no student fee associated with this program.

HS ESports Club

Advisor: Ms. Wright

Meeting Location, Date, & Time: 1-2 times per week after school throughout the school year. Additional meetings will occur leading up to ESports competitions. Students will meet to play approved online video games via computer, create teams for various competitions, and participate in state competitions. Competitions are held via remote access to certified servers. Students will practice and compete in Ms. Wright's classroom. There are a total of 3 seasons throughout the school year which includes Fall, Winter, and Spring. Students can choose which season(s) they would like to participate in. The current game titles for the 22-23 season include: Smite, Fortnite, Rocket League, League of Legends, and Valorant. Teams consist of 3-5 students per team depending upon the game.

Mission and Purpose: The mission of the LWHS Esports Club is to help provide team-building opportunities for students while building their confidence, and sharing their talents and love of gaming in a supportive atmosphere. The LWHS ESportss Club will be part of the Wisconsin High School Esports Association. Through WHSEA, students will participate in preselected games, follow the WHSEA rules, and participate in various state competitions through this organization. The program is open to all high school students. There is no student fee associated with this program.

Unit Name: **Atomic Structure**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: How has the understanding of he atom shaped how it looks like?	**Learning Targets:** Explain the law of conservation of mass, the law of definite proportions, and the law of multiple proportions. Describe John Dalton's atomic theory. Distinguish between the three main subatomic particles. Understand the contributions of J. J. Thomson, Robert Millikan, and Ernest Rutherford to atomic theory. Describe the structure of the nuclear atom. Define atomic number. Define mass number. Understand how isotopes differ from one another and be able to designate them by various methods. Be able to calculate the average atomic mass of an element.
Topic 1: **Atoms**	**Length**: 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** atom, law of conservation of mass, law of definite proportions, law of multiple proportions
Lesson Frame:	We will: compare and contrast different laws.
	I will: explain the law of conservation of mass, the law of definite proportions, and the law of multiple proportions.
Lesson Frame:	We will: analyze flaws in Dalton's atomic theory.
	I will: describe John Dalton's atomic theory.
Performance Tasks: Atom composition	Notes:
Topic 2: **Nuclear Model of the Atom**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** atomic model, cathode ray, cathode ray tube, electron, neutron, nucleus, proton
Lesson Frame:	We will: compare and contrast subatomic particles.
	I will: distinguish between the three main subatomic particles.

Lesson Frame:	We will: compare and contrast different models of the nuclear atoms.
	I will: distinguish between the contributions of J. J. Thomson, Robert Millikan, and Ernest Rutherford to atomic theory.
Performance Tasks: Quantum Story	Notes:

Topic 3: **Isotopes and Atomic Mass**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** atomic mass, atomic mass unit, atomic number, isotope, mass number, nuclide
Lesson Frame:	We will: compare different elements and atomic numbers.
	I will: define atomic number.
Lesson Frame:	We will: calculate mass number.
	I will: define mass number.
Lesson Frame:	We will: calculate different aspects of isotopes.
	I will: describe how isotopes differ from one another and be able to designate them by various methods.
Lesson Frame:	We will: define average atomic mass.
	I will: calculate the average atomic mass of an element.
Performance Tasks: Isotopes	Notes:

Unit Name: **Chemical Nomenclature**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: What do we call chemicals?	**Learning Targets:** Distinguish between inorganic and organic chemistry. Interpret a molecular formula. Explain why an ionic compound is represented by an empirical formula. Be able to determine the charges of monatomic ions formed by the representative elements from the position of each element on the periodic table. Use the Stock system to identify the charge of transition metal ions. Name an ionic compound given its formula. Write the correct formula for an ionic compound given its name. Describe the difference between an ionic compound and a molecular compound. Name a molecular compound given its formula. Write the correct formula for a molecular compound given its name. Define acids and bases in terms of the ions that are produced when each type of compound is dissolved in water. Be able to name acids when given their chemical formulas. Write the correct formula for an acid when given its name. Name and write formulas for bases.
Topic 1: **Ionic Compounds**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** binary ionic compound, empirical formula, inorganic chemistry, molecular formula, monatomic ion, organic chemistry, polyatomic ion, ternary ionic compound
Lesson Frame:	We will: compare inorganic and organic chemistry.
	I will: distinguish between inorganic and organic chemistry.
Lesson Frame:	We will: write molecular formulas.
	I will: interpret a molecular formula.
Lesson Frame:	We will: create a narrative on ionic compounds and empirical formula.
	I will: explain why an ionic compound is represented by an empirical formula.
Lesson Frame:	We will: calculate charges of ions.
	I will: determine the charges of monatomic ions formed by the representative elements from the position of each element on the periodic table.

Lesson Frame:	We will: use the Stock system to identify the charge of transition metal ions.
	I will: define the Stock system
Lesson Frame:	We will: write the correct formula for an ionic compound given its name.
	I will: name an ionic compound given its formula.
Performance Tasks: Ionic compounding	Notes:
Topic 2: **Molecular Compounds**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** binary ionic compound, empirical formula, inorganic chemistry, molecular formula, monatomic ion, organic chemistry, polyatomic ion, ternary ionic compound
Lesson Frame:	We will: Compare ionic and molecular compounds.
	I will: Describe the difference between an ionic compound and a molecular compound.
Lesson Frame:	We will: Name a molecular compound given its formula.
	I will: Write the correct formula for a molecular compound given its name.
Performance Tasks: Covalent compounding	Notes:
Topic 3: Acids and Bases	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** acid, base, binary acid, oxoacid
Lesson Frame:	We will: compare acids and bases.
	I will: define acids and bases in terms of the ions that are produced when each type of compound is dissolved in water.
Lesson Frame:	We will: describe naming conventions for acids and bases.
	I will: name acids when given their chemical formulas.
Lesson Frame:	We will: describe naming conventions for acids and bases.
	I will: write the correct formula for an acid when given its name.
Lesson Frame:	We will: describe naming conventions for acids and bases.
	I will: name and write formulas for bases.
Performance Tasks: Acids and bases compounding	Notes:

Unit Name: **Chemical Reactions**	**Length:** 2 Weeks
Standards: SCI.PS1.B	**Outcomes:** Chemical processes are understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.
Essential Questions: How does conservation of mass manifest itself?	**Learning Targets:** Describe chemical reactions using word equations. Know the correct symbols to use in order to write skeleton equations for chemical reactions. Use coefficients to balance chemical equations so that the law of conservation of mass is followed. Define and give general equations for combination, decomposition, single-replacement, and double-replacement reactions. Classify a reaction as combination, decomposition, single-replacement, double-replacement, or combustion. Use the activity series to correctly predict whether a given reaction will occur. Predict the products of simple reactions, given only the reactants.
Topic 1: **Chemical Equations**	**Length:** 3 days
Standards: SCI.PS1.B	**Academic Vocabulary:** balanced equation, chemical equation, coefficient, skeleton equation, activity series, combination reaction, combustion reaction, decomposition reaction, double-replacement reaction, single-replacement reaction
Lesson Frame:	We will: analyze chemical equations.
	I will: describe chemical reactions using word equations.
Lesson Frame:	We will: write correct symbols for chemical reactions.
	I will: list the correct symbols to use in order to write skeleton equations for chemical reactions.
Lesson Frame:	We will: write balanced chemical equations.
	I will: use coefficients to balance chemical equations so that the law of conservation of mass is followed.
Performance Tasks: Balancing equations	Notes:
Topic 2: **Types of Chemical Reactions**	**Length:** 3 days
Standards: SCI.PS1.B	**Academic Vocabulary:** activity series, combination reaction, combustion reaction, decomposition reaction, double-replacement reaction, single-replacement reaction
Lesson Frame:	We will: compare and contrast different types of chemical equations.

	I will: define and give general equations for combination, decomposition, single-replacement, and double-replacement reactions.
Lesson Frame:	We will: write different types of chemical reactions.
	I will: classify a reaction as combination, decomposition, single-replacement, double-replacement, or combustion.
Lesson Frame:	We will: predict the products of simple reactions, given only the reactants.
	I will: use the activity series to correctly predict whether a given reaction will occur.
Performance Tasks: Identification equations	Notes:

Course Name:	Chemistry		
Credits:	1		
Prerequisites:	Biology I & Algebra (C or better is recommended)		
Description:	A laboratory-oriented course designed to study the working of chemical reactions meant for students intending to attend a college or university. Labs are practical in nature and focus on applying concepts learned in class. An understanding of Algebra is essential to understand chemistry. Units covered include data analysis, matter, atomic structure, periodic table, compounds and chemical bonds, chemical reactions & equations, mole concept and stoichiometry, solution chemistry, and acids & bases.		
Academic Standards:	Next Generation Science Standards		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Introduction to Chemistry	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Matter and Change	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Measurements	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Chemical Reactions	2 Weeks	SCI.PS1.B	Chemical processes are understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.

The Mole	2 Weeks	SCI.PS1.B	Chemical processes are understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.
Stoichiometry	4 Weeks	SCI.PS1.B	Chemical processes are understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.
Atomic Structure	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Electrons in Atoms	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
The periodic Table	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Chemical Nomenclature	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.

Ionic and Metallic Bonding	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Covalent Bonding	4 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
States of Matter	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Behavior of Gases	2 Weeks	SCI.PS1.A	The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.

Unit Name: **Introduction to Chemistry**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: How would you approach a problem in the realm of pure vs. applied chemistry? In what ways can you distinguish the difference between each of the 5 disciplines of chemistyry? How does the scientific method help you solve a problem?	**Learning Targets:** Define chemistry. Differentiate between the macroscopic and the microscopic as it relates to chemistry. Know the relationship between pure chemistry and applied chemistry. Identify and describe the five primary disciplines of chemistry. Describe some of the concerns of the modern world in which chemistry has played and will continue to play a role. Differentiate between the independent variable and the dependent variable in an experiment.
Topic 1: **What is Chemistry?**	**Length:** 1 day
Standards: SCI.PS1.A	**Academic Vocabulary:** analytical chemistry, applied chemistry, biochemistry, chemistry, inorganic chemistry, macroscopic, matter, microscopic, organic chemistry, physical chemistry, pure chemistry, control group, dependent variable, hypothesis, independent variable, scientific law, scientific method, theory
Lesson Frame:	We will: compare and contrast macroscopic and microscopic matter.
	I will: differentiate between the macroscopic and the microscopic as it relates to chemistry.
Lesson Frame:	We will: compare and contrast pure and applied chemistry.
	I will: describe the relationship between pure chemistry and applied chemistry.
Lesson Frame:	We will: compare and contrast five disciplines of chemistry.
	I will: identify and describe the five primary disciplines of chemistry.
Lesson Frame:	We will: create a narrative of applications of chemistry.
	I will: describe some of the concerns of the modern world in which chemistry has played and will continue to play a role.
Performance Tasks: Chemistry for all types	Notes:

Topic 2: **The Scientific Method**	**Length:**1 day
Standards: SCI.PS1.A	**Academic Vocabulary:** control group, dependent variable, hypothesis, independent variable, scientific law, scientific method theory
Lesson Frame:	We will: apply the scientific method.
	I will: identify the steps of the scientific method.
Lesson Frame:	We will: compare and contrast variables.
	I will: differentiate between the independent variable and the dependent variable in an experiment.
Lesson Frame:	We will: analyze the research process.
	I will: describe how scientists work in research groups and communicate their results.
Performance Tasks: Name your graph	Notes:

Unit Name: **Covalent Bonding**	**Length:** 4 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: How can electrons define the shape and properties of a molecule?	**Learning Targets:** Describe how a covalent bond forms, including the energy change involved in the process. Use the octet rule to draw Lewis electron dot structures for simple molecules. Know how and when to incorporate double and triple bonds into the structures. Understand how a coordinate covalent bond differs from other covalent bonds. Be able to draw Lewis structures for polyatomic ions. Understand the concept of resonance. Know some common exceptions to the octet rule. Relate bond energy to the stability and reactivity of molecules. Explain the basis of VSEPR theory. Predict the shapes of molecules and polyatomic ions using VSEPR theory. Account for variations in bond angles based on the relative repulsive forces exerted by lone pairs and bonding pairs of electrons. Describe the relationship between molecular geometry and electron domain geometry. Describe how the electronegativity difference between two atoms in a covalent bond results in the formation of a nonpolar covalent, polar covalent, or ionic bond. Describe how molecular geometry plays a role in determining whether a molecule is polar or nonpolar. Distinguish between the following three types of intermolecular forces: dipole-dipole forces, London dispersion forces, and hydrogen bonds. Describe how chemical bonding and intermolecular forces influence the properties of various compounds. Describe valence bond theory as it pertains to the formation of a covalent bond between atoms. Describe the process of electron promotion and hybridization during the formation of hybrid orbitals. Explain the relationship between electron domain geometry and the various types of hybrid orbitals. Distinguish between sigma and pi bonding.
Topic 1: **Lewis Electron Dot Structures**	**Length:** 3 days

Standards: SCI.PS1.A	**Academic Vocabulary:** bond energy, coordinate covalent bond, covalent bond, diatomic molecule, double covalent bond, Lewis electron dot structures, lone pair, resonance, single covalent bond, structural formula, triple covalent bond
Lesson Frame:	We will: analyze covalent bonds.
	I will: describe how a covalent bond forms, including the energy change involved in the process.
Lesson Frame:	We will: analyze when to use double and triple bonds.
	I will: use the octet rule to draw Lewis electron dot structures for simple molecules. I will: describe how and when to incorporate double and triple bonds into the structures.
Lesson Frame:	We will:compare covalent bonds with coordinate bonds.
	I will: describe how a coordinate covalent bond differs from other covalent bonds.
Lesson Frame:	We will: draw lewis structures.
	I will: draw Lewis structures for polyatomic ions.
Lesson Frame:	We will: write resonance structures.
	I will: explain the concept of resonance.
Lesson Frame:	We will: draw common exceptions to the octet rule.
	I will: Name some common exceptions to the octet rule.
Lesson Frame:	We will: compare bond energy to stability.
	I will: relate bond energy to the stability and reactivity of molecules.
Performance Tasks: Dot your chemicals	Notes:
Topic 2: Molecular Geometry	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** electron domain geometry, molecular geometry, valence shell, valence shell electron pair repulsion (VSEPR)
Lesson Frame:	We will: compare VSEPR to MOT.
	I will: explain the basis of VSEPR theory.
Lesson Frame:	We will: compare molecules and polyatomic ions with VSEPR theory.
	I will: predict the shapes of molecules and polyatomic ions using VSEPR theory.
Lesson Frame:	We will: compare bond angles between lone pairs versus bonding pairs.
	I will: account for variations in bond angles based on the relative repulsive forces exerted by lone pairs and bonding pairs of electrons.

Lesson Frame:	We will: compare molecular geometry and electron domain.
	I will: describe the relationship between molecular geometry and electron domain geometry.
Performance Tasks: Molecular Geometry Phet	Notes:
Topic 3: **Polarity and Intermolecular Forces**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** diatomic element, dipole, dipole-dipole forces, hydrogen bond, intermolecular forces, London dispersion forces, nonpolar covalent bond, polar covalent bond, polar molecule, van der Waals forces
Lesson Frame:	We will: compare nonpolar, polar, and ionic bonds.
	I will: describe how the electronegativity difference between two atoms in a covalent bond results in the formation of a nonpolar covalent, polar covalent, or ionic bond.
Lesson Frame:	We will: relate molecular polarity and molecular geometry.
	I will: describe how molecular geometry plays a role in determining whether a molecule is polar or nonpolar.
Lesson Frame:	We will: compare intermolecular forces.
	I will: distinguish between the following three types of intermolecular forces: dipole-dipole forces, London dispersion forces, and hydrogen bonds.
Lesson Frame:	We will: compare chemical bonds and intermolecular forces.
	I will: describe how chemical bonding and intermolecular forces influence the properties of various compounds.
Performance Tasks: Molecular Polarity Phet	Notes:
Topic 4: **Hybridization of Atomic Orbitals**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** hybridization, hybrid orbitals, pi bond (π), sigma bond (σ), valence bond theory
Lesson Frame:	We will: compare valence bond theory and covalent bonding.
	I will: describe valence bond theory as it pertains to the formation of a covalent bond between atoms.
Lesson Frame:	We will: draw hybridization.
	I will: describe the process of electron promotion and hybridization during the formation of hybrid orbitals.
Lesson Frame:	We will: compare electron domain geometry and hybridized orbitals.

	I will: explain the relationship between electron domain geometry and the various types of hybrid orbitals.
Lesson Frame:	We will: draw sigma and pi bonding.
	I will: distinguish between sigma and pi bonding.
Performance Tasks: Hybridizing s,p, and d	Notes:

Unit Name: **Electrons in Atoms**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: How does quantum level reflect the atom?	**Learning Targets:** Describe the relationships between speed, wavelength, and frequency of light. Understand the photoelectric effect and how it is related to the wave-particle duality of light. Describe how changes in electron energies lead to atomic emission spectra. Describe the Bohr model of the atom. Understand the de Broglie wave equation and how it illustrates the wave nature of the electron. Explain the difference between quantum mechanics and classical mechanics. Understand how the Heisenberg uncertainty principle and Schrödinger's wave equation led to the idea of atomic orbitals. Know the four quantum numbers and how they are related to the arrangement of electrons in an atom. Describe the interrelationships between principal energy level, sublevel, orbital and electron spin and how they relate to the number of electrons of an atom. Understand how to apply the Aufbau principle, the Pauli exclusion principle, and Hund's rule to determine ground state electron configurations. Be able to write correct orbital filling diagrams and electron configurations for all elements. Know how to use the noble gas notation shorthand method. Be able to determine the number of valence electrons and the number of unpaired electrons in any atom. Understand that some electron configurations are exceptions to the normal Aufbau process.
Topic 1: **Light**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** atomic emission spectrum, electromagnetic radiation, electromagnetic spectrum, excited state, frequency, ground state, photoelectric effect, photon, quantum, wavelength
Lesson Frame:	We will: differentiate between speed, wavelength, and frequency.
	I will: describe the relationships between speed, wavelength, and frequency of light.

Lesson Frame:	We will: calculate photoelectric effect.
	I will: describe the photoelectric effect and how it is related to the wave-particle duality of light.
Lesson Frame:	We will: calculate electron energies.
	I will: describe how changes in electron energies lead to atomic emission spectra.
Lesson Frame:	We will: compare the Bohr model to other atomic models.
	I will: describe the Bohr model of the atom.
Performance Tasks: Phet Photoelectric Effect	Notes:
Topic 2: **The Quantum Mechanical Model**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** angular momentum quantum number, Heisenberg uncertainty principle, magnetic quantum number, orbital, principal quantum number, quantum mechanical model, quantum mechanics, quantum numbers
Lesson Frame:	We will: compare the de Broglie model to the Bohr model.
	I will: state the de Broglie wave equation and how it illustrates the wave nature of the electron.
Lesson Frame:	We will: compare and contrast quantum mechanics and classical mechanics.
	I will: explain the difference between quantum mechanics and classical mechanics.
Lesson Frame:	We will: create a narrative of the interactions between heisenberg and schrodinger.
	I will: describe how the Heisenberg uncertainty principle and Schrödinger's wave equation led to the idea of atomic orbitals.
Lesson Frame:	We will: calculate the four quantum numbers.
	I will: state the four quantum numbers and how they are related to the arrangement of electrons in an atom.
Lesson Frame:	We will: compare and contrast energy levels and electron numbers.
	I will: describe the interrelationships between principal energy level, sublevel, orbital and electron spin and how they relate to the number of electrons of an atom.
Performance Tasks: Quantum Story	Notes:
Topic 3: **Electron Arrangement in Atoms**	**Length:** 3 days

Standards: SCI.PS1.A	**Academic Vocabulary:** spin quantum number, Aufbau principle, electron configuration, Hund's rule, noble gas notation, Pauli exclusion principle, valence electron
Lesson Frame:	We will: create an accurate orbital filling diagram.
	I will: write correct orbital filling diagrams and electron configurations for all elements.
Lesson Frame:	We will: correctly write noble gas shorthand.
	I will: use the noble gas notation shorthand method.
Lesson Frame:	We will: determine the number of valence electrons and the number of unpaired electrons in any atom.
	I will: describe electron configurations that are exceptions to the normal Aufbau process.
Performance Tasks: Orbital diagrams	Notes:

Unit Name: **Ionic and Metallic Bonding**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: How can we determine ionic and metallic compounds?	**Learning Targets:** Be able to determine the number of valence electrons for any element and draw an electron dot diagram for any atom. Use the octet rule to predict the charges of the most common ions formed by the representative elements. Write electron configurations for ions. Identify other atoms or ions that are isoelectronic with a particular ion. Know that transition metal ions with either half-filled or completely filled d sublevels are particularly stable. Explain how an ionic bond is formed when electrons are transferred from one atom to another in terms of the resulting electrostatic attraction. Draw diagrams showing this process. Describe the structural arrangements of ions in a crystal, including coordination number and its relationship to a given compound's formula unit. Explain how various physical properties result from the ionic crystal lattice, such as strength, hardness, high melting points, brittleness, and electrical conductivity. Describe the electron-sea model of metallic bonding. Explain how metallic bonding is responsible for the conductivity and luster of metals. Explain why metals are malleable and ductile, while crystalline ionic compounds are not. Describe how metal atoms are arranged, including the three most common packing systems. Identify some common alloys and explain their importance.
Topic 1: **Ions**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** electron dot diagram, isoelectronic, octet rule
Lesson Frame:	We will: compare valence electrons and electron dot diagrams.
	I will: determine the number of valence electrons for any element and draw an electron dot diagram for any atom.
Lesson Frame:	We will: apply the octet rule to common ions.

	I will: use the octet rule to predict the charges of the most common ions formed by the representative elements.
Lesson Frame:	We will: ally electron configurations to ions.
	I will: write electron configurations for ions.
Lesson Frame:	We will: compare isoelectronic atoms
	I will: identify other atoms or ions that are isoelectronic with a particular ion.
Lesson Frame:	We will: relate half filled d-sublevels to stability.
	I will: describe how transition metal ions with either half-filled or completely filled d-sublevels are particularly stable.
Performance Tasks: Flame test	Notes:
Topic 2: **Ionic Bonds and Ionic Compounds**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** coordination number, formula unit, ionic bond, ionic compound
Lesson Frame:	We will: draw diagrams showing ionic bonding.
	I will: explain how an ionic bond is formed when electrons are transferred from one atom to another in terms of the resulting electrostatic attraction.
Lesson Frame:	We will: draw coordination numbers.
	I will: describe the structural arrangements of ions in a crystal, including coordination number and its relationship to a given compound's formula unit.
Lesson Frame:	We will: relate different physical properties in an ionic lattice.
	I will: explain how various physical properties result from the ionic crystal lattice, such as strength, hardness, high melting points, brittleness, and electrical conductivity.
Performance Tasks: Ion classification	Notes:
Topic 3: **Metallic Bonds**	**Length**: 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** alloy, closest packing, metallic bond
Lesson Frame:	We will: create a narrative of the electron-sea.
	I will: describe the electron-sea model of metallic bonding.
Lesson Frame:	We will: compare metallic bonding and luster.
	I will: explain how metallic bonding is responsible for the conductivity and luster of metals.

Lesson Frame:	We will: compare metals and ionic compounds.
	I will: explain why metals are malleable and ductile, while crystalline ionic compounds are not.
Lesson Frame:	We will: compare packing structures.
	I will: describe how metal atoms are arranged, including the three most common packing systems.
Lesson Frame:	We will: compare and contrast alloys.
	I will: identify some common alloys and explain their importance.
Performance Tasks: Golden penny	Notes:

Unit Name: **Matter and Change**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: What is the best way to separate mixtures?	**Learning Targets:** Describe a substance according to its physical properties. Distinguish between extensive and intensive properties. Describe the three states of matter. Identify physical changes to matter. Define a mixture and understand why mixtures are different than pure substances. Classify mixtures as homogeneous or heterogeneous. Describe several ways to separate mixtures. Distinguish between elements and compounds. Identify the chemical properties of a substance. Describe chemical changes and differentiate them from physical changes. Use various visual clues to identify whether a chemical reaction is taking place.
Topic 1: **Properties of Matter**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** extensive property, gas, intensive property, liquid, mass, physical change, physical property, pure substance, solid, vapor, volume
Lesson Frame:	We will: analyze physical properties of matter.
	I will: describe a substance according to its physical properties.
Lesson Frame:	We will: compare and contrast extensive and intensive properties.
	I will: distinguish between extensive and intensive properties.
Lesson Frame:	We will: compare and contrast the three states of matter.
	I will: describe the three states of matter.
Lesson Frame:	We will: analyze physical changes.
	I will: identify physical changes to matter.
Performance Tasks: From within or without	Notes:
Topic 2: **Classification of Matter**	Length: 3 days

Standards: SCI.PS1.A	**Academic Vocabulary:** chemical change, chemical formula, chemical symbol, compound, distillation, element, filtration, heterogeneous mixture, homogeneous mixture, mixture, phase
Lesson Frame:	We will: compare and contrast mixtures and pure substances.
	I will: define a mixture and understand why mixtures are different than pure substances.
Lesson Frame:	We will: compare and contrast homogeneous or heterogeneous mixtures.
	I will: classify mixtures as homogeneous or heterogeneous.
Lesson Frame:	We will: apply separation methods.
	I will: describe several ways to separate mixtures.
Lesson Frame:	We will: compare and contrast elements and compounds.
	I will: distinguish between elements and compounds.
Performance Tasks: What's the matter?	Notes:

Topic 3: **Changes in Matter**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** chemical property, chemical reaction, precipitate, product, reactant
Lesson Frame:	We will: analyze chemical properties of a substance.
	I will: identify the chemical properties of a substance.
Lesson Frame:	We will: compare and contrast physical and chemical changes.
	I will: describe chemical changes and differentiate them from physical changes.
Lesson Frame:	We will: identify physical and chemical changes.
	I will: use various visual clues to identify whether a chemical reaction is taking place.
Performance Tasks: Separation of mixtures lab	Notes:

Unit Name: **Measurements**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: Why hasn't the US switched to the metric system?	**Learning Targets:** Identify the seven base units of the International System of Units. Know the commonly used metric prefixes. Convert between the Celsius and Kelvin temperature scales. Understand volume and energy as combinations of SI Units. Distinguish between mass and weight. Identify and use conversion factors. Use the method of dimensional analysis to convert between units. Understand density as a physical property of matter. Perform calculations with derived units, including density. Distinguish between accuracy and precision in measurements. Calculate the percent error of a measured quantity. Report measured values to the correct number of significant figures based on the measuring tool. Perform calculations with measured quantities, rounding the answers to the correct number of significant figures.
Topic 1: **International System of Units**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** energy, International System of Units (SI), joule, kinetic energy, liter, measurement, scientific notation, temperature, weight
Lesson Frame:	We will: compare and contrast SI units and imperial units.
	I will: identify the seven base units of the International System of Units.
Lesson Frame:	We will: analyze metric prefixes
	I will: list the commonly used metric prefixes.
Lesson Frame:	We will: perform temperature calculations.
	I will: convert between the Celsius and Kelvin temperature scales.
Lesson Frame:	We will: convert between imperial and SI units of energy and volume.
	I will: describe volume and energy as combinations of SI Units.
Lesson Frame:	We will: compare and contrast mass and weight.
	I will: distinguish between mass and weight.

Performance Tasks: Big K	Notes:
Topic 2: **Unit Conversions**	**Length**: 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** conversion factor, density, derived unit, dimensional analysis
Lesson Frame:	We will: calculate with conversion factors.
	I will: identify and use conversion factors.
Lesson Frame:	We will: use dimensional analysis.
	I will: use the method of dimensional analysis to convert between units.
Lesson Frame:	We will: apply density as a property of matter.
	I will: Explain density as a physical property of matter.
Lesson Frame:	We will: calculate with density.
	I will: perform calculations with derived units, including density.
Performance Tasks: POGIL Conversion	Notes:
Topic 3: **Uncertainty in Measurements**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** accepted value, accuracy, error, experimental value, percent error, precision, significant figures
Lesson Frame:	We will: compare and contrast accuracy and precision.
	I will: distinguish between accuracy and precision in measurements.
Lesson Frame:	We will: analyze calculations of percent error.
	I will: calculate the percent error of a measured quantity.
Lesson Frame:	We will: perform accurate and precise measurements.
	I will: report measured values to the correct number of significant figures based on the measuring tool.
Lesson Frame:	We will: analyze calculations of measured quantities.
	I will: perform calculations with measured quantities, rounding the answers to the correct number of significant figures.
Performance Tasks: Precision vs. Accuracy	Notes:

Unit Name: **States of Matter**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule
Essential Questions: How does KMT affect our understanding of matter?	**Learning Targets:** State the main points of the kinetic molecular theory, and describe how it relates to the properties of an ideal gas. Define pressure and describe how gases exert pressure. Understand the barometer and how it measures atmospheric pressure. Convert between units of gas pressure. Relate temperature to average kinetic energy. Describe a liquid according to the kinetic-molecular theory. Describe how a liquid exhibits surface tension. Describe the evaporation of a liquid and its relationship to the kinetic energy of the evaporating particles. Define vapor pressure and understand its relationship to intermolecular forces and to the temperature of the liquid. Describe the process of boiling and differentiate between boiling point and normal boiling point. Use a vapor pressure curve to determine boiling points at different atmospheric pressures. Describe a solid according to the kinetic-molecular theory. Understand that a solid also has a vapor pressure, and describe the relationship between the vapor pressure of a solid and sublimation. Describe the features of the seven basic crystal systems. Define a unit cell. List the four classes of crystalline solids and describe the properties of each. Describe an amorphous solid Interpret heating and cooling curves. Know the terms for the six different changes of state. Describe the general features of a phase diagram, including the triple point and the critical point.
Topic 1: **Kinetic Molecular Theory and Gases**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** absolute zero, atmospheric pressure, barometer, gas pressure, ideal gas, kinetic-molecular theory, pascal, pressure
Lesson Frame:	We will: compare KMT with VSEPR.

	I will: state the main points of the kinetic molecular theory, and describe how it relates to the properties of an ideal gas.
Lesson Frame:	We will: draw gases with pressure.
	I will: define pressure and describe how gases exert pressure.
Lesson Frame:	We will: draw a barometer with arrow showing how they work.
	I will: describe a barometer and how it measures atmospheric pressure. I will: convert between units of gas pressure.
Lesson Frame:	We will: compare temperature and kinetic energy.
	I will: relate temperature to average kinetic energy.
Performance Tasks: Changing to KMT	Notes:
Topic 2: **Liquids**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** boiling point, condensation, evaporation, fluid, normal boiling point, surface tension, vapor pressure, vaporization
Lesson Frame:	We will: draw a liquid according to KMT.
	I will: describe a liquid according to the kinetic-molecular theory.
Lesson Frame:	We will: draw a liquid with surface tension.
	I will: describe how a liquid exhibits surface tension.
Lesson Frame:	We will: draw a liquid with evaporating particles.
	I will: describe the evaporation of a liquid and its relationship to the kinetic energy of the evaporating particles.
Lesson Frame:	We will: compare vapor pressure with intermolecular forces.
	I will: define vapor pressure and understand its relationship to intermolecular forces and to the temperature of the liquid.
Lesson Frame:	We will: draw a liquid boiling versus a liquid evaporating.
	I will: describe the process of boiling and differentiate between boiling point and normal boiling point.
Lesson Frame:	We will: create a diagram showing atmospheric pressure and boiling point.
	I will: use a vapor pressure curve to determine boiling points at different atmospheric pressures.
Performance Tasks: Transitioning with liquids	Notes:
Topic 3: **Solids**	**Length:** 3 days

Standards: SCI.PS1.A	**Academic Vocabulary:** amorphous solid, crystal, deposition, melting point, sublimation, unit cell
Lesson Frame:	We will: draw a solid according to KMT.
	I will: describe a solid according to the kinetic-molecular theory.
Lesson Frame:	We will: compare solid vapor pressure with a liquid vapor pressure.
	I will:Show how a solid also has a vapor pressure, and describe the relationship between the vapor pressure of a solid and sublimation.
Lesson Frame:	We will: compare the seven basic crystal structures.
	I will: describe the features of the seven basic crystal systems.
Lesson Frame:	We will: draw a unit cell.
	I will: define a unit cell.
Lesson Frame:	We will: compare the four classes of solids.
	I will: list the four classes of crystalline solids and describe the properties of each.
Lesson Frame:	We will: compare an amorphous solid and a crystalline solid.
	I will: describe an amorphous solid.
Performance Tasks: Solidifying	Notes:

Topic 4: **Changes of State**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** critical pressure, critical temperature, phase diagram, triple point
Lesson Frame:	We will: compare heating and cooling curves.
	I will: interpret heating and cooling curves.
Lesson Frame:	We will: draw the six different changes of state.
	I will: list the terms for the six different changes of state.
Lesson Frame:	We will: recreate a phase diagram.
	I will: describe the general features of a phase diagram, including the triple point and the critical point.
Performance Tasks: Phet phases	Notes:

Unit Name: **Stoichiometry**	**Length:** 4 Weeks
Standards: SCI.PS1.B	**Outcomes:** Chemical processes are understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.
Essential Questions: Which reactant is limiting and how much is left over?	**Learning Targets:** Relate balanced chemical equations to everyday analogies, such as a recipe. Define stoichiometry. Use mole ratios to convert between amounts of substances in a chemical reaction. Calculate the amount in moles of a reactant or product from the mass of another reactant or product. Calculate the mass of a reactant or product from the moles of another reactant or product. Calculate the mass of a reactant or product from the mass of another reactant or product. Create volume ratios from a balanced chemical equation. Use volume ratios and other stoichiometric principles to solve problems involving mass, molar amounts, or volumes of gases. Analyze a chemical reaction in order to determine which reactant is the limiting reactant and which is the excess reactant. Calculate the amount of excess reactant remaining after a reaction is complete. Calculate the theoretical yield of a reaction when the available amounts of each reactant are known. Calculate the percent yield of a reaction based on the theoretical and actual yields.
Topic 1: **Mole Ratios**	**Length:** 3 days
Standards: SCI.PS1.B	**Academic Vocabulary:** mole ratio, stoichiometry
Lesson Frame:	We will: analyze chemical equations with cars.
	I will: relate balanced chemical equations to everyday analogies, such as a recipe.
Lesson Frame:	We will: use mole ratios to convert between amounts of substances in a chemical reaction.
	I will: define stoichiometry.
Performance Tasks: Mole Ratios POGIL	Notes:
Topic 2: **Stoichiometric Calculations**	**Length:** 3 days

Standards: SCI.PS1.B	**Academic Vocabulary:** stoichiometry
Lesson Frame:	We will: perform stoichiometric calculations.
	I will: calculate the amount in moles of a reactant or product from the mass of another reactant or product. I will: calculate the mass of a reactant or product from the moles of another reactant or product.
Lesson Frame:	We will: perform stoichiometric calculations.
	I will: calculate the mass of a reactant or product from the mass of another reactant or product.
Lesson Frame:	We will: create volume ratios from a balanced chemical equation.
	I will: use volume ratios and other stoichiometric principles to solve problems involving mass, molar amounts, or volumes of gases.
Performance Tasks: Stoichiometric calculations	Notes:
Topic 3: **Limiting Reactant and Percent Yield**	**Length:** 3 days
Standards: SCI.PS1.B	**Academic Vocabulary:** actual yield, excess reactant (reagent), limiting reactant (reagent), percent yield, theoretical yield
Lesson Frame:	We will: analyze a chemical reaction in order to determine which reactant is the limiting reactant and which is the excess reactant.
	I will: define stoichiometry.
Lesson Frame:	We will: define excess reactant and limiting reactant.
	I will: calculate the amount of excess reactant remaining after a reaction is complete.
Lesson Frame:	We will: calculate the theoretical yield of a reaction when the available amounts of each reactant are known.
	I will: calculate the percent yield of a reaction based on the theoretical and actual yields.
Performance Tasks: Limiting reactant	Notes:

Unit Name: **The Behavior of Gases**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: How do gases stay together and fall apart?	**Learning Targets:** Describe how a gas can be compressed. Identify three factors that affect gas pressure. Describe the effects according to the kinetic-molecular theory. Use Boyle's law to calculate pressure-volume changes at constant temperature. Use Charles's law to calculate volume-temperature changes at constant pressure. Use Gay-Lussac's law to calculate pressure-temperature changes at constant volume. Use the combined gas law to solve problems in which pressure, volume, and temperature all change. Use Avogadro's law to calculate volume-number of moles changes at constant temperature and pressure. Know the ideal gas law, and know which of the different values for the ideal gas constant to use in a given situation. Use the ideal gas law to calculate the pressure, volume, temperature, or number of moles of an ideal gas when the other three quantities are known. Use the ideal gas law to calculate the molar mass or the density of a gas. Use the ideal gas law in stoichiometry problems involving gases that are not at STP. Explain the conditions under which real gases are most ideal or least ideal. Use Dalton's law and mole fraction to calculate the partial pressure of a gas in a mixture. Calculate the pressure of a gas that has been collected by water displacement in order to determine the volume of the dry gas. Define diffusion and effusion. Use Graham's law to calculate the velocity ratios of two gases based on their molar masses.
Topic 1: **Gas Properties**	**Length:** 3 days

Standards: SCI.PS1.A	**Academic Vocabulary:** compressibility
Lesson Frame:	We will: draw a gas being compressed.
	I will: describe how a gas can be compressed.
Lesson Frame:	We will: draw a gas with factors of gas pressure.
	I will: identify three factors that affect gas pressure. I will: describe the effects according to the kinetic-molecular theory.
Performance Tasks: Gas diagrams	Notes:
Topic 2: **Gas Laws**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** Avogadro's law, Boyle's law, Charles's law, Combined gas law, Gay-Lussac's law
Lesson Frame:	We will: perform calculations with gases.
	I will: use Boyle's law to calculate pressure-volume changes at constant temperature.
Lesson Frame:	We will: perform calculations with gases.
	I will: use Charles's law to calculate volume-temperature changes at constant pressure.
Lesson Frame:	We will: perform calculations with gases.
	I will: use Gay-Lussac's law to calculate pressure-temperature changes at constant volume.
Lesson Frame:	We will: perform calculations with gases.
	I will: use the combined gas law to solve problems in which pressure, volume, and temperature all change.
Lesson Frame:	We will: perform calculations with gases.
	I will: use Avogadro's law to calculate volume-number of moles changes at constant temperature and pressure.
Performance Tasks: Gas narratives	Notes:
Topic 3: **Ideal Gases**	**Length:** 3 days

Standards: SCI.PS1.A	**Academic Vocabulary:** ideal gas constant, ideal gas law, real gas
Lesson Frame:	We will: use the ideal gas law to calculate the pressure, volume, temperature, or number of moles of an ideal gas when the other three quantities are known.
	I will: state the ideal gas law, and know which of the different values for the ideal gas constant to use in a given situation.
Lesson Frame:	We will: perform calculations with gases
	I will: use the ideal gas law to calculate the molar mass or the density of a gas.
Lesson Frame:	We will: perform calculations with gases
	I will: use the ideal gas law in stoichiometry problems involving gases that are not at STP.
Lesson Frame:	We will: compare real and ideal gases.
	I will: explain the conditions under which real gases are most ideal or least ideal.
Performance Tasks: Gas calculations	Notes:
Topic 4: **Gas Mixtures and Molecular Speeds**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** Dalton's law of partial pressures, diffusion, effusion, mole fraction, partial pressure
Lesson Frame:	We will: calculate partial pressures.
	I will: use Dalton's law and mole fraction to calculate the partial pressure of a gas in a mixture.
Lesson Frame:	We will: perform calculations with gases.
	I will: calculate the pressure of a gas that has been collected by water displacement in order to determine the volume of the dry gas.
Lesson Frame:	We will: compare diffusion and effusion.
	I will: define diffusion and effusion.
Lesson Frame:	We will: compare gases using Graham's law.
	I will: use Graham's law to calculate the velocity ratios of two gases based on their molar masses.
Performance Tasks: Phet Gases	Notes:

Unit Name: **The Mole**	**Length:** 2 Weeks
Standards: SCI.PS1.B	**Outcomes:** Chemical processes are understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.
Essential Questions: Why convert between moles and mass?	Learning Targets: Identify three methods for measuring the amount of matter in a sample. Define the mole and its relationship to Avogadro's number. Use Avogadro's number to convert between moles and the number of representative particles of a substance. Relate the atomic mass of an element to its molar mass. Calculate the molar mass of a given compound. Use molar mass to make conversions between mass and moles of a substance. Explain Avogadro's hypothesis and how it relates to the volume of a gas at standard temperature and pressure. Convert between moles and volume of a gas at STP. Calculate the density of gases at STP. Use the mole road map to make two-step conversions between mass, number of particles, and gas volume. Calculate the percent composition of a compound either from mass data or from the chemical formula. Use percent composition to calculate the mass of an element in a certain sample of a compound. Calculate the percentage of a hydrate mass that is due to water. Determine the empirical formula of a compound from percent composition data. Determine the molecular formula of a compound from the empirical formula and the molar mass.
Topic 1: **The Mole Concept**	**Length:** 3 days
Standards: SCI.PS1.B	**Academic Vocabulary:** Avogadro's number, formula mass, molar mass, mole, representative particle
Lesson Frame:	We will: utilyze three methods to measure matter.
	I will: identify three methods for measuring the amount of matter in a sample.
Lesson Frame:	We will: use Avogadro's number to convert between moles and the number of representative particles of a substance.
	I will: define the mole and its relationship to Avogadro's number.
Lesson Frame:	We will: calculate the molar mass of a given compound.
	I will: relate the atomic mass of an element to its molar mass.
Performance Tasks: Mole conversions	Notes:

Topic 2: **Mass, Volume, and the Mole**	**Length:** 3 days
Standards: SCI.PS1.B	**Academic Vocabulary:** Avogadro's hypothesis, molar volume, standard temperature and pressure (STP)
Lesson Frame:	We will: calculate mole conversions.
	I will: use molar mass to make conversions between mass and moles of a substance.
Lesson Frame:	We will: use Avogadro's hypothesis at standard temperature and pressure.
	I will: explain Avogadro's hypothesis and how it relates to the volume of a gas at standard temperature and pressure.
Lesson Frame:	We will: calculate the density of gases at STP.
	I will: convert between moles and volume of a gas at STP.
Lesson Frame:	We will: calculate two-step mole conversions.
	I will: use the mole road map to make two-step conversions between mass, number of particles, and gas volume.
Performance Tasks: 2 step Mole Conversions.	Notes:

Topic 3: **Chemical Formulas**	**Length:** 3 days
Standards: SCI.PS1.B	**Academic Vocabulary:** hydrate, percent composition
Lesson Frame:	We will: calculate the percentage of a hydrate's mass that is due to water.
	I will: calculate the percent composition of a compound either from mass data or from the chemical formula. Use percent composition to calculate the mass of an element in a certain sample of a compound.
Lesson Frame:	We will: calculate empirical formula from data.
	I will: determine the empirical formula of a compound from percent composition data.
Performance Tasks: Chemical composition lab	Notes:

Unit Name: **The Periodic Table**	**Length:** 2 Weeks
Standards: SCI.PS1.A	**Outcomes:** The sub atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
Essential Questions: Why is the periodic table organized the way it is? What trends are buried in the periodic table?	**Learning Targets:** Describe some of the early attempts to organize the chemical elements. Know the periodic law. Describe various components of the modern periodic table, including periods, groups, metals, nonmetals, and metalloids. Understand the relationship between the number of orbitals in various energy sublevels and the length of the periods in the periodic table. Identify each block of the periodic table and be able to determine which block each element belongs to based on its electron configuration. Describe the relationship between outer electron configuration and group number. Be able to determine the number of valence electrons for any element. Locate the following groups on the periodic table: alkali metals, alkaline earth metals, halogens, and noble gases. Locate the transition elements, lanthanides, and actinides on the periodic table. Learn the periodic trends for atomic radius. Know the relationship between group number and valence electrons. Describe how ions are formed. Learn the periodic trends for ionization energy. Explain how multiple ionization energies are related to noble gas electron configurations. Describe electron affinity. Learn the periodic trends for electronegativity.
Topic 1: **History of the Periodic Table**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** group, metal, metalloid, nonmetal, period, periodic law, periodic table
Lesson Frame:	We will: attempt to organize elements.
	I will: describe some of the early attempts to organize the chemical elements.
Lesson Frame:	We will: create a narrative of the organization of the periodic table.
	I will: describe how Mendeleev organized his periodic table.
Lesson Frame:	We will: predict where an element falls on the periodic table based on properties.

	I will: state the periodic law.
Lesson Frame:	We will: compare and contrast various components of the periodic table.
	I will: describe various components of the modern periodic table, including periods, groups, metals, nonmetals, and metalloids.
Performance Tasks: Table of Beverages	Notes:
Topic 2: **Electron Configuration and the Periodic Table**	**Length**: 4 days
Standards: SCI.PS1.A	**Academic Vocabulary:** actinide, alkali metal, alkaline earth metal, halogen, inner transition element, lanthanide, noble gas, representative (main-group) elements, transition element
Lesson Frame:	We will: compare orbitals and periods on the periodic table.
	I will: describe the relationship between the number of orbitals in various energy sublevels and the length of the periods in the periodic table.
Lesson Frame:	We will: classify elements by block.
	I will: identify each block of the periodic table and be able to determine which block each element belongs to based on its electron configuration.
Lesson Frame:	We will: compare electron number and group number.
	I will: describe the relationship between outer electron configuration and group number. I will: determine the number of valence electrons for any element.
Lesson Frame:	We will: locate the following groups on the periodic table: alkali metals, alkaline earth metals, halogens, and noble gases.
	I will: define the following groups on the periodic table: alkali metals, alkaline earth metals, halogens, and noble gases.
Lesson Frame:	We will: locate the transition elements, lanthanides, and actinides on the periodic table.
	I will: define the transition elements, lanthanides, and actinides on the periodic table.
Performance Tasks: Table Label	Notes:
Topic 3: **Periodic Trends**	**Length:** 3 days
Standards: SCI.PS1.A	**Academic Vocabulary:** anion, atomic radius, cation, electron affinity, electronegativity, ion, ionization energy
Lesson Frame:	We will: show periodic trends.

	I will: state the periodic trends for atomic radius.
Lesson Frame:	We will: compare group number and valence electrons.
	I will: describe the relationship between group number and valence electrons.
Lesson Frame:	We will: demonstrate how ions are formed.
	I will: describe how ions are formed.
Lesson Frame:	We will: show periodic trends.
	I will: describe the periodic trends for ionization energy.
Lesson Frame:	We will: calculate ionization energies.
	I will: explain how multiple ionization energies are related to noble gas electron configurations.
Lesson Frame:	We will: calculate electron affinity.
	I will: describe electron affinity.
Lesson Frame:	We will: calculate ion sizes.
	I will: predict the effect that ion formation has on the size of an atom.
Performance Tasks: Tale label	Notes:

September	October	November	December	January	February	March	April	May	June
Unit 1	Unit 3	Unit 5	Unit 6	Unit 7	Unit 8	Unit 10	Unit 12	Unit 13	Unit 14
Unit 2	Unit 4	Unit 6			Unit 9	Unit 11		Unit 14	

Course Name:	Physical Science		
Credits:	1		
Prerequisites:	N/A		
Description:	Designed to expose students to various scientific descriptions. The goal is science literacy. The units covered include, but are not limited to: Basic Chemistry (the Nature of Matter and the Changes in Matter) and Basic Physics (Motion, Forces and Energy). Students will learn problem-solving skills and will be shown how science relates to their lives. Lab work is required and large scale cumulative projects replace Final Exams.		
Academic Standards:	Next Generation Science Standards (NGSS)		
Units:	**Time**	**Unit Standards:**	**Unit Outcomes:**
Nature of Science	2 weeks	HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and want. HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and want. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
Motion	3 weeks	HS-PS2-3. Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. HS-PS2-1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.	Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Work, Force and Power	3 weeks	HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
Momentum and Mechanical Advantage	3 weeks	HS-PS4-2. Evaluate questions about the advantages of using a digital transmission and storage of information. HS-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.	Evaluate questions about the advantages of using a digital transmission and storage of information. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.
Energy Conversion and Conservation	4 weeks	HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects). HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects). Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

Electricity and Magnetism	4 weeks	HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.
Nature of Matter	5 weeks	HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
Diversity of Matter	5 weeks	HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. HS-PS2-6.Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

Waves	4 weeks	HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. HS-PS1-8. (if the topic is chosen) Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. HS-PS4-5.(if topic is chosen) Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Unit Name: **Diversity of Matter: *New Materials Through Chemistry***	**Length**: 4 weeks
Standards: HS-PS1-4 HS-PS2-6 HS-PS1-5 HS-PS1-5	**Outcomes:** Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
Essential Questions: How can metals vs. alloys characteristics be differentiated? Can you identify polymer vs. composite characteristics? What is the scientific, technological and economic importance of materials classified as metal and alloy? **Academic Vocabulary:** Metal, Malleable, Ductile, Metallic Bonding, Radioactive Element, Transition Element, Nonmetal, Sublimation, Metalloid, Alloy, Luster, Polymer, Monomer, Synthetic, Composite	**Learning Targets:** Describe the properties of a typical metal. Identify the alkali metals and alkaline earth metals. Differentiate among three groups of transition elements. Recognize hydrogen as a nonmetal. Compare and contrast properties of the halogens. Describe properties and uses of the noble gases. Distinguish among metals, nonmetals, and metalloids. Understand the importance of synthetic elements. Identify how different alloys are used. Explain how the properties of alloys determine their use. Identify what a polymer is and the variety of polymers around us. Compare and contrast soaps and detergents. Explain what a composite material is and why composites are used.
Topic 1: **Metals and Alloys**	**Length**: 2 weeks
Lesson Frame: Materials of the Past	We will research the history of various metals.
	I will build a working timeline for this chapter.
Lesson Frame: Observing Properties of Alloys	We will observe the bonding of metals.
	I will ID the thing that make substances like metal stronger and weaker.
Lesson Frame: Iron Age, Bronze age	We will continue to add to our timeline.
	I will be able to cite differences in the iron age vs. bronze age.
Performance Tasks: Building Timelines Metallic Glass - Enrichment Observing Properties of Alloys - Lab	Notes:

Topic 2: **Polymers and Composites**	**Length**: 2 weeks
	I will ID and match various polymers to their subunits.
Lesson Frame: Composites	We will list the major differences between polymers and composites.
	I will show in a model specific examples contrasting and comparing polymers.
Lesson Frame: Versatile Materials	We will research examples of biomimicry relating to materials both natural and man-made.
	I will define and model biomimicry citing specific examples.
Performance Tasks: Natural vs. Synthetic Materials Technology Timelines for Ceramic/Glass and Polymer Composite Bowling Balls - History Pole Vaulting - History	Notes:

Unit Name: **Electricity and Magnetism**	**Length**: 4 weeks
Standards: HS-PS1-3 HS-PS2-4 HS-PS2-5 HS-PS3-5 HS-PS4-4	**Outcomes:** Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.
Essential Questions: How do the basics of electricity and power relate to consumer goods and affairs in relation to safety, technology, and conservation? **Academic Vocabulary:** Static Electricity, Law of Conservation of Charge, Conductor, Insulator, Charging by Contact, Charging by Induction, Electric Current, Voltage Difference, Circuit, Resistance, Ohm's Law, Series Circuit, Parallel Circuit, Electrical Power, AC, DC	**Learning Targets:** Describe how electric charges exert forces on each other. Compare the strengths of electric and gravitational forces. Distinguish between conductors and insulators. Explain how objects become electrically charged. Describe how voltage difference causes current to flow. Explain batteries produce a voltage difference in a circuit. List the factors that affect an object's electrical resistance. Define Ohm's Law. Describe the difference between series and parallel circuits. Recognize the function of circuit breakers and fuses. Calculate electrical power. Calculate the electrical energy used by a device. Compare and Contrast AC -vs- DC.

Topic 1: **Electricity and Ohm's Law**	**Length**: 2 weeks
Lesson Frame: Electrical Charge	We will demonstrate flow of electricity.
	I will model static electricity.
Lesson Frame: OHM's Law - Calculations	We will learn the three components of electrical conduction.
	I will use Ohm's law to calculate current, volts and resistance.
Lesson Frame: Identifying Circuits	We will build circuits to get light bulbs to work.
	I will know the difference between parallel and series circuit.
Performance Tasks: Electricity in Everyday Life - Lab Build a Voltaic Cell - ID Volts, Current, and Resistance- Lab Investigating Battery Additions Build Series and Parallel Circuits - Lab	Notes: Must be able to label (Ohm's Law) volts, current, resistance on circuits.

Topic 2: **Electrical Power**	**Length**: 2 weeks
Lesson Frame: Identify and Calculate Residential Electrical Power	We will ID the underwriters laboratory labels on electrical appliances.
	I will know what UL means and where to locate it.
Lesson Frame: Energy as commodity/price per KW/h daily?	We will research the cost energy per Kilowatt Hour daily.
	I will locate major appliances in my home and calculate cost/KWh to run them.
Lesson Frame: Who was Thomas Edison? Who was Nikola Tesla?	We will compare and contrast Edison and Tesla inventions and ideas.
	I will know the history of and difference between AC and DC.
Performance Tasks: Watts Going On - Scavenger Hunt/Calculations of KW/h per month Compare and Contrast AC/DC	Notes:

Unit Name: **Energy Conversion and Conservation**	**Length**: 4 weeks
Standards: HS-PS3-1 HS-PS3-2 HS-PS3-3	**Outcomes:** Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects). Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
Essential Questions: How can you to plan, build and present a Rube Goldberg Machine? **Academic Vocabulary:** Kinetic Energy, Joule, Potential Energy, Elastic Potential Energy, Chemical Potential Energy, Gravitational Potential Energy, Temperature, Thermal Energy, Heat, Specific Heat, Conduction, Convection, Radiation, Insulator, Thermodynamics, First Law of Thermodynamics, Second Law of Thermodynamics, Internal Combustion Engine	**Learning Targets**: Distinguish between kinetic and potential energy. Calculate kinetic energy. Describe different forms of potential energy. Calculate gravitational potential energy. Describe how energy can be transformed from one form to another. Explain how the mechanical energy of a system is the sum of the kinetic and potential energy. Discuss the law of conservation of energy. Define temperature. Calculate the change in thermal energy. Compare and contrast the transfer of thermal energy by conduction, convection, and radiation. Describe the first and second laws of thermodynamics. Explain how an internal combustion engine works. Explain how a refrigerator transfers thermal energy from a cool to a warm temperature.
Topic 1: **Energy Conversion**	**Length**: 2 weeks
Lesson Frame: Nature of Energy - Listing Forms and Examples	We will demonstrate various forms of energy.
	I will know at least 10 different forms of energy.
Lesson Frame: Calculating Potential and Kinetic Energy	We will ID the two types of energy.
	I will compare and contrast potential and kinetic energy.
Lesson Frame: Measuring and Converting Temperature	We will learn how to measure and convert temperature.
	I will know the 3 different temperature measurements (F, C, and K).

Performance Tasks: Comeback Can Lab - Data Collection and Graphing Exothermic vs Endothermic Reactions Demo Ice Cube Contest - Design and build an insulated container	Notes:
Topic 2:**Energy Conservation**	**Length**: 2 weeks
Lesson Frame: Law of Conservation of Energy	We will analyze the law of conservation of energy.
	I will apply the law of conservation of energy by reviewing ecology pyramids.
Lesson Frame: Heat Loss Calculations - Residential Insulation	We will research formulas for energy loss and energy conservation.
	I will be able to read and understand a heat calc.
Lesson Frame: Who was Albert Einstein? Who was Rube Goldberg?	We will build a timeline for Einstein and Goldberg from birth to death.
	I will know 2 influences from Al and Rube dealing with energy science.
Performance Tasks: Orbits, Ellipses and Energy What goes up must come down R- Values Rube Goldberg Machines	Notes:

Unit Name: **Momentum and Mechanical Advantage**	**Length:** 3 weeks
Standards: HS-PS4-2 HS-PS4-3	**Outcomes**: Evaluate questions about the advantages of using a digital transmission and storage of information. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.
Essential Questions: How can the use of simple vs. compound machines be compared and contrasted? How can various mechanical apparatus' that display the intricacies of the laws of motion and gravity be designed, buildt and tested? **Academic Vocabulary**: Newton's Second Law of Motion, Friction, Static Friction, Sliding Friction, Air Resistance, Gravity, Weight, Centripetal Acceleration, Centripetal Force, Newton's Third Law of Motion, Momentum, Mechanical Advantage, Kinesiology	**Learning Targets:** Apply Newton's second law of motion. Describe the three different types of friction. Observe the effects of air resistance on falling objects. Describe the gravitational force. Distinguish between mass and weight. Explain why objects that are thrown will follow a curved path. Compare circular motion with motion in a straight line. State Newton's third law of motion. Calculate momentum. Recognize when momentum is conserved. Explain how machines make doing work easier. Calculate the mechanical advantage of a machine. Calculate the efficiency of a machine. Describe the six types of simple machines. Explain how the different types of simple machines make doing work easier. Calculate the ideal mechanical advantage of the different types of simple machines.

Topic 1: **Momentum/Newton's Laws**	**Length**: 2 weeks
Lesson Frame: Newton's 3rd Law	We will identify Newton's 3rd Law and apply it.
	I will know that every action yields an equal and opposite reaction.
Lesson Frame: Calculating Momentum Law of Conservation of Momentum	We will demonstrate momentum under various conditions.
	I will measure mass and velocity to get momentum.
Lesson Frame: Friction and Gravity	We will demonstrate all different kinds of friction.
	I will know how to make a free body diagram for multiple scenarios.

Performance Tasks: Fitch Barrier Calculations Action Reaction - Bouncing Ball Collisions - Data Collection and Graphing Construction of the Great Pyramids Friction Labs	Notes:
Topic 2: **Mechanical Advantage and Efficiency**	**Length:** 1 week
Lesson Frame: Compare and Contrast MA and Efficiency	We will demonstrate work in and work out.
	I will know how to calculate mechanical advantage of a can opener.
Lesson Frame: Simple Machines	We will introduce the 6 simple machines with all their variations.
	I will ID simple machines.
Lesson Frame: Machines in the Human Body	We will learn the basic of kinesiology.
	I will be able to match human movement examples to the 3 classes of levers.
Performance Tasks: Whirly Bird Contest (part 2) Identify variations in simple machines Calculate Ideal MA from three types of levers ID Pulleys and Levers in the Human Machine Paper Tower Contest	Notes:

Unit Name: **Motion**	**Length**: 3 weeks
Standards: HS-PS2-3 HS-PS2-1 HS-PS2-2 HS-PS2-4	**Outcomes:** Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
Essential Questions: What is the connection between the measurements, units and tools and real life scenarios? How can you relate information the to speeding, car accidents, safety and mechanics? **Academic Vocabulary:** Distance, Displacement, Speed, Average Speed, Instantaneous Speed, Velocity, Acceleration, Deceleration, Newton's 1st Law	**Learning Targets:** Distinguish between distance and displacement. Explain the difference between speed and velocity. Interpret motion graphs. Identify how acceleration, time, and velocity are related. Explain how positive and negative acceleration affect motion. Describe how to calculate the acceleration of an object.
Topic 1: **Speed vs. Velocity**	**Length**: 2 weeks
Lesson Frame: Exploring Reference Points, Newton's 1st Law	We will devise ways to measure distance and time.
	I will know what a reference point is.
Lesson Frame: Calculating speed of vehicles without RADAR	We will analyze speed and velocity.
	I will calculate the speed and velocity of various objects.
Lesson Frame: Unit Conversions Km/m = mph	We will set a lab to measure speed of cars.
	I will calculate the speed of random cars and convert the speed to a unit I am familiar with.
Performance Tasks: Bowling Ball - Change in Velocity Speed Trap 400m walk vs.run	Notes:
Topic 2: **Acceleration and Deceleration**	**Length:** 1 week
Lesson Frame: Describing Acceleration	We will continue with our car speed lab, only this time we will make observation at the stop sign.
	I will be able to contrast acceleration and deceleration.
Lesson Frame: Exploring changes in direction	We will make and use an accelerometer.
	I will utilize my accelerometer to make measurements.

Lesson Frame: Acceleration Formula and Calculations	We will download an app for acceleration then compare our calculations to the app.
	I will be able to see how accurately I make measurements.
Performance Tasks: Starting Points vs. Stopping Points Centripetal Force and Ellipses Deceleration at a Stop Sign Olympic Sprinters Acceleration in the 100m	Notes:

Unit Name: **Nature of Matter**	**Length**: 4 weeks
Standards: HS-PS1-1 HS-PS1-2 HS-PS1-3	**Outcomes:** Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
Essential Questions: How do you interpret and apply the rules for the hierarchy of chemistry? How does the learning of a language associate to chemistry? **Academic Vocabulary**: Atom, Nucleus, Proton, Neutron, Electron, Quark, Electron Cloud, Atomic Number, Mass Number, Isotope, Average Atomic Mass, Periodic Table, Group, Period, Electron Dot Diagram	**Learning Targets**: Identify the names and symbols of common elements. Identify quarks as subatomic particles of matter. Describe the electron cloud model of the atom. Explain how electrons are arranged in an atom. Interpret the average atomic mass of an element. Explain the composition of the periodic table. Use the periodic table to obtain information. Explain what the terms: Metal, Non-Metal, Metalloid
Topic 1: **Trends of the Periodic Table**	**Length**: 2 weeks
Lesson Frame: Language of Chemistry	We will learn how subatomic particles can be traced to substances.
	I will understand the analogy letters, words, sentences, meanings.
Lesson Frame: How to read the Periodic Table	We will ID the trends of the periodic table.
	I will be able to locate characteristics and statistics of elements.
Lesson Frame: Atomic Structure	We will use trends of the periodic table to analyze atomic structure.
	I will be able to sketch then build a Bohr model of any element 1-18.
Performance Tasks: Organizing a Personal Periodic Table Building Bohr Models Predicting an Element's Group and Period	Notes:
Topic 2: **Atoms to Compounds**	**Length**: 2 weeks
Lesson Frame: Electron Configuration	We will evaluate the importance of valence electrons.

	I will be able to calculate electron numbers and locations via trends of the periodic table.
Lesson Frame: Bonding - Ionic vs. Covalent Molecule vs. Compound	We will compare and contrast types of bonding.
	I will ID types of bonds through the elements that bond easily and make simple compounds.
Lesson Frame: Balancing Equations 6 types of Chemical Reactions	We will learn the rule for balancing equations.
	I will balance notable chemical equations and classify the results as one of the 6 chemical reactions.
Performance Tasks: Gizmo Simulation Labs: https://www.explorelearning.com	Notes: List Chemical Reactions

Unit Name: Nature of Science	**Length**: 2 weeks
Standards: HS-ETS1-1 HS-ETS1-2 HS-PS1-7	**Outcomes**: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and want. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. This unit is the foundation for determining differentiation of important life skills like: identifying a scientific problem, making assumptions based on prior knowledge, reading measurements from various tools, collecting data, analyzing data, and graphing conclusive evidence.
Essential Questions: The use of measuring devices and their units of measure is essential to learning about scientific phenomenon. What is the difference between "math" math and "science" math? **Academic Vocabulary:** Part 1 - Scientific Method/PHEOC, Independent Variable, Dependent Variable, Constant:, Controls, Standard Part 2 - Volume, Mass, Density, Qualitative Data, Quantitative Data	**Learning Targets:** Identify the steps used to solve scientific phenomenon. Describe why scientists use variables. Compare and contrast science vs. technology. Know and apply the prefixes that define the metric system. Identify units measure and symbols for those units of measure. Utilize the correct tools to length, mass, volume, density, time, and temp. Identify the 3 types of graphs and utilize them in conclusions. Analyze data from graphs.
Topic 1: **Metric System and Units of Measure**	**Length**: 1 week
Lesson Frame: Metric System Stairway	We will study and manipulate numbers for the metric system.
	I will know how to use the metric stairway.
Lesson Frame: Metric Mania Scavenger Hunt	We will convert numbers and measures into and out of metric system.
	I will practice my metric conversions.
Lesson Frame: Metric System Challenge	We will take measurements in length, mass and volume.
	I will be able to use the proper tool for the job.
Performance Tasks: Measuring Objects Unit Conversions within Metric System Unit Conversions from Standard to Metric System	Notes:
Topic 2: **Density**	**Length**: 1 week
Lesson Frame: Density Pyramids	We will learn to use the density pyramid for converting measures.

	I will make conversion with the density formula for mass and volume.
Lesson Frame: Density Measurements, tools and units	We will demonstrate several ways of measuring.
	I will make volume measures using a ruler, grad cylinder and displacement.
Lesson Frame: Archimedes' Principle	We will analyze Archimedes Principle.
	I will use buoyancy to learn about displacement, surface area, floating and sinking.
Performance Tasks: Graphing Statistical Data of Common Elements	Notes:

Unit Name: **Waves**	**Length:** 6 weeks
Standards: HS-ETS1-4 HS-ETS1-2 HS-ETS1-3 HS-PS1-8 (if the topic is chosen) HS-PS4-5 (if the topic is chosen) HS-PS4-1	**Outcomes:** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Essential Questions: What is the connection with wave properties and anatomy to the senses, namely hearing and sight? **Academic Vocabulary:** Wave, Medium, Transverse Wave, Compressional Wave, Crests, Troughs, Rarefaction, Wavelength, Frequency, Period, Amplitude, Refraction, Diffraction, Interference, Standing Wave *Sound* - Resonance, Eardrum: Intensity, Loudness, Decibel, Pitch, Doppler Effect, Music, Acoustics, Sonar *Light* - Opaque, Translucent, Transparent, Pigment, Polarized Light	**Learning Targets:** Recognize that waves carry energy but not matter. Define mechanical waves. Compare and contrast transverse waves and compressional waves. Define wavelength, frequency, period, and amplitude. Describe the relationship between frequency and wavelength. Explain how a wave's energy and amplitude are related. Explain how sound travels through different mediums. Identify what influences the speed of sound. Describe how the ear enables you to hear. Recognize how amplitude, intensity, and loudness are related. Describe how sound intensity is measured and what levels can damage hearing. Explain the relationship between frequency and pitch. Discuss the Doppler effect. Distinguish between noise and music. Describe why different instruments have different sound qualities. Discuss the uses of sonar. Describe how light waves interact with matter. Define the index of refraction of a material. Explain why a prism separates white light into different colors. Explain how you see color. Explain how a laser produces coherent light. Distinguish polarized light from unpolarized light. Explain how a hologram is made. Describe the uses of optical fibers.
Topic 1: **Sound and Hearing**	**Length:** 3 weeks
Lesson Frame: Types of Waves, Anatomy of Waves	We will study the anatomical features of mechanical waves.
	I will be able to ID the major differences in Longitudinal waves and compressional waves.
Lesson Frame: Sound Through Mediums, Measuring Decibels	We will learn to calculate the characteristics of waves.
	I will learn and apply the formulas for frequency, amplitude, and wavelength to actual waves.
Lesson Frame: Anatomy and Physiology of the Ear	We will locate and function of the parts within the ear.
	I will know how sound waves react with the eardrum, ossicles, cochlea and auditory nerve.

Performance Tasks: Superposition Principle - Lab Resonance Tubes - Lab Breaking the Sound Barrier - Timeline Ultrasonic vs. Subsonic Simulating Hearing Loss - Lab Parts of the Outer, Middle and Inner Ear	Notes: Specialize communication and hearing. Match amplitude - decibel frequency - pitch wavelength - speed
Topic 2: **Light and Sight**	**Length**: 3 weeks
Lesson Frame: Behavior of Light	We will research statistics on light.
	I will know the speed of light and how travels through mediums.
Lesson Frame: Light and Color	We will analyze the electromagnetic spectrum (ROYGBIV).
	I will observe how we see and determine colors.
Lesson Frame: Anatomy and Physiology of the Eye	We will study the anatomy and physiology of the eye.
	I will know the difference between rods and cones (light and color detection cells on retina).
Performance Tasks: Observing Refraction - Lab Angles of Incidence and Reflection - Laser Lab Knowing the Color Wheel Complementary Color Logos- Who was Henri Matisse? Uses for Lightf: Polarization - Lasers/Barcodes - Fiber Optics Making Holograms	Notes:

Unit Name: **Work, Force and Power**	**Length:** 3 weeks
Standards: HS-PS1-5. HS-PS3-4. HS-PS4-1.	**Outcomes:** Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
Essential Questions: Do our students possess the capacity to take these measurements/calculations and manipulate them to support a real life situation? **Academic Vocabulary:** Force, Net Force, Balanced Force, Inertia, Work, Power, Types of Force, Free Body Diagram, Newton's 1st Law, 2nd Law, 3rd Law	**Learning Targets**: Explain how force and motion are related. Describe what inertia is and how it is related to Newton's first law of motion. Identify the forces and motion that are present during a car crash. Apply knowledge of forces to Free Body Diagrams. Site examples for Newton's Laws. Interpret and apply terminology.
Topic 1: **Force**	**Length**: 1 week
Lesson Frame: Balanced and Unbalanced forces (Newton's 1st Law)	We will demonstrate inertia.
	I will define and apply Newton's 1st Law (inertia).
Lesson Frame: Types of Force	We will demonstrate multiple forces.
	I will be able to determine differences in force.
Lesson Frame: Newton's 2nd Law	We will utilize the force formula for calculations and then conversions.
	I will measure mass and acceleration to get force.
Performance Tasks: Crash Reconstruction - Inertia Free Body Diagrams Making and Reading Accelerometers Whirlybird Contest	Notes:

Topic 2: **Work and Power**	**Length**: 2 weeks
Lesson Frame: Exploring Work, Direction and Weight	We will observe moving objects and monitor their work output.
	I will know how to calculate work. w = f * d.
Lesson Frame: Calculating Work	We will demonstrate work in and work out for efficiency.
	I will will be able to calculate the work under several conditions.
Lesson Frame: Calculating Power	We will demonstrate power.
	I will know how to calculate power P = w/t under specific conditions.
Performance Tasks: Family of squirrels creating electricity Can Opener Lab - machines multiplying force Comparing and contrasting horsepower and power from WPS Calculating your own force, work and power (steps lab)	Notes: Research and compare horsepower, electrical power and normal power.

September	October	November	December	January	February	March	April	May	June
Unit 1	Unit 2 cont.	Unit 4	Unit 5 cont		Unit 6	Unit 7	Unit 8	Unit 9	
Unit 2	Unit 3	Unit 5		Semester 1 Final					
								Semester 2 Final	

September	October	November	December	January	February	March	April	May	June
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	

Course Name:	Course 1		
Credits:	1		
Prerequisites:	5th Grade		
Description:	In this course, students will work in cooperative groups to solve problems, explain their thinking, and listen to others explanations on their thinking.		
Academic Standards:	See Unit List		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Introduction and representation	14 days	M.6.G.A.1M.6.SP.B.4M.6.EE.A.1M.6.NS.B.4,	Outcomes:Students will organize data and use mathematical reasoning to make predictions
Arithmetic strategies and area	13 days	M.6.EE.A.3M.6.G.A.1M.6.NS.B.4	Outcomes:Students will investigate area and how to measure it.
Portions and integers	16 days	M.6.G.A.3M.6.NS.B.3M.6.NS.B.4M.6.NS.C.5M.6.NS.C.6aM.6.NS.C.6bM.6.NS.C.6cM.6.NS.C.7aM.6.NS.C.7bM.6.NS.C.7cM.6.NS.C.7dM.6.NS.C.8M.6.RP.A.1	Outcomes:Students will use percents, decimals, and frations to describe a portion of a whole.
Variables and ratios	12 days	M.6.EE.A.4M.6.EE.A.2aM.6.EE.A.2cM.6.EE.A.4M.6.EE.B.6M.6.RP.A.1	Outcomes:Students will use variables to generalize and to represent unknown quantities.
Multiplying fractions and area	16 days	M.6.RP.A.3cM.6.NS.A.1M.6.G.A.1M.6.NS.B.3	Outcomes:Students will discover how to multiply fractions, mixed numbers, and decimals.
Dividing and building expressions	17 days	M.6.EE.A.1M.6.EE.A.2bM.6.EE.A.2cM.6.EE.A.3M.6.EE.A.4M.6.EE.B.6M.6.NS.A.1M.6.NS.B.2	Outcomes:Students will use the order of operations to find the correct value of a numerical expression.
Rates and operations	16 days	M.6.EE.A.2aM.6.EE.A.3M.6.EE.B.5M.6.EE.B.6M.6.EE.B.7M.6.EE.B.8M.6.NS.A.1M.6.NS.B.3M.6.RP.A.2M.6.RP.A.3a	Outcomes:Students will calculate rates, including unit rates.
Statistics and multiplication equations	16 days	M.6.EE.B.7M.6.EE.C.9M.6.RP.A.3bM.6.RP.A.3dM.6.SP.A.1M.6.SP.A.2M.6.SP.A.3M.6.SP.B.4M.6.SP.B.5a	Outcomes:Students will use measures of central tendency, histograms, stem and leaf plots, and box plots to represent and compare data.
Volume and Percents	19 days	M.6.G.A.2M.6.G.A.4M.6.RP.A.3c	Outcomes:Students will find the volume of three dimensional solids, known as right prisms.

Unit Name:Introduction and representation	Length:14 days		
Standards:M.6.G.A.1M.6.SP.B.4M.6.EE.A.1M.6.NS.B.4,	Outcomes:Students will organize data and use mathematical reasoning to make predictions		
Essential Questions:What can I ask about this problem?	Learning Targets:Students will be able to develop several ways to represent mathematical ideas.		
Topic 1:Visualizing information	Length:1 day		
Lesson Frame:	We will identify strengths and weaknesses of scatterplots and histograms.		
	I will pracice precision while communicating my observations of different graphs.		
Performance Tasks: Students will be able to analyze histograms.	Notes:		
Topic 2:Perimeter and area relationships	Length:1 day		
Lesson Frame:	We will experiment with changing area while keeping the perimeter the same.		
	I will construct viable arguments to describe the impact on the area of a shape when I change the measurements without changing the perimeter.		
Performance Tasks: Students will be able to look for relationships between perimeter and area.	Notes:		
Topic 3:Describing and extending patterns	Length:1 day		
Lesson Frame:	We will make predictions based on extending patterns.		
	I will look for and make sense of structure while observing patterns.		
Performance Tasks: Students will be able to extend patterns.	Notes:		
Topic 4:Representing data	Length:1 day		
Lesson Frame:	We will explore ways to organize data to answer different questions.		
	I will reason abstractly and quantitatively to make sense of data.		
Performance Tasks: Students will be able to generate questions about data.	Notes:		
Topic 5:Making sense of a logic problem	Length:1 day		
Lesson Frame:	We will justify a conjecture as we make sense of logic problems.		
	I will explain conjectures using words, symbols, diagrams and models.		
Performance Tasks: Students will be able to make conjectures.	Notes:		
Topic 6:Multiple representations	Length:1 day		
Lesson Frame:	We will represent quantities with words, symbols, and diagrams.		
	I will look for structure as I compare quantities.		
Performance Tasks: Students will be able to decompose quantities into sums of parts.	Notes:		
Topic 7:Representing comparisons	Length:1 day		
Lesson Frame:	We will use appropriate symbol notations when comparing expressions.		
	I will make use of structures to compare and contrast decomposed quantities.		
Performance Tasks: Students will be able to compare values of numerical expressions.	Notes:		
Topic 8:Characteristics of numbers	Length:1 day		
Lesson Frame:	We will categorize numbers as prime, composite, odd and even.		
	I will make use of structure when categorizing numbers.		
Performance Tasks: Students will be able to represent whole numbers with rectangular arrays.	Notes:		
Topic 9:Products, factors, and factor pairs	Length:2 days		
Lesson Frame:	We will write numbers as products of their prime factors using exponents.		
	I will look for and express regularity in repeated reasoning as I notice repeated multiplication of factors.		
Performance Tasks: Students will be able to extend multiplication tables in order to understand factors, factor pairs, and properties of numbers.	Notes:		

Unit Name:Arithmetic strategies and area	Length:13 days
Standards:M.6.EE.A.3M.6.G.A.1M.6.NS.B.4	Outcomes:Students will investigate area and how to measure it.
Essential Questions:How do area and perimeter change?	Learning Targets:Students will be able to explore the relationship between area and perimeter.
Topic 1:Dot plots and bar graphs	Length:1 day
Lesson Frame:	We will identify strengths and weaknesses of various graphical representations.
	I will focus on diffferent modeling of data.
Performance Tasks: Students will be able to analyze graphs.	Notes:
Topic 2:histograms and stem and leaf plots	Length:1 day
Lesson Frame:	We will create ste and leaf plots and histograms.
	I will make sense of data and model it in the appropriate graph.
Performance Tasks: Students will be able to collect data and display data.	Notes:
Topic 3:Exploring area	Length:1 day
Lesson Frame:	We will develop strategies for measuring area of closed two dimensional regions.
	I will use the appropriate tool strategically in order to find the are of a region.
Performance Tasks: Students will be able to explore the concept of area.	Notes:
Topic 4:Square units and area of rectangles	Length:1 day
Lesson Frame:	We will understand area as it is related to standard units of measurement.
	I will attend to precision while finding measurements in order to find area.
Performance Tasks: Students will be able to understand standard units of measurement.	Notes:
Topic 5:Area and perimeter	Length:1 day
Lesson Frame:	We will identify how composing and decomposing area affects perimeter.
	I will attend to precision while idenifying relationships between area and perimeter.
Performance Tasks: Students will be able to compose and decompose area.	Notes:
Topic 6:Using rectangles to multiply	Length:1 day
Lesson Frame:	We will use area models to represent multiplication of mulit-digit numbers.
	I will reason quantitatively while working with generic rectangles.
Performance Tasks: Students will be able to use generic rectangles to find area.	Notes:
Topic 7:Using generic rectangles	Length:1 day
Lesson Frame:	We will multiply mult-digit numbers using generic rectangles.
	I will reason quantitatively while multiply multi-digit numbers.
Performance Tasks: Students will be able to multiply multi-digit numbers.	Notes:
Topic 8:Generic rectangles and greatest common factor	Length:1 day
Lesson Frame:	We will use the GCF to find dimensions of generic rectangles.
	I will look for structure while developing the idea of distribution.
Performance Tasks: Students will be able to define the greatest common factor.	Notes:
Topic 9:Distributive property	Length:1 day
Lesson Frame:	We will use generic rectangles to discover the distributive property.
	I will make use of structure while applying the distributive property.
Performance Tasks: Students will be able to apply the distributive property.	Notes:

Unit Name:Portions and integers	Length:16 days		
Standards:M.6.G.A.3M.6.NS.B.3M.6.NS.B.4M.6.NS.C.5M.6.NS.C.6aM.6.NS.C.6bM.6.NS.C.6cM.6.NS.C.7aM.6.NS.C.7bM.6.NS.C.7cM.6.NS.C.7dM.6.NS.C.8M.6.RP.A.1	Outcomes:Students will use percents, decimals, and frations to describe a portion of a whole.		
Essential Questions:How is it the same or different?	Learning Targets:Students will be able to represent portions as percents, decimals, and fractions with pictures, symbols, and words.		
Topic 1:Using the multiplicative identity	Length:2 days		
Lesson Frame:	We will use multiplicative identity to find equivalent fractions.		
	I will use the appropriate tool in order to find equivalent fractions.		
Performance Tasks: Students will be able to create equivalent fractions.	Notes:		
Topic 2:Portions as percents	Length:1 day		
Lesson Frame:	We will compare portions of a while in order to understand percents.		
	I will use appropriate tools, such as a percent ruler, to understand percents.		
Performance Tasks: Students will be able to develop and understanding of percents.	Notes:		
Topic 3:Connecting percents with decimals and fractions	Length:2 days		
Lesson Frame:	We will identify the connections between fractions, percents, and decimals.		
	I will make use of structure to connect fractions, percents, and decimals.		
Performance Tasks: Students will be able to recognize the connections between fractions and percents.	Notes:		
Topic 4:Multiple representations of a portion	Length:1 day		
Lesson Frame:	We will make sense of standard algorithms for adding and subtracting decimals.		
	I will attend to precision while adding and subtracting decimals.		
Performance Tasks: Students will be able to develop methods to represent portions as percents, fractions, and decimals.	Notes:		
Topic 5:Completing the web	Length:1 day		
Lesson Frame:	We will work with the 100% block model to move from fractions to decimals.		
	I will look for and express regularity in repeated reasoning while identifying patterns in the 100% block model.		
Performance Tasks: Students will be able to move between equivalent forms of portions.	Notes:		
Topic 6:Investigation ratios	Length:1 day		
Lesson Frame:	We will use diagrams and ratio tables to represent ratios.		
	I will make sense of problems and persevere in solving ratio representations.		
Performance Tasks: Students will be able to use ration language to describe a relationship between two quantities.	Notes:		
Topic 7:Addition, subtraction, and opposites	Length:1 day		
Lesson Frame:	We will use number lines to recognize opposites.		
	I will make sense of addition and subtraction of positive whole numbers using a number line.		
Performance Tasks: Students will be able to connect movement on a number line with adding and subtracting.	Notes:		
Topic 8:Locating negative numbers	Length:1 day		
Lesson Frame:	We will make statements about the relative size of numbers using inequalities.		
	I will use an appropriate tool to make sense of comparing rational numbers.		
Performance Tasks: Students will be able to position rational numbers on a number line.	Notes:		
Topic 9:Absolute value	Length:1 day		
Lesson Frame:	We will compare rational numbers using inqualities in contextual situations.		
	I will make use of structure in mathematics in using absolute value operations.		
Performance Tasks: Students will be able to understand the meaning of absolute value.	Notes:		
Topic 10:Length on a coordinate graph	Length:1 day		
Lesson Frame:	We will use coordinates to find length of sides.		
	I will make use of structure and absolute value to find side lengths.		

Unit Name:Portions and integers	Length:16 days		
Standards:M.6.G.A.3M.6.NS.B.3M.6.NS.B.4M.6.NS.C.5M.6.NS.C.6aM.6.NS.C.6bM.6.NS.C.6cM.6.NS.C.7aM.6.NS.C.7bM.6.NS.C.7cM.6.NS.C.7dM.6.NS.C.8M.6.RP.A.1	Outcomes:Students will use percents, decimals, and frations to describe a portion of a whole.		
Essential Questions:How is it the same or different?	Learning Targets:Students will be able to represent portions as percents, decimals, and fractions with pictures, symbols, and words.		
Performance Tasks: Students will be able to draw polygons on a coordinate plane.	Notes:		

Unit Name:Variables and ratios	Length:12 days		
Standards:M.6.EE.A.4M.6.EE.A.2aM.6.EE.A.2cM.6.EE.A.4M.6.EE.B.6M.6.RP.A.1	Outcomes:Students will use variables to generalize and to represent unknown quantities.		
Essential Questions:How can I change the size but keep the same shape?	Learning Targets:Students will be able to find the value of an algebraic expression when the value of the variable is known.		
Topic 1:Introduction to variables	Length:1 day		
Lesson Frame:	We will evalute expressions and solve for unknowns.		
	I will reason abstractly and quantitatively to evaluate expressions.		
Performance Tasks: Students will be able to represent unknown quantities as variables.	Notes:		
Topic 2:Writing equivalent expressions	Length:1 day		
Lesson Frame:	We will make general statements about how to count the number of squares in a pattern.		
	I will look for and make use of structure while identifying patterns.		
Performance Tasks: Students will be able to compare multiple counting strategies.	Notes:		
Topic 3:Using variables to generalize	Length:2 days		
Lesson Frame:	We will use a variable to represent a set of solutions.		
	I will identify that two expressions are equivalent by evaluating them for specific values.		
Performance Tasks: Students will be able to find the number of small squares in and square frame pattern.	Notes:		
Topic 4:Enlarging two dimensional shapes	Length:1 day		
Lesson Frame:	We will examine the relationship between the original image and an enlarged image.		
	I will attend to precision while enlarging shapes.		
Performance Tasks: Students will be able to enlarge and image.	Notes:		
Topic 5:Enlarging and reducing figures	Length:1 day		
Lesson Frame:	We will make use of structure to identify patterns between original shapes and enlarged shapes.		
	I will make sense of problems to identify similarity and multiplicative property.		
Performance Tasks: Students will be able to identify that enlarging a shape means to multiply the original sides by the same number.	Notes:		
Topic 6:Enlargement and reduction ratios	Length:1 day		
Lesson Frame:	We will use ratios to make similar figures.		
	I will reason abstractly and quantitivly while creating similar figures.		
Performance Tasks: Students will be able to compose similar figures.	Notes:		
Topic 7:Ratios in other situations	Length:1 day		
Lesson Frame:	We will use ratios in non-geometric real life contexts.		
	I will make sense of ration problems and persevere in solving them.		
Performance Tasks: Students will be able to use ratios to solve problems.	Notes:		

Unit Name:Multiplying fractions and area	Length:16 days		
Standards:M.6.RP.A.3cM.6.NS.A.1M.6.G.A.1M.6.NS.B.3	Outcomes:Students will discover how to multiply fractions, mixed numbers, and decimals.		
Essential Questions:How can I break it into smaller pieces?	Learning Targets:Students will be able to find the areas of shapes, including rectangles, triangles, parallelograms, and trapezoids.		
Topic 1:Representing fraction multiplication	Length:1 day		
Lesson Frame:	We will use area models to solve multiplication problems.		
	I will make senseof multiplication of fractions to solve problems.		
Performance Tasks: Students will be able to solve multiplication problems in context.	Notes:		
Topic 2:Describing parts of parts	Length:1 day		
Lesson Frame:	We will develop the standard algorithm for multiplying fractions.		
	I will make sense of problems and persevere in solving fraction problems.		
Performance Tasks: Students will be able to use models to multiply fractions.	Notes:		
Topic 3:Calculating parts of parts	Length:1 day		
Lesson Frame:	We will identify how to multiply fractions.		
	I will attend to precision while multiplying fractions.		
Performance Tasks: Students will be able to apply the standard algorithm for fraction multiplication.	Notes:		
Topic 4:Multiplying mixed numbers	Length:1 day		
Lesson Frame:	We will compare the appropriateness of estimations versus exact answers.		
	I will use appropriate tools to understand multiplication of mixed numbers.		
Performance Tasks: Students will be able to compare multiplication strategies for mixed numbers.	Notes:		
Topic 5:Making sense of decimal multiplication	Length:1 day		
Lesson Frame:	We will assess the reasonableness of answers.		
	I will make sense of problems and persevere in solving them.		
Performance Tasks: Students will be able to multiply fractions, decimals and percents.	Notes:		
Topic 6:Fraction multiplication number sense	Length:1 day		
Lesson Frame:	We will identify multipliers that increase and decrease numbers.		
	I will reason abstractly and quantitatively to identify how multipliers impact numbers.		
Performance Tasks: Students will be able to understand the multiplying can increase and decrease a number.	Notes:		
Topic 7:Rearranging areas	Length:1 day		
Lesson Frame:	We will find areas of complex shapes by creating rectangles.		
	I will look for and make use of structure to compose and decompose shapes in order to find area.		
Performance Tasks: Students will be able to convert complex shapes into rectangles.	Notes:		
Topic 8:Area of parallelogram	Length:1 day		
Lesson Frame:	We will develop the area formula for parallelograms.		
	I will look for and make use of structure while identifying patterns in area to identify the formula for parallelogram.		
Performance Tasks: Students will be able to use composite shapes to find area.	Notes:		
Topic 9:Area of a triangle	Length:1 day		
Lesson Frame:	We will use relationships to create the formula for area of a triangle.		
	I will look for patterns in data to identify the formula for area of a triangle.		
Performance Tasks: Students will be able to identify that rectangles and parallelograms are made up of repeated triangles.	Notes:		
Topic 10:Area of a trapezoid	Length:1 day		
Lesson Frame:	We will develop strategies for finding the area of trapezoids.		
	I will look for and make use of structure to develop the formula for area of a trapezoid.		

Unit Name:Multiplying fractions and area	Length:16 days		
Standards:M.6.RP.A.3cM.6.NS.A.1M.6.G.A.1M.6.NS.B.3	Outcomes:Students will discover how to multiply fractions, mixed numbers, and decimals.		
Essential Questions:How can I break it into smaller pieces?	Learning Targets:Students will be able to find the areas of shapes, including rectangles, triangles, parallelograms, and trapezoids.		
Performance Tasks: Students will be able to find the area of trapezoids.	Notes:		

Unit Name:Dividing and building expressions	Length:17 days		
Standards:M.6.EE.A.1M.6.EE.A.2bM.6.EE.A.2cM.6.EE.A.3M.6.EE.A.4M.6.EE.B.6M.6.NS.A.1M.6.NS.B.2	Outcomes:Students will use the order of operations to find the correct value of a numerical expression.		
Essential Questions:Are these representations equivalent?	Learning Targets:Students will be able to combine like terms and simplify algebraic expressions.		
Topic 1:Dividing	Length:2 days		
Lesson Frame:	We will use visual fraction models and equations to represent division.		
	I will make sense of fair share problems and persevere in solving them.		
Performance Tasks: Students will be able to divide quantities and represent the result in multiple ways.	Notes:		
Topic 2:Fractions as division problems	Length:1 day		
Lesson Frame:	We will construct various visual modles to represent division problems, including long division.		
	I will make sense of and persevere in solving long division problems.		
Performance Tasks: Students will be able to see that a fraction can be seen as one number formed by divison.	Notes:		
Topic 3:Problem solving with division	Length:2 days		
Lesson Frame:	We will solve division problems and check answers using multiplication.		
	I will make sense of problems and persevere in solving them by using verbal descriptions and drawing diagrams.		
Performance Tasks: Students will be able to identify problems that can be solved using division.	Notes:		
Topic 4:Solving problems involving fraction division	Length:2 days		
Lesson Frame:	We will represent fraction division problems in multiple ways.		
	I will reason quantitatively to make sense of division problems and persevere in solving them.		
Performance Tasks: Students will be able to divide fractions.	Notes:		
Topic 5:Order of operations	Length:2 days		
Lesson Frame:	We will evaluate expressions with whole number operations.		
	I will use mathematical structure in solving order of operation problems.		
Performance Tasks: Students will be able to solve real world problems using the order of operations.	Notes:		
Topic 6:Area of a rectangular shape	Length:1 day		
Lesson Frame:	We will find that area of algebra tiles using variables and constants.		
	I will use the appropriate tool to find the area of rectangles.		
Performance Tasks: Students will be able to use variables to represent unknown lengths.	Notes:		
Topic 7:Naming perimeters of algebra tiles	Length:1 day		
Lesson Frame:	We will find the perimeter of a shape by finding the side lengths of the algebra tiles.		
	I will look for and express regularity in repeated reasoning as I combine like terms to find area.		
Performance Tasks: Students will be able to combine like terms through sorting.	Notes:		
Topic 8:Combining like terms	Length:1 day		
Lesson Frame:	We will find the perimeter of complex figures composed of algebra tiles.		
	I will make use of mathematical structure of variables and combining like terms.		
Performance Tasks: Students will be able to find equivalent expression to find perimeter.	Notes:		
Topic 9:Evaluating algebraic expressions	Length:1 day		
Lesson Frame:	We will evaluate expressions by combining like terms.		
	I will look for and make use of structure to find areas of irregular shapes.		
Performance Tasks: Students will be able to visually demonstrate that x can represent any number.	Notes:		

Unit Name:Rates and operations	Length:16 days
Standards:M.6.EE.A.2aM.6.EE.A.3M.6.EE.B.5M.6.EE.B.6M.6.EE.B.7M.6.EE.B.8M.6.NS.A.1M.6.NS.B.3M.6.RP.A.2M.6.RP.A.3a	Outcomes:Students will calculate rates, including unit rates.
Essential Questions:What does the comparison tell me?	Learning Targets:Students will be able to rewrite expressions by combining like terms and using the distributive property.
Topic 1:Comparing rates	Length:1 day
Lesson Frame:	We will convert ratios into different units in order to compare rates.
	I will make sense of structure in order to compare rates.
Performance Tasks: Students will be able to compare rates that are not unit rates.	Notes:
Topic 2:Comparing rates with tables and graphs	Length:1 day
Lesson Frame:	We will use tables and graphes to compare rates when numerical comparisons are cumbersome.
	I will construct viable arguments on when tables and graphs should be used to compare rates.
Performance Tasks: Students will be able to compare rates using tables and graphs.	Notes:
Topic 3:Unit rates	Length:1 day
Lesson Frame:	We will use tables and graphes to calculate unit rates.
	I will make sense of problems involving rates.
Performance Tasks: Students will be able to calculate unit rates.	Notes:
Topic 4:Analyzing strategies for dividing fractions	Length:1 day
Lesson Frame:	We will analyze and apply the common denominator method of fraction division.
	I will make sense of division of fractions and persevere in solving problems involving them.
Performance Tasks: Students will be able to divide fractions.	Notes:
Topic 5:Another strategy for division	Length:1 day
Lesson Frame:	We will identify that multiplying by the reciprical is the same as dividing.
	I will make sense of traditional algorithms in order to divide fractions.
Performance Tasks: Students will be able to divide fractions by invert and multiply.	Notes:
Topic 6:Division with fractions and decimals	Length:1 day
Lesson Frame:	We will connect fraction division with decimal division.
	I will use the appropriate tools when dividing fractions.
Performance Tasks: Students will be able to divide fractions using the giant one.	Notes:
Topic 7:Fraction division as ratios	Length:1 day
Lesson Frame:	We will explore the connections between ratios and dividing fractions.
	I will reason abstractlya nd quantitatively to make sense of problems involving dividing fractions.
Performance Tasks: Students will be able to connect ratios with fraction division.	Notes:
Topic 8:Inverse operations	Length:1 day
Lesson Frame:	We will represent the steps in a math problem using algebraic expressions.
	I will look for and make use of structure when using inverses.
Performance Tasks: Students will be able to apply inverse operations to numbers.	Notes:
Topic 9:Distributive property	Length:1 day
Lesson Frame:	We will explore the distributive property to create equivalent pictures and expressions.
	I will look for and make use of the structure of inverses and the use of algebraic expressions.
Performance Tasks: Students will be able to translate math steps into expressions.	Notes:
Topic 10:Distributive property and expressions vocabulary	Length:1 day
Lesson Frame:	We will use the distributive property in reverse to identify parts of an expression.
	I will make use of structure in order to use the distributive property.
Performance Tasks: Students will be able to translate math into steps of the distributive property.	Notes:

Unit Name:Rates and operations	Length:16 days		
Standards:M.6.EE.A.2aM.6.EE.A.3M.6.EE.B.5M.6.EE.B.6M.6.EE.B.7M.6.EE.B.8M.6.NS.A.1M.6.NS.B.3M.6.RP.A.2M.6.RP.A.3a	Outcomes:Students will calculate rates, including unit rates.		
Essential Questions:What does the comparison tell me?	Learning Targets:Students will be able to rewrite expressions by combining like terms and using the distributive property.		
Topic 11: Writing algebraic equations and inequalities	Length:2 days		
Lesson Frame:	We will informally solve equations and inequalities.		
	I will solve equations and inequalities by modeling with mathematics.		
Performance Tasks: Students will be able to create equations and inequalities to represent real world situations.	Notes:		

Unit Name:Statistics and multiplication equations	Length:16 days
Standards:M.6.EE.B.7M.6.EE.C.9M.6.RP.A.3bM.6.RP.A.3dM.6.SP.A.1M.6.SP.A.2M.6.SP.A.3M.6.SP.B.4M.6.SP.B.5a	Outcomes:Students will use measures of central tendency, histograms, stem and leaf plots, and box plots to represent and compare data.
Essential Questions:What is the best representation?	Learning Targets:Students will be able to solve problems using distance, rate and time.
Topic 1:Measures of central tendancy	Length:1 day
Lesson Frame:	We will develop methods for finding mean, median, and range of data.
	I will analyze the relationship between mean, median, and range.
Performance Tasks: Students will be able to identify the measures of central tendency.	Notes:
Topic 2:Choosing mean or median	Length:2 days
Lesson Frame:	We will choose between median and mean to describe the middle value in a distribuation of data.
	I will graph data and make sense of the problem it is representing.
Performance Tasks: Students will be able to use mean, median, and range to compare two sets of data.	Notes:
Topic 3:Shape and spread	Length:1 day
Lesson Frame:	We will identify the mean absolute deviation from a set of data.
	I will attend to rpecision while identifying average distance from a graph.
Performance Tasks: Students will be able to be able to identify the average distance.	Notes:
Topic 4:Box plots and interquartile range	Length:2 days
Lesson Frame:	We will interpret box plots and compare sets of data.
	I will make sense of data sets including box blots.
Performance Tasks: Students will be able to construct box plots.	Notes:
Topic 5:Comparing and choosing representations	Length:1 day
Lesson Frame:	We will determine what kinds of information different representatiosn will provide.
	I will make sense of data sets by comparing histograms, stem and leaf plots, and box plots.
Performance Tasks: Students will be able to create three representations for a single set of data.	Notes:
Topic 6:Statistical questions	Length:2 days
Lesson Frame:	We will anticipate variability in answers using statistical questions.
	I will use appropriate tools strategically to identify statistical questions.
Performance Tasks: Students will be able to identify statistical questions.	Notes:
Topic 7:Writing multiplication equations	Length:1 day
Lesson Frame:	We will solve equations in the from of ax=b.
	I will attend to precision while solving equations.
Performance Tasks: Students will be able to write and solve variable equations.	Notes:
Topic 8:Distance, rate, and time	Length:1 day
Lesson Frame:	We will use d=rt to solve word problems.
	I will look for and make use of structure to solve distance word problems.
Performance Tasks: Students will be able to identify the relationship between distance, rate and time.	Notes:
Topic 9:Unit conversion	Length:1 day
Lesson Frame:	We will understand the importance of units when comparing rates.
	I will make sense of problems and attend to precision when converting units in order to compare rates.
Performance Tasks: Students will be able to solve problems with different units.	Notes:

Unit Name:Volume and Percents	Length:19 days
Standards:M.6.G.A.2M.6.G.A.4M.6.RP.A.3c	Outcomes:Students will find the volume of three dimensional solids, known as right prisms.
Essential Questions:Am I learning in one, two, or three dimensions?	Learning Targets:Students will be able to find the surface area and volume of rectangular prisms.
Topic 1:Volume of a rectangular prism	Length:1 day
Lesson Frame:	We will identify that volume can be found by multiplying the area of the base times the height.
	I will look for and express repeated reasoning to develop the formula for volume of a rectangular prism.
Performance Tasks: Students will be able to calculate the volume of rectangular prisms.	Notes:
Topic 2:Nets and surface area	Length:1 day
Lesson Frame:	We will predict the appearance of three dimensional shapes given their net.
	I will calculate surface area of shapes made of rectangles and triangles.
Performance Tasks: Students will be able to create nets of shapes.	Notes:
Topic 3:Multiplicative growth and percents	Length:1 day
Lesson Frame:	We will use ratios and percents to solve multiplicative growth situations.
	I will attend to precision as I convert units to solve problems involving percents and ratios.
Performance Tasks: Students will be able to represent ratios and percents.	Notes:
Topic 4:Composition and decomposition of percents	Length:1 day
Lesson Frame:	We will solve problems involving parts, wholes, and percentages.
	I will use quantitative reasoning to solve problems.
Performance Tasks: Students will be able to determine the parts, whole, and percentages from a problem.	Notes:
Topic 5:Percent discounts	Length:2 days
Lesson Frame:	We will solve problems involving percent discounts and sale prices.
	I will use appropriate tools to find the cost of items on sale or discounted.
Performance Tasks: Students will be able to calculate percent discounts.	Notes:
Topic 6:Simple interest and tips	Length:1 day
Lesson Frame:	We will calculate total cost of items including tip.
	I will identify problems and persevere in solving them involving percents and interest.
Performance Tasks: Students will be able to find simple interest.	Notes:
Topic 7:Culminating portions challenge	Length:2 days
Lesson Frame:	We will solving puzzles involing adding, subtracting, multiplying and dividing fractions.
	I will make sense of fraction problems and persevere in solving them.
Performance Tasks: Students will be able to solve problems involving fractions.	Notes:
Topic 8:Representing and predicting patterns	Length:2 days
Lesson Frame:	We will use area and perimeter to solve real world problems.
	I will make sense of area and perimeter problems and persevere in solving them.
Performance Tasks: Students will be able to solve a problem involving area and perimeter.	Notes:
Topic 9:Analyzing data to identify a trend	Length:2 days
Lesson Frame:	We will convert measurements in order to compare data represented in multiple ways.
	I will reason abstractly and quantitatively in order to compare data from different representations.
Performance Tasks: Students will be able to graph and analyze data.	Notes:

September	October	November	December	January	February	March	April	May	June
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	

Course Name:	Course 1		
Credits:	1		
Prerequisites:	5th Grade		
Description:	In this course, students will work in cooperative groups to solve problems, explain their thinking, and listen to others explanations on their thinking.		
Academic Standards:	See Unit List		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Introduction and representation	14 days	M.6.G.A.1M.6.SP.B.4M.6.EE.A.1M.6.NS.B.4,	Outcomes:Students will organize data and use mathematical reasoning to make predictions
Arithmetic strategies and area	13 days	M.6.EE.A.3M.6.G.A.1M.6.NS.B.4	Outcomes:Students will investigate area and how to measure it.
Portions and integers	16 days	M.6.G.A.3M.6.NS.B.3M.6.NS.B.4M.6.NS.C.5M.6.NS.C.6aM.6.NS.C.6bM.6.NS.C.6cM.6.NS.C.7aM.6.NS.C.7bM.6.NS.C.7cM.6.NS.C.7dM.6.NS.C.8M.6.RP.A.1	Outcomes:Students will use percents, decimals, and frations to describe a portion of a whole.
Variables and ratios	12 days	M.6.EE.A.4M.6.EE.A.2aM.6.EE.A.2cM.6.EE.A.4M.6.EE.B.6M.6.RP.A.1	Outcomes:Students will use variables to generalize and to represent unknown quantities.
Multiplying fractions and area	16 days	M.6.RP.A.3cM.6.NS.A.1M.6.G.A.1M.6.NS.B.3	Outcomes:Students will discover how to multiply fractions, mixed numbers, and decimals.
Dividing and building expressions	17 days	M.6.EE.A.1M.6.EE.A.2bM.6.EE.A.2cM.6.EE.A.3M.6.EE.A.4M.6.EE.B.6M.6.NS.A.1M.6.NS.B.2	Outcomes:Students will use the order of operations to find the correct value of a numerical expression.
Rates and operations	16 days	M.6.EE.A.2aM.6.EE.A.3M.6.EE.B.5M.6.EE.B.6M.6.EE.B.7M.6.EE.B.8M.6.NS.A.1M.6.NS.B.3M.6.RP.A.2M.6.RP.A.3a	Outcomes:Students will calculate rates, including unit rates.
Statistics and multiplication equations	16 days	M.6.EE.B.7M.6.EE.C.9M.6.RP.A.3bM.6.RP.A.3dM.6.SP.A.1M.6.SP.A.2M.6.SP.A.3M.6.SP.B.4M.6.SP.B.5a	Outcomes:Students will use measures of central tendency, histograms, stem and leaf plots, and box plots to represent and compare data.
Volume and Percents	19 days	M.6.G.A.2M.6.G.A.4M.6.RP.A.3c	Outcomes:Students will find the volume of three dimensional solids, known as right prisms.

Unit Name:Introduction and representation	Length:14 days		
Standards:M.6.G.A.1M.6.SP.B.4M.6.EE.A.1M.6.NS.B.4,	Outcomes:Students will organize data and use mathematical reasoning to make predictions		
Essential Questions:What can I ask about this problem?	Learning Targets:Students will be able to develop several ways to represent mathematical ideas.		
Topic 1:Visualizing information	Length:1 day		
Lesson Frame:	We will identify strengths and weaknesses of scatterplots and histograms.		
	I will pracice precision while communicating my observations of different graphs.		
Performance Tasks: Students will be able to analyze histograms.	Notes:		
Topic 2:Perimeter and area relationships	Length:1 day		
Lesson Frame:	We will experiment with changing area while keeping the perimeter the same.		
	I will construct viable arguments to describe the impact on the area of a shape when I change the measurements without changing the perimeter.		
Performance Tasks: Students will be able to look for relationships between perimeter and area.	Notes:		
Topic 3:Describing and extending patterns	Length:1 day		
Lesson Frame:	We will make predictions based on extending patterns.		
	I will look for and make sense of structure while observing patterns.		
Performance Tasks: Students will be able to extend patterns.	Notes:		
Topic 4:Representing data	Length:1 day		
Lesson Frame:	We will explore ways to organize data to answer different questions.		
	I will reason abstractly and quantitatively to make sense of data.		
Performance Tasks: Students will be able to generate questions about data.	Notes:		
Topic 5:Making sense of a logic problem	Length:1 day		
Lesson Frame:	We will justify a conjecture as we make sense of logic problems.		
	I will explain conjectures using words, symbols, diagrams and models.		
Performance Tasks: Students will be able to make conjectures.	Notes:		
Topic 6:Multiple representations	Length:1 day		
Lesson Frame:	We will represent quantities with words, symbols, and diagrams.		
	I will look for structure as I compare quantities.		
Performance Tasks: Students will be able to decompose quantities into sums of parts.	Notes:		
Topic 7:Representing comparisons	Length:1 day		
Lesson Frame:	We will use appropriate symbol notations when comparing expressions.		
	I will make use of structures to compare and contrast decomposed quantities.		
Performance Tasks: Students will be able to compare values of numerical expressions.	Notes:		
Topic 8:Characteristics of numbers	Length:1 day		
Lesson Frame:	We will categorize numbers as prime, composite, odd and even.		
	I will make use of structure when categorizing numbers.		
Performance Tasks: Students will be able to represent whole numbers with rectangular arrays.	Notes:		
Topic 9:Products, factors, and factor pairs	Length:2 days		
Lesson Frame:	We will write numbers as products of their prime factors using exponents.		
	I will look for and express regularity in repeated reasoning as I notice repeated multiplication of factors.		
Performance Tasks: Students will be able to extend multiplication tables in order to understand factors, factor pairs, and properties of numbers.	Notes:		

Unit Name:Arithmetic strategies and area	Length:13 days
Standards:M.6.EE.A.3M.6.G.A.1M.6.NS.B.4	Outcomes:Students will investigate area and how to measure it.
Essential Questions:How do area and perimeter change?	Learning Targets:Students will be able to explore the relationship between area and perimeter.
Topic 1:Dot plots and bar graphs	Length:1 day
Lesson Frame:	We will identify strengths and weaknesses of various graphical representations.
	I will focus on diffferent modeling of data.
Performance Tasks: Students will be able to analyze graphs.	Notes:
Topic 2:histograms and stem and leaf plots	Length:1 day
Lesson Frame:	We will create ste and leaf plots and histograms.
	I will make sense of data and model it in the appropriate graph.
Performance Tasks: Students will be able to collect data and display data.	Notes:
Topic 3:Exploring area	Length:1 day
Lesson Frame:	We will develop strategies for measuring area of closed two dimensional regions.
	I will use the appropriate tool strategically in order to find the are of a region.
Performance Tasks: Students will be able to explore the concept of area.	Notes:
Topic 4:Square units and area of rectangles	Length:1 day
Lesson Frame:	We will understand area as it is related to standard units of measurement.
	I will attend to precision while finding measurements in order to find area.
Performance Tasks: Students will be able to understand standard units of measurement.	Notes:
Topic 5:Area and perimeter	Length:1 day
Lesson Frame:	We will identify how composing and decomposing area affects perimeter.
	I will attend to precision while idenifying relationships between area and perimeter.
Performance Tasks: Students will be able to compose and decompose area.	Notes:
Topic 6:Using rectangles to multiply	Length:1 day
Lesson Frame:	We will use area models to represent multiplication of mulit-digit numbers.
	I will reason quantitatively while working with generic rectangles.
Performance Tasks: Students will be able to use generic rectangles to find area.	Notes:
Topic 7:Using generic rectangles	Length:1 day
Lesson Frame:	We will multiply mult-digit numbers using generic rectangles.
	I will reason quantitatively while multiply multi-digit numbers.
Performance Tasks: Students will be able to multiply multi-digit numbers.	Notes:
Topic 8:Generic rectangles and greatest common factor	Length:1 day
Lesson Frame:	We will use the GCF to find dimensions of generic rectangles.
	I will look for structure while developing the idea of distribution.
Performance Tasks: Students will be able to define the greatest common factor.	Notes:
Topic 9:Distributive property	Length:1 day
Lesson Frame:	We will use generic rectangles to discover the distributive property.
	I will make use of structure while applying the distributive property.
Performance Tasks: Students will be able to apply the distributive property.	Notes:

Unit Name:Portions and integers	Length:16 days		
Standards:M.6.G.A.3M.6.NS.B.3M.6.NS.B.4M.6.NS.C.5M.6.NS.C.6aM.6.NS.C.6bM.6.NS.C.6cM.6.NS.C.7aM.6.NS.C.7bM.6.NS.C.7cM.6.NS.C.7dM.6.NS.C.8M.6.RP.A.1	Outcomes:Students will use percents, decimals, and frations to describe a portion of a whole.		
Essential Questions:How is it the same or different?	Learning Targets:Students will be able to represent portions as percents, decimals, and fractions with pictures, symbols, and words.		
Topic 1:Using the multiplicative identity	Length:2 days		
Lesson Frame:	We will use multiplicative identity to find equivalent fractions.		
	I will use the appropriate tool in order to find equivalent fractions.		
Performance Tasks: Students will be able to create equivalent fractions.	Notes:		
Topic 2:Portions as percents	Length:1 day		
Lesson Frame:	We will compare portions of a while in order to understand percents.		
	I will use appropriate tools, such as a percent ruler, to understand percents.		
Performance Tasks: Students will be able to develop and understanding of percents.	Notes:		
Topic 3:Connecting percents with decimals and fractions	Length:2 days		
Lesson Frame:	We will identify the connections between fractions, percents, and decimals.		
	I will make use of structure to connect fractions, percents, and decimals.		
Performance Tasks: Students will be able to recognize the connections between fractions and percents.	Notes:		
Topic 4:Multiple representations of a portion	Length:1 day		
Lesson Frame:	We will make sense of standard algorithms for adding and subtracting decimals.		
	I will attend to precision while adding and subtracting decimals.		
Performance Tasks: Students will be able to develop methods to represent portions as percents, fractions, and decimals.	Notes:		
Topic 5:Completing the web	Length:1 day		
Lesson Frame:	We will work with the 100% block model to move from fractions to decimals.		
	I will look for and express regularity in repeated reasoning while identifying patterns in the 100% block model.		
Performance Tasks: Students will be able to move between equivalent forms of portions.	Notes:		
Topic 6:Investigation ratios	Length:1 day		
Lesson Frame:	We will use diagrams and ratio tables to represent ratios.		
	I will make sense of problems and persevere in solving ratio representations.		
Performance Tasks: Students will be able to use ration language to describe a relationship between two quantities.	Notes:		
Topic 7:Addition, subtraction, and opposites	Length:1 day		
Lesson Frame:	We will use number lines to recognize opposites.		
	I will make sense of addition and subtraction of positive whole numbers using a number line.		
Performance Tasks: Students will be able to connect movement on a number line with adding and subtracting.	Notes:		
Topic 8:Locating negative numbers	Length:1 day		
Lesson Frame:	We will make statements about the relative size of numbers using inequalities.		
	I will use an appropriate tool to make sense of comparing rational numbers.		
Performance Tasks: Students will be able to position rational numbers on a number line.	Notes:		
Topic 9:Absolute value	Length:1 day		
Lesson Frame:	We will compare rational numbers using inqualities in contextual situations.		
	I will make use of structure in mathematics in using absolute value operations.		
Performance Tasks: Students will be able to understand the meaning of absolute value.	Notes:		
Topic 10:Length on a coordinate graph	Length:1 day		
Lesson Frame:	We will use coordinates to find length of sides.		
	I will make use of structure and absolute value to find side lengths.		

Unit Name:Portions and integers	Length:16 days		
Standards:M.6.G.A.3M.6.NS.B.3M.6.NS.B.4M.6.NS.C.5M.6.NS.C.6aM.6.NS.C.6bM.6.NS.C.6cM.6.NS.C.7aM.6.NS.C.7bM.6.NS.C.7cM.6.NS.C.7dM.6.NS.C.8M.6.RP.A.1	Outcomes:Students will use percents, decimals, and frations to describe a portion of a whole.		
Essential Questions:How is it the same or different?	Learning Targets:Students will be able to represent portions as percents, decimals, and fractions with pictures, symbols, and words.		
Performance Tasks: Students will be able to draw polygons on a coordinate plane.	Notes:		

Unit Name:Variables and ratios	Length:12 days		
Standards:M.6.EE.A.4M.6.EE.A.2aM.6.EE.A.2cM.6.EE.A.4M.6.EE.B.6M.6.RP.A.1	Outcomes:Students will use variables to generalize and to represent unknown quantities.		
Essential Questions:How can I change the size but keep the same shape?	Learning Targets:Students will be able to find the value of an algebraic expression when the value of the variable is known.		
Topic 1:Introduction to variables	Length:1 day		
Lesson Frame:	We will evalute expressions and solve for unknowns.		
	I will reason abstractly and quantitatively to evaluate expressions.		
Performance Tasks: Students will be able to represent unknown quantities as variables.	Notes:		
Topic 2:Writing equivalent expressions	Length:1 day		
Lesson Frame:	We will make general statements about how to count the number of squares in a pattern.		
	I will look for and make use of structure while identifying patterns.		
Performance Tasks: Students will be able to compare multiple counting strategies.	Notes:		
Topic 3:Using variables to generalize	Length:2 days		
Lesson Frame:	We will use a variable to represent a set of solutions.		
	I will identify that two expressions are equivalent by evaluating them for specific values.		
Performance Tasks: Students will be able to find the number of small squares in and square frame pattern.	Notes:		
Topic 4:Enlarging two dimensional shapes	Length:1 day		
Lesson Frame:	We will examine the relationship between the original image and an enlarged image.		
	I will attend to precision while enlarging shapes.		
Performance Tasks: Students will be able to enlarge and image.	Notes:		
Topic 5:Enlarging and reducing figures	Length:1 day		
Lesson Frame:	We will make use of structure to identify patterns between original shapes and enlarged shapes.		
	I will make sense of problems to identify similarity and multiplicative property.		
Performance Tasks: Students will be able to identify that enlarging a shape means to multiply the original sides by the same number.	Notes:		
Topic 6:Enlargement and reduction ratios	Length:1 day		
Lesson Frame:	We will use ratios to make similar figures.		
	I will reason abstractly and quantitivly while creating similar figures.		
Performance Tasks: Students will be able to compose similar figures.	Notes:		
Topic 7:Ratios in other situations	Length:1 day		
Lesson Frame:	We will use ratios in non-geometric real life contexts.		
	I will make sense of ration problems and persevere in solving them.		
Performance Tasks: Students will be able to use ratios to solve problems.	Notes:		

Unit Name:Multiplying fractions and area	Length:16 days		
Standards:M.6.RP.A.3cM.6.NS.A.1M.6.G.A.1M.6.NS.B.3	Outcomes:Students will discover how to multiply fractions, mixed numbers, and decimals.		
Essential Questions:How can I break it into smaller pieces?	Learning Targets:Students will be able to find the areas of shapes, including rectangles, triangles, parallelograms, and trapezoids.		
Topic 1:Representing fraction multiplication	Length:1 day		
Lesson Frame:	We will use area models to solve multiplication problems.		
	I will make senseof multiplication of fractions to solve problems.		
Performance Tasks: Students will be able to solve multiplication problems in context.	Notes:		
Topic 2:Describing parts of parts	Length:1 day		
Lesson Frame:	We will develop the standard algorithm for multiplying fractions.		
	I will make sense of problems and persevere in solving fraction problems.		
Performance Tasks: Students will be able to use models to multiply fractions.	Notes:		
Topic 3:Calculating parts of parts	Length:1 day		
Lesson Frame:	We will identify how to multiply fractions.		
	I will attend to precision while multiplying fractions.		
Performance Tasks: Students will be able to apply the standard algorithm for fraction multiplication.	Notes:		
Topic 4:Multiplying mixed numbers	Length:1 day		
Lesson Frame:	We will compare the appropriateness of estimations versus exact answers.		
	I will use appropriate tools to understand multiplication of mixed numbers.		
Performance Tasks: Students will be able to compare multiplication strategies for mixed numbers.	Notes:		
Topic 5:Making sense of decimal multiplication	Length:1 day		
Lesson Frame:	We will assess the reasonableness of answers.		
	I will make sense of problems and persevere in solving them.		
Performance Tasks: Students will be able to multiply fractions, decimals and percents.	Notes:		
Topic 6:Fraction multiplication number sense	Length:1 day		
Lesson Frame:	We will identify multipliers that increase and decrease numbers.		
	I will reason abstractly and quantitatively to identify how multipliers impact numbers.		
Performance Tasks: Students will be able to understand the multiplying can increase and decrease a number.	Notes:		
Topic 7:Rearranging areas	Length:1 day		
Lesson Frame:	We will find areas of complex shapes by creating rectangles.		
	I will look for and make use of structure to compose and decompose shapes in order to find area.		
Performance Tasks: Students will be able to convert complex shapes into rectangles.	Notes:		
Topic 8:Area of parallelogram	Length:1 day		
Lesson Frame:	We will develop the area formula for parallelograms.		
	I will look for and make use of structure while identifying patterns in area to identify the formula for parallelogram.		
Performance Tasks: Students will be able to use composite shapes to find area.	Notes:		
Topic 9:Area of a triangle	Length:1 day		
Lesson Frame:	We will use relationships to create the formula for area of a triangle.		
	I will look for patterns in data to identify the formula for area of a triangle.		
Performance Tasks: Students will be able to identify that rectangles and parallelograms are made up of repeated triangles.	Notes:		
Topic 10:Area of a trapezoid	Length:1 day		
Lesson Frame:	We will develop strategies for finding the area of trapezoids.		
	I will look for and make use of structure to develop the formula for area of a trapezoid.		

Unit Name:Multiplying fractions and area	Length:16 days		
Standards:M.6.RP.A.3cM.6.NS.A.1M.6.G.A.1M.6.NS.B.3	Outcomes:Students will discover how to multiply fractions, mixed numbers, and decimals.		
Essential Questions:How can I break it into smaller pieces?	Learning Targets:Students will be able to find the areas of shapes, including rectangles, triangles, parallelograms, and trapezoids.		
Performance Tasks: Students will be able to find the area of trapezoids.	Notes:		

Unit Name:Dividing and building expressions	Length:17 days		
Standards:M.6.EE.A.1M.6.EE.A.2bM.6.EE.A.2cM.6.EE.A.3M.6.EE.A.4M.6.EE.B.6M.6.NS.A.1M.6.NS.B.2	Outcomes:Students will use the order of operations to find the correct value of a numerical expression.		
Essential Questions:Are these representations equivalent?	Learning Targets:Students will be able to combine like terms and simplify algebraic expressions.		
Topic 1:Dividing	Length:2 days		
Lesson Frame:	We will use visual fraction models and equations to represent division.		
	I will make sense of fair share problems and persevere in solving them.		
Performance Tasks: Students will be able to divide quantities and represent the result in multiple ways.	Notes:		
Topic 2:Fractions as division problems	Length:1 day		
Lesson Frame:	We will construct various visual modles to represent division problems, including long division.		
	I will make sense of and persevere in solving long division problems.		
Performance Tasks: Students will be able to see that a fraction can be seen as one number formed by divison.	Notes:		
Topic 3:Problem solving with division	Length:2 days		
Lesson Frame:	We will solve division problems and check answers using multiplication.		
	I will make sense of problems and persevere in solving them by using verbal descriptions and drawing diagrams.		
Performance Tasks: Students will be able to identify problems that can be solved using division.	Notes:		
Topic 4:Solving problems involving fraction division	Length:2 days		
Lesson Frame:	We will represent fraction division problems in multiple ways.		
	I will reason quantitatively to make sense of division problems and persevere in solving them.		
Performance Tasks: Students will be able to divide fractions.	Notes:		
Topic 5:Order of operations	Length:2 days		
Lesson Frame:	We will evaluate expressions with whole number operations.		
	I will use mathematical structure in solving order of operation problems.		
Performance Tasks: Students will be able to solve real world problems using the order of operations.	Notes:		
Topic 6:Area of a rectangular shape	Length:1 day		
Lesson Frame:	We will find that area of algebra tiles using variables and constants.		
	I will use the appropriate tool to find the area of rectangles.		
Performance Tasks: Students will be able to use variables to represent unknown lengths.	Notes:		
Topic 7:Naming perimeters of algebra tiles	Length:1 day		
Lesson Frame:	We will find the perimeter of a shape by finding the side lengths of the algebra tiles.		
	I will look for and express regularity in repeated reasoning as I combine like terms to find area.		
Performance Tasks: Students will be able to combine like terms through sorting.	Notes:		
Topic 8:Combining like terms	Length:1 day		
Lesson Frame:	We will find the perimeter of complex figures composed of algebra tiles.		
	I will make use of mathematical structure of variables and combining like terms.		
Performance Tasks: Students will be able to find equivalent expression to find perimeter.	Notes:		
Topic 9:Evaluating algebraic expressions	Length:1 day		
Lesson Frame:	We will evaluate expressions by combining like terms.		
	I will look for and make use of structure to find areas of irregular shapes.		
Performance Tasks: Students will be able to visually demonstrate that x can represent any number.	Notes:		

Unit Name:Rates and operations	Length:16 days
Standards:M.6.EE.A.2aM.6.EE.A.3M.6.EE.B.5M.6.EE.B.6M.6.EE.B.7M.6.EE.B.8M.6.NS.A.1M.6.NS.B.3M.6.RP.A.2M.6.RP.A.3a	Outcomes:Students will calculate rates, including unit rates.
Essential Questions:What does the comparison tell me?	Learning Targets:Students will be able to rewrite expressions by combining like terms and using the distributive property.
Topic 1:Comparing rates	Length:1 day
Lesson Frame:	We will convert ratios into different units in order to compare rates.
	I will make sense of structure in order to compare rates.
Performance Tasks: Students will be able to compare rates that are not unit rates.	Notes:
Topic 2:Comparing rates with tables and graphs	Length:1 day
Lesson Frame:	We will use tables and graphes to compare rates when numerical comparisons are cumbersome.
	I will construct viable arguments on when tables and graphs should be used to compare rates.
Performance Tasks: Students will be able to compare rates using tables and graphs.	Notes:
Topic 3:Unit rates	Length:1 day
Lesson Frame:	We will use tables and graphes to calculate unit rates.
	I will make sense of problems involving rates.
Performance Tasks: Students will be able to calculate unit rates.	Notes:
Topic 4:Analyzing strategies for dividing fractions	Length:1 day
Lesson Frame:	We will analyze and apply the common denominator method of fraction division.
	I will make sense of division of fractions and persevere in solving problems involving them.
Performance Tasks: Students will be able to divide fractions.	Notes:
Topic 5:Another strategy for division	Length:1 day
Lesson Frame:	We will identify that multiplying by the reciprical is the same as dividing.
	I will make sense of traditional algorithms in order to divide fractions.
Performance Tasks: Students will be able to divide fractions by invert and multiply.	Notes:
Topic 6:Division with fractions and decimals	Length:1 day
Lesson Frame:	We will connect fraction division with decimal division.
	I will use the appropriate tools when dividing fractions.
Performance Tasks: Students will be able to divide fractions using the giant one.	Notes:
Topic 7:Fraction division as ratios	Length:1 day
Lesson Frame:	We will explore the connections between ratios and dividing fractions.
	I will reason abstractlya nd quantitatively to make sense of problems involving dividing fractions.
Performance Tasks: Students will be able to connect ratios with fraction division.	Notes:
Topic 8:Inverse operations	Length:1 day
Lesson Frame:	We will represent the steps in a math problem using algebraic expressions.
	I will look for and make use of structure when using inverses.
Performance Tasks: Students will be able to apply inverse operations to numbers.	Notes:
Topic 9:Distributive property	Length:1 day
Lesson Frame:	We will explore the distributive property to create equivalent pictures and expressions.
	I will look for and make use of the structure of inverses and the use of algebraic expressions.
Performance Tasks: Students will be able to translate math steps into expressions.	Notes:
Topic 10:Distributive property and expressions vocabulary	Length:1 day
Lesson Frame:	We will use the distributive property in reverse to identify parts of an expression.
	I will make use of structure in order to use the distributive property.
Performance Tasks: Students will be able to translate math into steps of the distributive property.	Notes:

Unit Name:Rates and operations	Length:16 days		
Standards:M.6.EE.A.2aM.6.EE.A.3M.6.EE.B.5M.6.EE.B.6M.6.EE.B.7M.6.EE.B.8M.6.NS.A.1M.6.NS.B.3M.6.RP.A.2M.6.RP.A.3a	Outcomes:Students will calculate rates, including unit rates.		
Essential Questions:What does the comparison tell me?	Learning Targets:Students will be able to rewrite expressions by combining like terms and using the distributive property.		
Topic 11: Writing algebraic equations and inequalities	Length:2 days		
Lesson Frame:	We will informally solve equations and inequalities.		
	I will solve equations and inequalities by modeling with mathematics.		
Performance Tasks: Students will be able to create equations and inequalities to represent real world situations.	Notes:		

Unit Name:Statistics and multiplication equations	Length:16 days
Standards:M.6.EE.B.7M.6.EE.C.9M.6.RP.A.3bM.6.RP.A.3dM.6.SP.A.1M.6.SP.A.2M.6.SP.A.3M.6.SP.B.4M.6.SP.B.5a	Outcomes:Students will use measures of central tendency, histograms, stem and leaf plots, and box plots to represent and compare data.
Essential Questions:What is the best representation?	Learning Targets:Students will be able to solve problems using distance, rate and time.
Topic 1:Measures of central tendancy	Length:1 day
Lesson Frame:	We will develop methods for finding mean, median, and range of data.
	I will analyze the relationship between mean, median, and range.
Performance Tasks: Students will be able to identify the measures of central tendency.	Notes:
Topic 2:Choosing mean or median	Length:2 days
Lesson Frame:	We will choose between median and mean to describe the middle value in a distribuation of data.
	I will graph data and make sense of the problem it is representing.
Performance Tasks: Students will be able to use mean, median, and range to compare two sets of data.	Notes:
Topic 3:Shape and spread	Length:1 day
Lesson Frame:	We will identify the mean absolute deviation from a set of data.
	I will attend to rpecision while identifying average distance from a graph.
Performance Tasks: Students will be able to be able to identify the average distance.	Notes:
Topic 4:Box plots and interquartile range	Length:2 days
Lesson Frame:	We will interpret box plots and compare sets of data.
	I will make sense of data sets including box blots.
Performance Tasks: Students will be able to construct box plots.	Notes:
Topic 5:Comparing and choosing representations	Length:1 day
Lesson Frame:	We will determine what kinds of information different representatiosn will provide.
	I will make sense of data sets by comparing histograms, stem and leaf plots, and box plots.
Performance Tasks: Students will be able to create three representations for a single set of data.	Notes:
Topic 6:Statistical questions	Length:2 days
Lesson Frame:	We will anticipate variability in answers using statistical questions.
	I will use appropriate tools strategically to identify statistical questions.
Performance Tasks: Students will be able to identify statistical questions.	Notes:
Topic 7:Writing multiplication equations	Length:1 day
Lesson Frame:	We will solve equations in the from of ax=b.
	I will attend to precision while solving equations.
Performance Tasks: Students will be able to write and solve variable equations.	Notes:
Topic 8:Distance, rate, and time	Length:1 day
Lesson Frame:	We will use d=rt to solve word problems.
	I will look for and make use of structure to solve distance word problems.
Performance Tasks: Students will be able to identify the relationship between distance, rate and time.	Notes:
Topic 9:Unit conversion	Length:1 day
Lesson Frame:	We will understand the importance of units when comparing rates.
	I will make sense of problems and attend to precision when converting units in order to compare rates.
Performance Tasks: Students will be able to solve problems with different units.	Notes:

Unit Name:Volume and Percents	Length:19 days
Standards:M.6.G.A.2M.6.G.A.4M.6.RP.A.3c	Outcomes:Students will find the volume of three dimensional solids, known as right prisms.
Essential Questions:Am I learning in one, two, or three dimensions?	Learning Targets:Students will be able to find the surface area and volume of rectangular prisms.
Topic 1:Volume of a rectangular prism	Length:1 day
Lesson Frame:	We will identify that volume can be found by multiplying the area of the base times the height.
	I will look for and express repeated reasoning to develop the formula for volume of a rectangular prism.
Performance Tasks: Students will be able to calculate the volume of rectangular prisms.	Notes:
Topic 2:Nets and surface area	Length:1 day
Lesson Frame:	We will predict the appearance of three dimensional shapes given their net.
	I will calculate surface area of shapes made of rectangles and triangles.
Performance Tasks: Students will be able to create nets of shapes.	Notes:
Topic 3:Multiplicative growth and percents	Length:1 day
Lesson Frame:	We will use ratios and percents to solve multiplicative growth situations.
	I will attend to precision as I convert units to solve problems involving percents and ratios.
Performance Tasks: Students will be able to represent ratios and percents.	Notes:
Topic 4:Composition and decomposition of percents	Length:1 day
Lesson Frame:	We will solve problems involving parts, wholes, and percentages.
	I will use quantitative reasoning to solve problems.
Performance Tasks: Students will be able to determine the parts, whole, and percentages from a problem.	Notes:
Topic 5:Percent discounts	Length:2 days
Lesson Frame:	We will solve problems involving percent discounts and sale prices.
	I will use appropriate tools to find the cost of items on sale or discounted.
Performance Tasks: Students will be able to calculate percent discounts.	Notes:
Topic 6:Simple interest and tips	Length:1 day
Lesson Frame:	We will calculate total cost of items including tip.
	I will identify problems and persevere in solving them involving percents and interest.
Performance Tasks: Students will be able to find simple interest.	Notes:
Topic 7:Culminating portions challenge	Length:2 days
Lesson Frame:	We will solving puzzles involing adding, subtracting, multiplying and dividing fractions.
	I will make sense of fraction problems and persevere in solving them.
Performance Tasks: Students will be able to solve problems involving fractions.	Notes:
Topic 8:Representing and predicting patterns	Length:2 days
Lesson Frame:	We will use area and perimeter to solve real world problems.
	I will make sense of area and perimeter problems and persevere in solving them.
Performance Tasks: Students will be able to solve a problem involving area and perimeter.	Notes:
Topic 9:Analyzing data to identify a trend	Length:2 days
Lesson Frame:	We will convert measurements in order to compare data represented in multiple ways.
	I will reason abstractly and quantitatively in order to compare data from different representations.
Performance Tasks: Students will be able to graph and analyze data.	Notes:

I	Course 2		
Credits:	1		
Prerequisites:	6th Grade math(Course 1)		
Description:	In this couse, students will learn to use new models and methods to think about problems as well as solve them.		
Academic Standards:	M.7.EE.A.1M.7.EE.A.2M.7.EE.B.3M.7.EE.B.4aM.7.EE.B.4bM.7.G.A.1M.7.G.A.2M.7.G.A.3M.7.G.B.4M.7.G.B.5M.7.G.B.6M.7.NS.A.1aM.7.NS.A.1bM.7.NS.A.1c		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Probability	15 days	M.7.SP.C.5M.7.SP.C.6M.7.SP.C.7aM.7.SP.C.7bM.7.SP.C.8a	Outcomes:Students will find the likelihood that a specific event will occur.
Fractions and integer addition	15 days	M.7.NS.A.1aM.7.NS.A.1bM.7.NS.A.1dM.7.NS.A.2aM.7.NS.A.2d	Outcomes:Students will rewrite numbers in different forms in order to compare them.
Arithmetic Properties	14 days	M.7.NS.A.1cM.7.NS.A.1dM.7.NS.A.2aM.7.NS.A.2bM.7.NS.A.2cM.7.NS.A.3	Outcomes:Students will simplify expressions with multiple operations.
Proportions and Expressions	15 days	M.7.EE.A.1M.7.G.A.1M.7.RP.A.1M.7.RP.A.2aM.7.RP.A.2bM.7.RP.A.2cM.7.RP.A.2d	Outcomes:Students will find solutions to problems involving proportional relationships?
Probability and solving word problems	19 days	M.7.EE.B.3M.7.RP.A.3M.7.SP.C.6M.7.SP.C.7aM.7.SP.C.7bM.7.SP.C.8aM.7.SP.C.8bM.7.SP.C.8c	Outcomes:Students will find and use percetagesto solve problems.
Solving inequalities and equations	17 days	M.7.EE.B.4bM.7.EE.B.4aM.7.EE.B.3	Outcomes:Students will simplify and compare two algebraic expressions.
Proportions and percents	14 days	M.7.EE.A.2M.7.EE.B.3M.7.EE.B.4aM.7.NS.A.3M.7.RP.A.2cM.7.RP.A.2dM.7.RP.A.3	Outcomes:Students will solve problems involving distance, rate, and time.
Statistics and angle relationships	14 days	M.7.G.A.2M.7.G.B.5M.7.SP.A.1M.7.SP.A.2M.7.SP.B.3M.7.SP.B.4	Outcomes:Students will describe, analyze and compare sets of data using measures of central tendency.
Circles and volume	15 days	M.7.G.A.3M.7.G.B.4M.7.G.B.6	Outcomes:Students will calculate circuference and areas of circles.

Unit Name:Introduction and Probability	Length:15 days		
Standards:M.7.SP.C.5M.7.SP.C.6M.7.SP.C.7aM.7.SP.C.7bM.7.SP.C.8a	Outcomes:Students will find the likelihood that a specific event will occur.		
Essential Questions:How can I reprsent this?	Learning Targets:Students will be able to calculate probabilities of seperate events to decidee which is more likely to happen.		
Topic 1:Finding shared and unique characteristics	Length:1 day		
Lesson Frame:	We will begin learning effective strategies for working in teams.		
	I will make sense of problems by analyzing criteria and relationships.		
Performance Tasks: Students will be able to identify shared characteristics to make generalizations across a set.	Notes:		
Topic 2:Analyzing a game	Length:1 day		
Lesson Frame:	We will analyze probability in order to determine if a game is fair.		
	I will construct viable arguments and critique th reasoning of others while analyzing probabilities.		
Performance Tasks: Students will be able to determine if a game is fair.	Notes:		
Topic 3:Finding unkowns	Length:1 day		
Lesson Frame:	We will begin to identify solutions to equations.		
	I will reason abstractly and quantitatively to determine the number of solutions I may find.		
Performance Tasks: Students will be able to understand that a variable can have a single number solution, many solutions or no solutions.	Notes:		
Topic 4:Investigating a proportional relationship	Length:1 day		
Lesson Frame:	We will make predictions using proportional reasoning in more than one way.		
	I will look for and make use of structure while analyzing proportional reasoning.		
Performance Tasks: Students will be able to make a prediction based on a set of data.	Notes:		
Topic 5:Investigating number patterns	Length:1 day		
Lesson Frame:	We will: understand the meaning of repeating and terminating decimals.		
	I will look for and express regularity in repeated reasoning while look at number patterns.		
Performance Tasks: Students will be able to investigate number patterns.	Notes:		
Topic 6:Introduction to probability	Length:1 day		
Lesson Frame:	We will be introduced to the difference between experimental and theoretical probabilities.		
	I will construct viable arguments and critique the reasoning of others while defending my solutions.		
Performance Tasks: Students will be able to understand that probability is a fraction of the outcomes in a sample space.	Notes:		
Topic 7:Investigating probability	Length:1 day		
Lesson Frame:	We will investigate the role that the number of trials plays in the relationship between experimental and theoretical probabilities.		
	I will make sense of problems based on probabilities.		
Performance Tasks: Students will be able to develop probability models.	Notes:		
Topic 8:Modifying the sample space	Length:1 day		
Lesson Frame:	We will observe how multiplying the sample space impacts the probability.		
	I will attend to precision in using my vocabulary while describing probabilities.		
Performance Tasks: Students will be able to describe what happens to the probability of an event when the sabple space is changed.	Notes:		
Topic 9:Expressing fractions and percents	Length:1 day		
Lesson Frame:	We will use a 10 by 10 grid as a geometric model.		
	I will attend to precision as I make sense of a hundreds grid.		
Performance Tasks: Students will be bale to convert fractions to percents.	Notes:		
Topic 10:Rewriting fractions	Length:1 day		
Lesson Frame:	We will compare probabilities written in different forms.		

Unit Name:Introduction and Probability	Length:15 days		
Standards:M.7.SP.C.5M.7.SP.C.6M.7.SP.C.7aM.7.SP.C.7bM.7.SP.C.8a	Outcomes:Students will find the likelihood that a specific event will occur.		
Essential Questions:How can I reprsent this?	Learning Targets:Students will be able to calculate probabilities of seperate events to decidee which is more likely to happen.		
	I will use appropriate tools strategically in comparing rectangular arrays.		
Performance Tasks: Students will be able to represent portions in different ways.	Notes:		
Topic 11:Fraction addition	Length:1 day		
Lesson Frame:	We will add fractions with unlike denominators.		
	I will use the giant one as an appropriate tool for adding fractions.		
Performance Tasks: Students will be able to add fractions.	Notes:		
Topic 12:Compound probability	Length:1 day		
Lesson Frame:	We will determine where either one of the outocmes or the other is desired.		
	I will contruct viable arguments and critique the reasoning of teammeates while comparing events.		
Performance Tasks: Students will be able to calculate probabilities of compound events.	Notes:		
Topic 13:Subtracting probabilities	Length:1 day		
Lesson Frame:	We will find the missing portions by subtracting fractions from one.		
	I will look for and make use of structure of probabilities.		
Performance Tasks: Students will be able to apply strategies for calculating and comparing probabilities.	Notes:		

Unit Name:Fractions and Integer Addition	Length:15 days
Standards:M.7.NS.A.1aM.7.NS.A.1bM.7.NS.A.1dM.7.NS.A.2aM.7.NS.A.2d	Outcomes:Students will rewrite numbers in different forms in order to compare them.
Essential Questions:How are the numbers written and are they equal?	Learning Targets:Students will be able to determine whether a fraction can be rewritten as a repeating or terminating decimal.
Topic 1:Fraction to decimal conversions	Length:2 days
Lesson Frame:	We will develop an understanding of why decimals repeat or terminate.
	I will make sense of suing long division to convert fractions to decimals.
Performance Tasks: Students will be able to convert fractions to decimals using long division.	Notes:
Topic 2: Rewriting decimals as fractions	Length:1 day
Lesson Frame:	We will convert terminating and repeating decimals to fractions.
	I will look for and express regularity in repeated reasoning while rewriting decimals.
Performance Tasks: Students will be able to develop strategies for rewriting terminating and repeating decimals as fractions.	Notes:
Topic 3:Composing integers	Length:1 day
Lesson Frame:	We will develop an understanding of how to compose and decompose intergers.
	I will look for structure within a quantity to develop the idea of interger addition.
Performance Tasks: Students will compose and decompose numbers in multiple ways.	Notes:
Topic 4: Adding integers and rational numbers	Length:1 day
Lesson Frame:	We will investigate the concept of opposites and zero pairs.
	I will make usre of structure of addition of signed numbers.
Performance Tasks: Students will be able to solve real world problems involving composing numbers.	Notes:
Topic 5: More addition of integers and rational numbers	Length:1 day
Lesson Frame:	We will add integers in a variety of settings.
	I will attend to precisions while communicating my strategies within my group.
Performance Tasks: Students will be able to use a new model to understand adding integers.	Notes:
Topic 6: Multiplication as repeated addition	Length:1 day
Lesson Frame:	We will identify that multiplication is just repeated addition.
	I will look for and express regularity in repeated reasoning while looking for patterns in multiplication.
Performance Tasks: Students will be able to multiply integers.	Notes:
Topic 7:Multiplication of portions	Length:1 day
Lesson Frame:	We will multiply positive and negative fractions, decimals and percents.
	I will use an appropriate tool to multiply portions.
Performance Tasks: Students will be able to represent fractions parts with diagrams.	Notes:
Topic 8:Multiplying mixed numbers	Length:1 day
Lesson Frame:	We will use generic rectangles to multiply mixed numbers.
	I will make use of structure when using the multiplication algorithm.
Performance Tasks: Students will be able to use the stardard algorithm for multiplying fractions.	Notes:
Topic 9:Choosing a scale and graphing data	Length:1 day
Lesson Frame:	We will choose appropriate sclaes, draw axes, and plot points.
	I will attend to precision while making graphs.
Performance Tasks: Students will be bale to plot points on a coordinate graph.	Notes:
Topic 10:More graph scaling	Length:1 day
Lesson Frame:	We will plot data for which the placement of points must be approximated.
	I will model with mathematics in order to map relationships using graphs.

Unit Name:Fractions and Integer Addition	Length:15 days		
Standards:M.7.NS.A.1aM.7.NS.A.1bM.7.NS.A.1dM.7.NS.A.2aM.7.NS.A.2d	Outcomes:Students will rewrite numbers in different forms in order to compare them.		
Essential Questions:How are the numbers written and are they equal?	Learning Targets:Students will be able to determine whether a fraction can be rewritten as a repeating or terminating decimal.		
Performance Tasks: Students will be able to fix scaling errors.	Notes:		

Unit Name:Arithmetic Properties	Length:14 days		
Standards:M.7.NS.A.1cM.7.NS.A.1dM.7.NS.A.2aM.7.NS.A.2bM.7.NS.A.2cM.7.NS.A.3	Outcomes:Students will simplify expressions with multiple operations.		
Essential Questions:How can I calculate it and what strategy should I use?	Learning Targets:Students will be able to subtract and multiply positive and negative numbers.		
Topic 1:Grouping expressions	Length:1 day		
Lesson Frame:	We will learn to group numbers with parenthesis.		
	I will look for and make use of structure of the order of operations.		
Performance Tasks: Students will be able to begin to perform the order of operations.	Notes:		
Topic 2:Identify terms in expressions	Length:1 day		
Lesson Frame:	We will: simplify expressions correctly.		
	I will understand structure while using the order of operations.		
Performance Tasks: Students will be able to identify terms that have sums inside grouping symbols.	Notes:		
Topic 3:Subtracting integers	Length:1 day		
Lesson Frame:	We will use tiles to develop an understanding of integer subtraction.		
	I will attend to precision while working with signed numbers.		
Performance Tasks: Students will be able to subtract integer tiles.	Notes:		
Topic 4:Connecting addition and subtraction	Length:1 day		
Lesson Frame:	We will recognize that every subtraction problem can be rewritten as an addition problem.		
	I will reason quantitatively as I am looking for connections between adding and subtracting problems.		
Performance Tasks: Students will be able to connect concepts of addition and subtraction.	Notes:		
Topic 5:Multiplication as repeated subtraction	Length:1 day		
Lesson Frame:	We will multiply integers.		
	I will attend to precision and make sense of signs while multiplying integers.		
Performance Tasks: Students will be able to multiply positive and negative integers.	Notes:		
Topic 6:Multiplication of decimals	Length:1 day		
Lesson Frame:	We will use a variety of formats in order multiply decimals.		
	I will use appropriate tools strategically when multiplying portions.		
Performance Tasks: Students will be able to multiply decimals using hundredths grids.	Notes:		
Topic 7:Addition, subtraction, multiplication, and division of integers	Length:1 day		
Lesson Frame:	We will solve word problems using many integer processes.		
	I will reason abstractly and quantitatively while completing problems involving integers.		
Performance Tasks: Students will be able to add, subtract, multiply, and divide integers within a word problem.	Notes:		
Topic 8:Division of ration numbers	Length:1 day		
Lesson Frame:	We will divide fractions, mixed numbers, and decimals.		
	I will use appropriate tools while dividing rational numbers.		
Performance Tasks: Students will be able to understand what a rational number is.	Notes:		
Topic 9:Division of decimals	Length:1 day		
Lesson Frame:	We will work with problems involving decimal division.		
	I will make sense of decimal problems and persevere in solving them.		
Performance Tasks: Students will be able to make sense of problems involving standard algorithms.	Notes:		
Topic 10:Arithmetic properties	Length:2 days		
Lesson Frame:	We will use operations of decimals and fractions to consolidate learning.		
	I will make sense of operations with rational numbers and perseverd in solving problems using them.		

Unit Name:Arithmetic Properties	Length:14 days		
Standards:M.7.NS.A.1cM.7.NS.A.1dM.7.NS.A.2aM.7.NS.A.2bM.7.NS.A.2cM.7.NS.A.3	Outcomes:Students will simplify expressions with multiple operations.		
Essential Questions:How can I calculate it and what strategy should I use?	Learning Targets:Students will be able to subtract and multiply positive and negative numbers.		
Performance Tasks: Students will be able to determine which of the four basic opperations are commutative.	Notes:		

Unit Name:Proportions and Expressions	Length:15 days		
Standards:M.7.EE.A.1M.7.G.A.1M.7.RP.A.1M.7.RP.A.2aM.7.RP.A.2bM.7.RP.A.2cM.7.RP.A.2d	Outcomes:Students will find solutions to problems involving proportional relationships?		
Essential Questions:Which shapes are similar?	Learning Targets:Students will be able to identify proportional relationships in tables, graphs, and equations.		
Topic 1:Similar Figures	Length:1 day		
Lesson Frame:	We will compate ratios of corresponding sides.		
	I will attend to precision whle drawing representations of problems and ratios.		
Performance Tasks: Students will be able to identify corresponding sides of similar shapes.	Notes:		
Topic 2:Scale drawings	Length:1 day		
Lesson Frame:	We will create drawings and compute actual lengths and areas from scale drawings.		
	I will analyze the relatships mathematicallsy and draw conclusions from scale drawings.		
Performance Tasks: Students will be able to solve problems involving scale drawings of geometric figures.	Notes:		
Topic 3:Recognizing proportional relationships	Length:1 day		
Lesson Frame:	We will identify proportional relationships within real world problems.		
	I will interpret mathematical results within the context of real world problems.		
Performance Tasks: Students will be able to identify the difference between proportional relationships and other linear relationships.	Notes:		
Topic 4:Proportional relationships with tables and graphs	Length:1 day		
Lesson Frame:	We will identify proportional relationships from graphs and tables.		
	I will look for and make use of structure while analyzing graphs.		
Performance Tasks: Students will be able to create tables and graph proportional relationships.	Notes:		
Topic 5:Unit rate and proportional equations	Length:1 day		
Lesson Frame:	We will solve word problems involving proportional relationships.		
	I will model with algebraic equations while solving proportional relationships.		
Performance Tasks: Students will be able to calculate unit rates.	Notes:		
Topic 6:Connecting representations of proportional relationships	Length:2 days		
Lesson Frame:	We will discover connections between all representations of proportional relationships.		
	I will compare and contrast representations to make sense of proportional relationship problems.		
Performance Tasks: Students will bea ble to look at different ways to represent proportional relationships.	Notes:		
Topic 7:Combining like terms	Length:2 days		
Lesson Frame:	We will find the area and perimeter of algebra tiles using variables and constants.		
	I will use algebra tiles to look for and make sue of the structure of algebraic notation as I combine like terms.		
Performance Tasks: Students will be able to use variables to represent unkown lengths.	Notes:		
Topic 8:Distributive property	Length:2 days		
Lesson Frame:	We will combine like terms using distributive property.		
	I will use the structure of algabraic notation while using the distributive property.		
Performance Tasks: Students will be able to use distributive property to find area and perimeter.	Notes:		
Topic 9:Simplifying with zero	Length:2 days		
Lesson Frame:	We will combine like terms to simplify expressions.		
	I will look for and make use of the structure of zero in order to combine like terms.		
Performance Tasks: Students will be able to simplify expressions.	Notes:		

Unit Name:Probability and solving word problems	Length:19 days
Standards:M.7.EE.B.3M.7.RP.A.3M.7.SP.C.6M.7.SP.C.7aM.7.SP.C.7bM.7.SP.C.8aM.7.SP.C.8bM.7.SP.C.8c	Outcomes:Students will find and use percetagesto solve problems.
Essential Questions:How can I represent the relationship?	Learning Targets:Students will be able to calculate the proobability of compound events.
Topic 1:Part-whole relationships	Length:1 day
Lesson Frame:	We will develop strategies and their connections to percents.
	I will make sense of percents, a percent ruler.
Performance Tasks: Students will be able to use linear model to examine part-whole relationships.	Notes:
Topic 2:Finding and using percentages	Length:1 day
Lesson Frame:	We will find percentages, portions and whiles.
	I will use the percent ruler to make sense of problems and persevere in solving them.
Performance Tasks: Students will be able to interpret situations related to percent discount.	Notes:
Topic 3:Probability games	Length:1 day
Lesson Frame:	We will work to find the complement of events.
	I will attend to precision as I find the probability of events and their complement.
Performance Tasks: Students will understand uniform probability models.	Notes:
Topic 4:Computer simulations of probability	Length:1 day
Lesson Frame:	We will make sense of complicated complex probabilities.
	I will reason abstractly and quantitativley as I analyze complex probabilities.
Performance Tasks: Students will be able to find the experimental probabilities of complex combound probabilities.	Notes:
Topic 5:Compound independent events	Length:1 day
Lesson Frame:	We will determine whether pairs of events are dependent or independent.
	I will construct viable arguments while determining if an event is dependent or independent.
Performance Tasks: Students will be able to find probabilities of compound independent events.	Notes:
Topic 6:Probability tables	Length:1 day
Lesson Frame:	We will generate a list of possible outcomes of compound events.
	I will use an appropriate tool such as a probability table.
Performance Tasks: Students will be able to use probability tables.	Notes:
Topic 7:Probability trees	Length:1 day
Lesson Frame:	We will use probability trees to model outcomes.
	I will contruct probability trees to compare outcomes of events.
Performance Tasks: Students will be able to create systematic lists.	Notes:
Topic 8:Compound events	Length:2 days
Lesson Frame:	We will review an area model for fraction multiplication.
	I will model with mathematics while learning compound probabilities.
Performance Tasks: Students will be able to calculate probabilities in which outcomes are not equally likely.	Notes:
Topic 9:Describing relationships between quantities	Length:1 day
Lesson Frame:	We will construct diagrams in order to represent a situation.
	I will make sense of problems by using diagrams.
Performance Tasks: Students will be able to represent relationships with pictures.	Notes:
Topic 10:Solving a word problem	Length:1 day
Lesson Frame:	We will apply 5D to word problems.
	I will use the tool 5d to solve word problems.

Unit Name:Probability and solving word problems	Length:19 days		
Standards:M.7.EE.B.3M.7.RP.A.3M.7.SP.C.6M.7.SP.C.7aM.7.SP.C.7bM.7.SP.C.8aM.7.SP.C.8bM.7.SP.C.8c	Outcomes:Students will find and use percetagesto solve problems.		
Essential Questions:How can I represent the relationship?	Learning Targets:Students will be able to calculate the proobability of compound events.		
Performance Tasks: Students will be able to use the 5 step problem solving process.	Notes:		
Topic 11:Strategies for using the 5-d process	Length:1 day		
Lesson Frame:	We will solve word problems using the 5D process.		
	I will make sense of problems and persevere in solving them.		
Performance Tasks: Students will be able to apply the 5D process to complex word problems.	Notes:		
Topic 12:Using variables to represent quantities in word problems	Length:1 day		
Lesson Frame:	We will use appropriate tools to grapple with word problems.		
	I will construct viable arguments and critique the reasoning of others while working through the 5D process.		
Performance Tasks: Students will be able to use variables to define quantities.	Notes:		
Topic 13:More word problem solving	Length:1 day		
Lesson Frame:	We will define terms using a variety of variables.		
	I will make sense of problems and model mathematics while explaining the process within our group.		
Performance Tasks: Students will be able to solve complex word problems using the 5D process.	Notes:		

Unit Name:Solving inequalities and equations	Length:17 days		
Standards:M.7.EE.B.4bM.7.EE.B.4aM.7.EE.B.3	Outcomes:Students will simplify and compare two algebraic expressions.		
Essential Questions:Are they equivalent?	Learning Targets:students will be able to write and solve algebraic inequalities.		
Topic 1:Comparing expressions	Length:1 day		
Lesson Frame:	We will use legal moves to compare expressions.		
	I will use algebra tiles to simplify expressions.		
Performance Tasks: Students will be able to simplify expressions using a mat.	Notes:		
Topic 2:Comparing quantities with variables	Length:1 day		
Lesson Frame:	We will learn all legal moves.		
	I will use algebra tiles to compare expressions.		
Performance Tasks: Students will be able to understand that all expressions can't be compared.	Notes:		
Topic 3:One variable inequalities	Length:1 day		
Lesson Frame:	We will record steps and answers on number lines.		
	I will make sense of problems and persevere in solving them using algebra tiles.		
Performance Tasks: Students will be able to represent solutions to one variable inequalities.	Notes:		
Topic 4:Solving one variable inequalities	Length:1 day		
Lesson Frame:	We will express our solutions on a graph and withe words.		
	I will modle with mathematics answers to inequaltiies.		
Performance Tasks: Students will be able to solve one variable inequalities.	Notes:		
Topic 5:Solving equations	Length:1 day		
Lesson Frame:	We will determine if one expression is larger than the other.		
	I will find solutions when expressions are equal.		
Performance Tasks: Students will be able to apply stratgies for simplifying expressions.	Notes:		
Topic 6:Checking solutions and the distributive property	Length:1 day		
Lesson Frame:	We will solve equations using the distributive property.		
	I will critique the reasoning of others while discussing solutions to equations.		
Performance Tasks: Students will be able to check solutions.	Notes:		
Topic 7:Solving equations and recording work	Length:2 days		
Lesson Frame:	We will compare arithmetic and algebraic methods of solving problems.		
	I will attend to precision as I solve word problems.		
Performance Tasks: Students will be able to use formal notation while simplifying expressions.	Notes:		
Topic 8:Using a table to write equations from word problems	Length:1 day		
Lesson Frame:	We will write expressions as equations.		
	I will make sense of problems and persevere in solving them.		
Performance Tasks: Students will be able to extend and modify the 5D process.	Notes:		
Topic 9:Writing and solving equations	Length:2 days		
Lesson Frame:	We will use estimation to check the reasonableness of a solution.		
	I will attend to precision as I am solving equations.		
Performance Tasks: Students will be able to write and solve problems from a context.	Notes:		
Topic 10:Cases with infinite or no solutions	Length:1 day		
Lesson Frame:	We will solve equations that have no solution and many solutions.		
	I will reason abstractly and quantitatively while solving the three types of equations.		
Performance Tasks: Students will be able to identify equations with no solution.	Notes:		

Unit Name:Solving inequalities and equations	Length:17 days		
Standards:M.7.EE.B.4bM.7.EE.B.4aM.7.EE.B.3	Outcomes:Students will simplify and compare two algebraic expressions.		
Essential Questions:Are they equivalent?	Learning Targets:students will be able to write and solve algebraic inequalities.		
Topic 11:Choosing a solving strategy	Length:1 day		
Lesson Frame:	We will solve word problems using algebra tiles.		
	I will use appropriate tools strategically to solve problems.		
Performance Tasks: Students will be able to solve equations using algebra tiles.	Notes:		

Unit Name:Proportions and percents	Length:14 days
Standards:M.7.EE.A.2M.7.EE.B.3M.7.EE.B.4aM.7.NS.A.3M.7.RP.A.2cM.7.RP.A.2dM.7.RP.A.3	Outcomes:Students will solve problems involving distance, rate, and time.
Essential Questions:How is it changing?	Learning Targets:Students will be able to solve equations that have fractional and decimal coefficients.
Topic 1:Distance, rate and time	Length:1 day
Lesson Frame:	We will relate distance to time for objects.
	I will determine the relationships between distance, rate, and time.
Performance Tasks: Students will be able to make table, graphs and rules.	Notes:
Topic 2:Scaling quantities	Length:1 day
Lesson Frame:	We will connect finding percents of a number with multiplying by an equivalent fraction.
	I will make sense of problems involving percents.
Performance Tasks: Students will be able to use multiplication to scale a quantity.	Notes:
Topic 3:Solving problems involving percents	Length:1 day
Lesson Frame:	We will solve percent discount problems.
	I will use diagrams to make sense of percent problems.
Performance Tasks: Students will be able to recognize the different multipliers to find different related quantities.	Notes:
Topic 4:Equations with fraction and decimal coefficients	Length:1 day
Lesson Frame:	We will discover how to eliminate decimal and fractional coeifficients.
	I will use the appropriate tool to solve equations.
Performance Tasks: Students will be able to solve an equation with fractional coefficients.	Notes:
Topic 5:Creating integer coefficients	Length:1 day
Lesson Frame:	We will create integer coefficients in equations.
	I will make sense of problems while comparing multiple equations.
Performance Tasks: Students will be able to solve equations with both fractions and decimals.	Notes:
Topic 6:Creating integer coefficients efficiently	Length:1 day
Lesson Frame:	We will make complex equations into integer equations.
	I will make sense of equations by solving them.
Performance Tasks: Students will be able to make more equations into integer equations.	Notes:
Topic 7:Percent increase and decrease	Length:1 day
Lesson Frame:	We will identify the multiplier related to a change.
	I will attend to precision while finding percent increase and decrease.
Performance Tasks: Students will be able to understand percent increase and decrease problems.	Notes:
Topic 8:Simple interest	Length:1 day
Lesson Frame:	We will identify the rate if we know the interest.
	I will make sense of percent problems and persevere in solving them.
Performance Tasks: Students will be able to find simple interest.	Notes:
Topic 9:Finding missing information in proportional relationships	Length:1 day
Lesson Frame:	We will not use the term cross multiply.
	I will attend to precision in solving for the correct unit.
Performance Tasks: Students will be able to find missing information in proportions.	Notes:
Topic 10:Solving proportions	Length:1 day
Lesson Frame:	We will identify different strategies for solving proportions.
	I will attend to precision while solving proportions.

Unit Name:Proportions and percents	Length:14 days		
Standards:M.7.EE.A.2M.7.EE.B.3M.7.EE.B.4aM.7.NS.A.3M.7.RP.A.2cM.7.RP.A.2dM.7.RP.A.3	Outcomes:Students will solve problems involving distance, rate, and time.		
Essential Questions:How is it changing?	Learning Targets:Students will be able to solve equations that have fractional and decimal coefficients.		
Performance Tasks: Students will be able to solve proportions.	Notes:		

Unit Name:Statistics and angle relationships	Length:14 days		
Standards:M.7.G.A.2M.7.G.B.5M.7.SP.A.1M.7.SP.A.2M.7.SP.B.3M.7.SP.B.4	Outcomes:Students will describe, analyze and compare sets of data using measures of central tendency.		
Essential Questions:How can I select a good sample?	Learning Targets:Students will be able to attempt to find random and representative samples to complete a survey.		
Topic 1:Measuring precision	Length:2 days		
Lesson Frame:	We will compare data creating histograms.		
	I will make sense of measurement depending on how I collect data.		
Performance Tasks: Students will be able to generate two sets of data using different tools.	Notes:		
Topic 2:Comparing distributions	Length:1 day		
Lesson Frame:	We will quantify the difference between medians.		
	I will make sense of problems using histograms and box plots.		
Performance Tasks: Students will be able to compare two populations based on making inferences from samples.	Notes:		
Topic 3:Representative samples	Length:1 day		
Lesson Frame:	We will critique how well a sample represents a certain population.		
	I will reason abstractly and quantitatively as I consider representative samples.		
Performance Tasks: Students will be able to analyze methods of sampling.	Notes:		
Topic 4:Inference from random samples	Length:1 day		
Lesson Frame:	We will generate multiple samples of the same size to gauge the variation in sample statistics.		
	I will make sense of data sets.		
Performance Tasks: Students will be able to use random sampling to draw inferences.	Notes:		
Topic 5:Introduction to angles	Length:1 day		
Lesson Frame:	We will learn about angle measuring tools.		
	I will use the appropriate tool when measuring angles.		
Performance Tasks: Students will be able to understand angles and how to measure them.	Notes:		
Topic 6:Classifying angles	Length:1 day		
Lesson Frame:	We will classify angles and anlge pairs.		
	I will look for and make use of structure while classifying angles.		
Performance Tasks: Students will be able to measure angles with a protractor.	Notes:		
Topic 7:Constructing shapes	Length:1 day		
Lesson Frame:	We will use rulers and technology to draw shapes.		
	I will attend to precision as I use tools to create shapes given certain conditions.		
Performance Tasks: Students will be able to draw geometric shapes.	Notes:		
Topic 8:Building triangles	Length:2 days		
Lesson Frame:	We will determine how many triangles can be made given 3 angle measurements.		
	I will look for and make use of the structure of angles and angle measurement.		
Performance Tasks: Students will be able to construct triangles from three angle measures.	Notes:		

Unit Name:Circles and volume	Length:15 days
Standards:M.7.G.A.3M.7.G.B.4M.7.G.B.6	Outcomes:Students will calculate circuference and areas of circles.
Essential Questions:How are the parts of a circle related?	Learning Targets:Students will be able to find the areas of shapes made up of special quadrilaterals, circles and triangles.
Topic 1:Circumference, diameter, and pi	Length:2 days
Lesson Frame:	We will idenitfy the relationship between C and D.
	I will look for and express repeated reasoning in order to define PI.
Performance Tasks: Students will be able to graph PI.	Notes:
Topic 2:Area of circles	Length:2 days
Lesson Frame:	We will find the area of a circle within the context of word problems.
	I will attend to precision while approximating the area of a circle.
Performance Tasks: Students will be able to find the area of a circle.	Notes:
Topic 3:Area of composite shapes	Length:1 day
Lesson Frame:	We will find the area of shapes made up of rectangles, triangles and circles.
	I will reason abstractly and quanitiatively as I make sense of area problems.
Performance Tasks: Students will be able to find the area of composite shapes.	Notes:
Topic 4:Surface area and volume	Length:1 day
Lesson Frame:	We will investigae the relationship between surface area and volume.
	I will attend to precision as I find the units of my labels.
Performance Tasks: Students will be able to find the surface area and volume of rectangular prisms.	Notes:
Topic 5:Cross sections	Length:1 day
Lesson Frame:	We will slice three dimensional shapes to create two dimensional views.
	I will reason abstractly as I visualize the two dimensional shapes.
Performance Tasks: Students will be able to describe two dimensional shapes.	Notes:
Topic 6:Volume of a prism	Length:1 day
Lesson Frame:	We will create 1 unit high layers in order to find the volume of prisms.
	I will look for and express regulariy in repeated reasoning to find the formula for volume.
Performance Tasks: Students will be able to find the volume of prisms.	Notes:
Topic 7:Volume of nonrectangular prisms	Length:1 day
Lesson Frame:	We will identify characterisics of nonrectangular prisms.
	I will construct viable arguments for my volume measurements.
Performance Tasks: Students will be able to find the volume of nonrectangular prisms.	Notes:
Topic 8:Volume and scaling	Length:2 days
Lesson Frame:	We will find volumes using scaling.
	I will attend to precision while comparing volume of scaled shapes.
Performance Tasks: Students will be able to find proportional increases.	Notes:
Topic 9:Using multiple math ideas to create an interior design	Length:2 days
Lesson Frame:	We will multiply, add and subtract fractions to convert between units.
	I will convert units of measurement.
Performance Tasks: Students will be able to create scale drawings.	Notes:
Topic 10:Applying ratios	Length:2 days
Lesson Frame:	We will use appropriate tools in order to solve ratios.
	I will use diagrams when comparing ratios within a word problem.
Performance Tasks: Students will be able to solve application problems involving proportions.	Notes:

Unit Name:Circles and volume	Length:15 days		
Standards:M.7.G.A.3M.7.G.B.4M.7.G.B.6	Outcomes:Students will calculate circuference and areas of circles.		
Essential Questions:How are the parts of a circle related?	Learning Targets:Students will be able to find the areas of shapes made up of special quadrilaterals, circles and triangles.		

September	October	November	December	January	February	March	April	May	June
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	

Course Name:	Course 3		
Credits:	1		
Prerequisites:	7th Grade Math		
Description:	Students will use new models and methods to think about problesm and solve them. Students will work at teams to complete problems and activities that will help students discover mathematical ideas and develop solution methods.		
Academic Standards:	M.8.EE.A.1M.8.EE.A.2M.8.EE.A.3M.8.EE.A.4M.8.EE.B.5M.8.EE.B.6M.8.EE.C.7aM.8.EE.C.7bM.8.EE.C.8aM.8.EE.C.8bM.8.EE.C.8cM.8.F.A.1M.8.F.A.2M.8.F.A.3M.8.F.B.4M.8.F.B.5M.8.G.A.1a		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Problem Solving	12 days	M.8.SP.A.2M.8.EE.B.5M.8.EE.C.7a,M.8.EE.C.7b	Student will collect data, find patterns, write equations, and work backewrds to solve problems.
Simplifying with Variables	13 days	M.8.EE.C.7a,M.8.EE.C.7b	Students will write and simplify algebraic expressions.
Graphs and Equations	17 days	M.8.EE.C.7aM.8.EE.C.7bM.8.F.A.1M.8.F.A.2M.8.F.A.3M.8.F.B.4	Students will learn what it means for something to be the solution to an equation, and what it means for an equation to have no solutions.
Multiple Representations	13 days	M.8.EE.B.6M.8.F.A.2M.8.F.B.4	Students will learn how to change any representation of data to any other representation.
Systems of equations	13 days	M.8.EE.C.7bM.8.EE.C.8aM.8.EE.C.8cM.8.EE.C.8b	Students will learn how to use the connections between graphs, tables, rules, and patterns to solve problems.
Transformations and Similarity	14 days	M.8.G.A.1aM.8.G.A.1bM.8.G.A.1cM.8.G.A.2M.8.G.A.3M.8.G.A.4	Students will transform shapes by flipping, turning, and sliding them on a coordinate graph.
Slope and Association	15 days	M.8.EE.B.5M.8.EE.B.6M.8.F.A.3M.8.SP.A.1M.8.SP.A.2M.8.SP.A.3M.8.SP.A.4	Students will create scatterplots that show the relationship between two variables.
Exponents and Functions	15 days	M.8.EE.A.1M.8.EE.A.3M.8.EE.A.4M.8.F.A.1M.8.F.A.3M.8.F.B.5	Students will determine whether a relationship grows linearly or exponentially.
Angles and the Pythagorean Theorem	17 days	M.8.EE.A.2M.8.G.A.5M.8.G.B.6M.8.G.B.7M.8.G.B.8M.8.NS.A.1M.8.NS.A.2	Students will find the measurements of missing angles made by lines that interesect parallel lines.
Surface Area and Volume	16 days	M.8.EE.A.2M.8.G.C.9	Students will find the volumes of non-rectangular shapes, including cylinders, pyramids, cones and spheres.

Unit Name:Problem Solving	Length:12 days
Standards:M.8.SP.A.2M.8.EE.B.5M.8.EE.C.7a,M.8.EE.C.7b	Outcomes:Student will collect data, find patterns, write equations, and work backewrds to solve problems.
Essential Questions:How can I solve a problem that I have never seen before?	Learning Targets:Students will be able to apply their current math knowledge sol solve problems.
Topic 1: Interpreting graphs	Length:1 day
Lesson Frame:	We will be given the opportunity to know the members of our study teams while interpreting the graphs.
	I will construct viable arguments and critique the reasoning of others to create stories for graphs.
Performance Tasks: Students will be able to interpret points and continuous graphs.	Notes:
Topic 2:Finding and generalizing patterns	Length:1 day
Lesson Frame:	We will be able to generalize a geometric description of a pattern.
	I will look for and express regularity in repeated reasoning in order to identify the specific figure number.
Performance Tasks: Students will be able to exten a tile pattern.	Notes:
Topic 3: The algebra walk	Length:1 day
Lesson Frame:	We will informally be introduced to linear functions.
	I will look for and make use of structure at I use input and output values of equations to make graphs.
Performance Tasks: Students will be able to experience the xy coordinate system.	Notes:
Topic 4: Collecting, organizing, and analyzing data	Length:2 days
Lesson Frame:	We will be introduced to the concept of dependent and independent measures.
	I will model with mathematics while collecting data and identifying trends from graphs.
Performance Tasks: Students will be able to oranize data in scatterplots and make predictions.	Notes:
Topic 5: Proportional relationship with graphs and tables	Length:1 day
Lesson Frame:	We will compare rates in different representations of proportional relationships
	I will make sense of problems by recognizing proportional relationships and their multiplicative property.
Performance Tasks: Students will be able to explore proportional relationships using graphs and tables.	Notes:
Topic 6: Strategies for solving proportional realationship.	Length:1 day
Lesson Frame:	We will investigate different strategies to solve proportions.
	I will abstract and quantitative reasoing as I identify connnections betwee things I see.
Performance Tasks: Students will be able to solve proportions written as equivalent fractions.	Notes:

Unit Name:Simplifying with Variables	Length:13 days
Standards:M.8.EE.C.7a,M.8.EE.C.7b	Outcomes:Students will write and simplify algebraic expressions.
Essential Questions:What is a variable and what can I do with a variable?	Learning Targets:Students will be able to solve for a varible if they know that two expressions are equal.
Topic 1:Exploring variables and expressions	Length:1 day
Lesson Frame:	We will name each tile by its areas and learn how to simplify expressions.
	I will look for and make use of structure of algebraic notation as I combine like terms.
Performance Tasks: Students will be able to use tiles to manipulate algebraic expressions.	Notes:
Topic 2:Simplifying expressions by combining like terms	Length:1 day
Lesson Frame:	We will differenciate between the dimensions of the tiles and the area.
	I will find the perimeter and area of algebra tiles.
Performance Tasks: Students will be able to find the perimeter of shapes formed with tiles.	Notes:
Topic 3:Writing algabraic expressions	Length:1 day
Lesson Frame:	We will construct and simplify algebraic expressions using algebra tiles.
	I will make sense of the meaning of minus.
Performance Tasks: Students will be able to represent ngeatives with algebra tiles.	Notes:
Topic 4:Using zero to simplify algebraic expressions	Length:1 day
Lesson Frame:	We will deepen our understanding of the concept of zero.
	I will make sense of problems by recognizing simpler algebraic expressions.
Performance Tasks: Students will be able to build and simplify algebraic expressions using tiles.	Notes:
Topic 5:Using algebra tiles to simplify algebraic expressions	Length:1 day
Lesson Frame:	We will begin to simplify expression use tiles and comparison mats.
	I will reason abstractly and quantitatively as I compare expressions.
Performance Tasks: Students will be able to use different interpretations of minus to represent negatives with algebra tiles.	Notes:
Topic 6: Simplifying and recording work	Length:1 day
Lesson Frame:	We will learn how to record work and show our solution in steps.
	I will attend to precision as I practice recording my work and communicating with others my thinking.
Performance Tasks: Students will be able to compare expressions using tiles to identify which expression is greater.	Notes:
Topic 7: Using algebra tiles to solve for x	Length:1 day
Lesson Frame:	We will strengthen our simplifying skills by solving equations for x.
	I will use equation mats to solve equations.
Performance Tasks: Students will be able to solve equations for x.	Notes:
Topic 8: More solving equations	Length:1 day
Lesson Frame:	We will strengthen our simplification and recording skills.
	I will critique the reasoning of other to clarify the structure of meaning in my mind.
Performance Tasks: Students will be able to consider special types of solutions such as all numbers and no solution.	Notes:

Unit Name:Graphs and Equations	Length:17 days
Standards:M.8.EE.C.7aM.8.EE.C.7bM.8.F.A.1M.8.F.A.2M.8.F.A.3M.8.F.B.4	Outcomes:Students will learn what it means for something to be the solution to an equation, and what it means for an equation to have no solutions.
Essential Questions:How many different ways can I represent it?	Learning Targets:Students will be able to represent a situation using a table, a graph or a rule.
Topic 1:Extending patterns and finding rules	Length:1 day
Lesson Frame:	We will work toward concise and desriptive rules using words.
	I will look for and express regularity in repeated reasoning as I investigate tile patterns.
Performance Tasks: Students will be able to identify the rule for a pattern.	Notes:
Topic 2:Using tables, graphs, and rules to make predictions	Length:1 day
Lesson Frame:	We will evaluate algebraic expressions to make predictions about a pattern.
	I will model with mathematics as I find an equation for predicting the height of a tree.
Performance Tasks: Students will be able to write rules using symbolic notation.	Notes:
Topic 3:Using a graphing caclulator and identifying solutions	Length:2 days
Lesson Frame:	We will learn the difference between discrete and continuous graphs.
	I will use graphing calculatoors to verify that the equation of my line matches the points on the table.
Performance Tasks: Students will be able to graph data points from a pattern on the xy coordinate plane.	Notes:
Topic 4:Completing tables and drawing graphs	Length:1 day
Lesson Frame:	We will practice setting up appropriate axes for a data set.
	I will look for and make use of structure as I graph equations.
Performance Tasks: Students will be able to plot point from and xy table.	Notes:
Topic 5:Graphs, tables and rules	Length:1 day
Lesson Frame:	We will practice graphing decimal values.
	I will use what I have learned about structure to solve word problems.
Performance Tasks: Students will be able to set up and complete a table, plot points, and draw a graph when given a situation or equation.	Notes:
Topic 6:Complete graphs	Length:1 day
Lesson Frame:	We will draw and complete quadratic and linear equations.
	I will attend to precision as I create complete graphs.
Performance Tasks: Students will be able to create tables and scale axes when given a quadratic equation.	Notes:
Topic 7:Identifying common graphing errors	Length:1 day
Lesson Frame:	We will use graphs and rules to analyze a contextual situation with a limited domain.
	I will reason abstractly and quantitatively as I analyze situations.
Performance Tasks: Students will be able to identify common errors in scaling and plotting points.	Notes:
Topic 8:Solving equations and checking solutions	Length:1 day
Lesson Frame:	We will recognize that a solution is a value that makes and equation true.
	I will make sense of legal moves use on my equation mat to record work and persevere in solving problems.
Performance Tasks: Students will be able to check their answers.	Notes:
Topic 9:Determing the number of solutions	Length:1 day
Lesson Frame:	We will work with equations that have one, many, and no solutions.
	I will reason abstractly and quantitatively to solve equations with infinite and no solutions.
Performance Tasks: Students will be able to develop their understanding of what makes a solution to an equation.	Notes:
Topic 10:Problem solving with equations	Length:1 day
Lesson Frame:	We will expand the idea of a solution to include its meaning in relation to an application.
	I will use appropriate toolds strategically to solve equations and understand the meaning of the solutions.

Unit Name:Graphs and Equations	Length:17 days
Standards:M.8.EE.C.7aM.8.EE.C.7bM.8.F.A.1M.8.F.A.2M.8.F.A.3M.8.F.B.4	Outcomes:Students will learn what it means for something to be the solution to an equation, and what it means for an equation to have no solutions.
Essential Questions:How many different ways can I represent it?	Learning Targets:Students will be able to represent a situation using a table, a graph or a rule.
Performance Tasks: Students will be able to identify the meaning of a solution.	Notes:
Topic 11:More solving equations to solve problems	Length:1 day
Lesson Frame:	We will think of our solutions in terms of real world applications.
	I will create mathematical models for situations given to us in real world settings.
Performance Tasks: Students will be able to understand why some equations can't be solved.	Notes:
Topic 12:Distributive property equations	Length:1 day
Lesson Frame:	We will use the distributive property to solve linear equations.
	I will critique the reasoning of others to clarify a concept for myself.
Performance Tasks: Students will be able to use the distributive property.	Notes:

Unit Name:Multiple Representations	Length:13 days
Standards:M.8.EE.B.6M.8.F.A.2M.8.F.B.4	Outcomes:Students will learn how to change any representation of data to any other representation.
Essential Questions:How does a pattern grow and show up in a table, graph and rule?	Learning Targets:Students will be able to use the connections between patterns, tables, graphes, and rules to solve problems.
Topic 1:Finding connections between representations	Length:2 days
Lesson Frame:	We will discover connections between the representations of a pattern.
	I will investigate the connections between tile patterns, tables, graphs, and rules.
Performance Tasks: Students will be able to look at different ways to represent connections.	Notes:
Topic 2:Seeing growth in different representations	Length:1 day
Lesson Frame:	We will identify connections between growth and its linear equation.
	I will look for and make use of structure within linear equations.
Performance Tasks: Students will be able to write linear algebraic rules.	Notes:
Topic 3:Connecting linear rules and graphs	Length:1 day
Lesson Frame:	We will focus on how a geometric pattern grows and how the size of figure 0 can be determined on a graph.
	I will look for and express regualarity in repeated reasoning as I identify growth patterns.
Performance Tasks: Students will be able to connect linear geometric patterns with patterns on a graph.	Notes:
Topic 4:Y=MX+B	Length:1 day
Lesson Frame:	We will develop new connections between multipl representations and patterns.
	I will make use of structure of linear equations to write a rule for a graph.
Performance Tasks: Students will identify rules for patterns in slope intercept form.	Notes:
Topic 5:Checking the connections	Length:2 days
Lesson Frame:	We will apply our understanding of growth and figure 0 in order to generate complete representiations.
	I will make sense of word problems within a real word setting.
Performance Tasks: Students will be able to make connections between multiple representations when they are presented with disparate pices of information	Notes:
Topic 6:Graphing a line without an x/y table	Length:1 day
Lesson Frame:	We will graph equations quickly without making a table.
	I will look for and make use of structure o a linear equation while creating graphs.
Performance Tasks: Students will be able to make graphs quickly given m and b.	Notes:
Topic 7:Completing the web	Length:1 day
Lesson Frame:	We will use the representations of patterns web to identify linear models.
	I will make sense of problems involving moving between representations.
Performance Tasks: Students will be able to graph and write equations from various representations.	Notes:

Unit Name:Systems of equations	Length:13 days
Standards:M.8.EE.C.7bM.8.EE.C.8aM.8.EE.C.8cM.8.EE.C.8b	Outcomes:Students will learn how to use the connections between graphs, tables, rules, and patterns to solve problems.
Essential Questions:In how many different ways can a pattern be represented?	Learning Targets:Students will be able to solve multi-variable equations for one of the variables.
Topic 1:Working with multi-variable equations	Length:1 day
Lesson Frame:	We will solve two variable linear equations.
	I will rewrite linear equations in slope interecept form.
Performance Tasks: Students will be able to identify equations with multiple variables.	Notes:
Topic 2:Solving equations with fractions	Length:1 day
Lesson Frame:	We will learn how to change fractional and decimal coefficients and constants to integers.
	I will use repeated reasoning of multiplying an equation with fractional coefficients by the LCD.
Performance Tasks: Students will be able to solve equations with integer coefficients.	Notes:
Topic 3:INtroduction to systems of equations	Length:1 day
Lesson Frame:	We will focus on systems of equations and their intersection point.
	I will reason abstractly and quantitatively while I examine graphs.
Performance Tasks: Students will be able to examine the meaning of points of intersection.	Notes:
Topic 4:Writing rules from word problems	Length:1 day
Lesson Frame:	We will find intersections of equations in the contexts of word problems.
	I will use appropriate tools strategically to make sense of word problems and the intersections of equations.
Performance Tasks: Students will be able to write rules to word problems.	Notes:
Topic 5:Solving systems algebraically	Length:1 day
Lesson Frame:	We will solve systems algebraically by rewriting equations in slope intercept form.
	I will use appropriate tools strategically so solve systems of equations by using the equal values method.
Performance Tasks: Students will be able to solve systems algebraically.	Notes:
Topic 6:Strategines for solving systems	Length:1 day
Lesson Frame:	We will identify systems that are the same line or parallel lines.
	I will look for and express regularity in repeated reasoning as I write linear equations in slop intercept form in order to use the equal values method.
Performance Tasks: Students will be able to solve systems of equations using the equal values method.	Notes:

Unit Name:Transformations and Similarity	Length:14 days
Standards:M.8.G.A.1aM.8.G.A.1bM.8.G.A.1cM.8.G.A.2M.8.G.A.3M.8.G.A.4	Outcomes:Students will transform shapes by flipping, turning, and sliding them on a coordinate graph.
Essential Questions:How can I describe the motion?	Learning Targets:Students will be able to compare shapes and use similarity to find missing side lengths of polygions.
Topic 1:Rigid transformations	Length:1 day
Lesson Frame:	We will translate, rotate, and reflect shapes.
	I will make sense of rigid transformations.
Performance Tasks: Students will be able to move a shape on a coordinate graph using rigid transformations.	Notes:
Topic 2:Rigid transformations on a coordinate graph	Length:1 day
Lesson Frame:	We will use coordinates to describe the positions of objects in a plane.
	I will attend to precision as I describe the transformation using correct mathemtical vocabulary.
Performance Tasks: Students wiil be able to desribe complete transformations.	Notes:
Topic 3:Describing transformations	Length:1 day
Lesson Frame:	We will identiy whether a shape has been translated, rotated or reflected.
	I will attend to precision as I describe rigid transformations.
Performance Tasks: Students will extend their techniques for using integer expressions to record movement on a number line.	Notes:
Topic 4:Using rigid transformations	Length:1 day
Lesson Frame:	We will identiy each type of transformation.
	I will make use of structure as I look for reasoning to make a unique drawing.
Performance Tasks: Students will be able to move shapes on a coordinate graphe to create drawings.	Notes:
Topic 5:Multiplication and dilation	Length:1 day
Lesson Frame:	We will practice dialations using shapes and coordinates.
	I will write a conjecture to construct a viable argument.
Performance Tasks: Students will be able to dialate.	Notes:
Topic 6:Dilation of similar figures	Length:1 day
Lesson Frame:	We will compare shapes to determine similarity.
	I will be able to identify how scale factors determine if an object gets larger or smaller.
Performance Tasks: Students will be able to understand how dilations by different numbers result in changes in shapes.	Notes:
Topic 7:Identifying similar shapes	Length:1 day
Lesson Frame:	We will develop an understanding of congruence and how it relates to similarity.
	I will make sense of and persevere in solving problems with scale factors.
Performance Tasks: Students will be able to explore different scale factors.	Notes:
Topic 8:Similar figures and transformations	Length:1 day
Lesson Frame:	We will use sequences of transformations to show two figures similar or congruent.
	I will attend to precision when I describe transformations and similar figures.
Performance Tasks: Students will be able to use sequences of transformations.	Notes:
Topic 9:Working with correspondings sides	Length:1 day
Lesson Frame:	We will develop our understaning of ratio and similarity.
	I will reason abstractly and quantitatively to evaluate ratios in order to determine similarity.
Performance Tasks: Students will be able to identify actions that enlarge and reduce shapes.	Notes:
Topic 10:Solving problems involveing similar shapes	Length:1 day
Lesson Frame:	We will recognize that equivalent fractions can be used to find missing sides of shapes.
	I will evaluate ratios in order to determine similarity.

Unit Name:Transformations and Similarity	Length:14 days		
Standards:M.8.G.A.1aM.8.G.A.1bM.8.G.A.1cM.8.G.A.2M.8.G.A.3M.8.G.A.4	Outcomes:Students will transform shapes by flipping, turning, and sliding them on a coordinate graph.		
Essential Questions:How can I describe the motion?	Learning Targets:Students will be able to compare shapes and use similarity to find missing side lengths of polygions.		
Performance Tasks: Students will be able to find missing parts of similar figures.	Notes:		

Unit Name:Slope and Association	Length:15 days
Standards:M.8.EE.B.5M.8.EE.B.6M.8.F.A.3M.8.SP.A.1M.8.SP.A.2M.8.SP.A.3M.8.SP.A.4	Outcomes:Students will create scatterplots that show the relationship between two variables.
Essential Questions:What information is needed to find the equation of a line?	Learning Targets:Students will be able to identify associations between sets of data and represent the relationship with a trend line.
Topic 1:Circle graphs	Length:1 day
Lesson Frame:	We will interpret circle graphs using central angles and perscents.
	I will construct viable arguments about given circle graphs.
Performance Tasks: Students will be able to construct circle graphs.	Notes:
Topic 2:Organizing data in a scatterplot	Length:1 day
Lesson Frame:	We will identify whether there is a relationship between two sets of data.
	I will model with mathematics as I create scatterplots and draw lines of best fit.
Performance Tasks: Students will be able to create scatterplots.	Notes:
Topic 3:Identifying and describing associations	Length:1 day
Lesson Frame:	We will create and use scatterplots to make predictions.
	I will attend to precision when creating and labeling scatter plots.
Performance Tasks: Students will be able to understand the relationship between different associations.	Notes:
Topic 4:Y=MX+B revisited	Length:1 day
Lesson Frame:	We will strengthen our knowledge of y=mx+b form.
	I will attend to precision as I write equations of lines.
Performance Tasks: Students will be able to show that data is linear with a constant growth.	Notes:
Topic 5:Slope	Length:1 day
Lesson Frame:	We will use ratios between vertical change and horizontal change to describe slope.
	I will reason abstractly and quantitatively to find slope and connect it to unit rate.
Performance Tasks: Students will be able to describe the rate of change of a line.	Notes:
Topic 6:Slope in different representations	Length:1 day
Lesson Frame:	We will recognize the effect of scaling on the steepness of a line.
	I will look for and express regularity in repeated reasoning as I recognize slope relationships.
Performance Tasks: Students will be able to identify slope from a graph.	Notes:
Topic 7:More about slope	Length:1 day
Lesson Frame:	We will use slope to describe the average rate when the rate is not a constant.
	I will make use of structure of slope to decribe growth and make predictions.
Performance Tasks: Students will be able to connect negative slope with negative rates of change.	Notes:
Topic 8:Proportional equations	Length:1 day
Lesson Frame:	We will connect the constant of proportionality to the slop of a graph to the unit rate.
	I will look for and express regularity in repeated reasoning as I recognize proportional relationships.
Performance Tasks: Students will be able to write equations representing proportional relationships.	Notes:
Topic 9:Using equations to make predictions	Length:1 day
Lesson Frame:	We will use the equaiton and a graph to make and justify predictions.
	I will make sense of quantities and their relationships to problem situations.
Performance Tasks: Students will be able to write the equations for line of best fit.	Notes:
Topic 10:Describing association fully	Length:1 day
Lesson Frame:	We will continue to write equations for lines of best fit.
	I will connect the ideas of slope and y intercepts to make sense of problems and persevere is solving them

Unit Name:Slope and Association	Length:15 days
Standards:M.8.EE.B.5M.8.EE.B.6M.8.F.A.3M.8.SP.A.1M.8.SP.A.2M.8.SP.A.3M.8.SP.A.4	Outcomes:Students will create scatterplots that show the relationship between two variables.
Essential Questions:What information is needed to find the equation of a line?	Learning Targets:Students will be able to identify associations between sets of data and represent the relationship with a trend line.
Performance Tasks: Students will be able to fully describe an association between two numberical variables using form, direction, strength, and outliers.	Notes:

Topic 11: Association between categorical variables	Length:1 day
Lesson Frame:	We will develop an understanding that association can be seen in table rows or in table columns.
	I will use the appropriate tool strategically to identify associations between categorical variables.

Performance Tasks: Students will be able to informally look for and describe associations between two categorical variables in a two way table.	Notes:

Unit Name:Exponents and Functions	Length:15 days
Standards:M.8.EE.A.1M.8.EE.A.3M.8.EE.A.4M.8.F.A.1M.8.F.A.3M.8.F.B.5	Outcomes:Students will determine whether a relationship grows linearly or exponentially.
Essential Questions:How is the pattern changing and how can I describe it?	Learning Targets:Students will be able to determine if a relation is a function by looking at a table or a graph.
Topic 1:Patterns and growth in tables and graphs	Length:1 day
Lesson Frame:	We will use tables and graphs to compare linear and nonlinear data.
	I will look fro and express regularity in repeated reasoning as I identify linear and nonlinear situations.
Performance Tasks: Students will be able to recognize linear and nonlinear situations.	Notes:
Topic 2:Compound interest	Length:1 day
Lesson Frame:	We will recognize that compound interest is an example of multiplicative growth.
	I will model exponential grwoth in the context of compound interest.
Performance Tasks: Students will be able to calculate compound interest.	Notes:
Topic 3:Linear and exponential growth	Length:1 day
Lesson Frame:	We will identify each of of interest in multiple situations.
	I will look for and make sense of structure as I identify patterns.
Performance Tasks: Students will be able to compare simple and comound interest.	Notes:
Topic 4:Exponents and scientific notation	Length:2 days
Lesson Frame:	We will build our understanding of exponents by writing numbers greater than one in scientific notations.
	I will make use of the structure of exponent notation to write numbers using scientific notation.
Performance Tasks: Students will be able to simplify expressions written with positive exponents.	Notes:
Topic 5:Exponent rules	Length:1 day
Lesson Frame:	We will recognize the difference between raising a single number to a power and raising a grouped quantity to a power.
	I will reason abstractly as I simplify expressions with exponents.
Performance Tasks: Students will develope methods for simplifying expressions with exponents.	Notes:
Topic 6:Negative exponents	Length:2 days
Lesson Frame:	We will develop methods for simplifying expressions with exponents.
	I will look for and express regularity in repeated reasoning in patterns with exponents.
Performance Tasks: Students will be able to represent expressions with zero and negative exponents.	Notes:
Topic 7:Operations with scientific notation	Length:1 day
Lesson Frame:	We will connect our knowledge of scientific notation with simplifying expressions.
	I will make use of structure to perform computations with scientific notation.
Performance Tasks: Students will be able to compare and perform computations with numbers in scientific notation.	Notes:
Topic 8:Functions in graphs and tables	Length:2 days
Lesson Frame:	We will practice identifying and describing functions.
	I will attend to precision as I describe functions.
Performance Tasks: Students will be able to determine which relatioship are functions and which are not.	Notes:

Unit Name:Angles and the Pythagorean Theorem	Length:17 days
Standards:M.8.EE.A.2M.8.G.A.5M.8.G.B.6M.8.G.B.7M.8.G.B.8M.8.NS.A.1M.8.NS.A.2	Outcomes:Students will find the measurements of missing angles made by lines that interesect parallel lines.
Essential Questions:What do I know about this triangle?	Learning Targets:Students will be able to determine if two triangles are similar by looking at their angles.
Topic 1:Parallel line angle pair relationships	Length:1 day
Lesson Frame:	We will explore angles made with parallel lines and a transversal.
	I will contruct viable arguments and critique the reasoning of other about angle pairs.
Performance Tasks: Students will be able to establish facts about angles.	Notes:
Topic 2:Finding unkown angles in triangles	Length:1 day
Lesson Frame:	We will identify missing angles of a triangle.
	I will reason abstractly and quantitatively to find the missing angles of a triangle.
Performance Tasks: Students will be able to identify that the three angles of a triangle.	Notes:
Topic 3:Exterior angles in triangles	Length:1 day
Lesson Frame:	We will identify that the exterior angle of a triangle is equal to the sume of the two remote interior angles.
	I will reason quantitatively, using repeated reasoning to elicit the exterior angles theorem.
Performance Tasks: Students will be able to find the measures of exterior angles of a triangle.	Notes:
Topic 4:AA triangle similarity	Length:1 day
Lesson Frame:	We will identify the criterion for similarity using AA.
	I will make sense of and persevere in solving problems using similar triangles.
Performance Tasks: Students will identify AA triangle similarity.	Notes:
Topic 5:Side lengths and triangles	Length:2 days
Lesson Frame:	We will focus on trangles to identify patterns in combinations that make right, acute, and obtuse angles.
	I will reason abstractly and quantitatively as I investigate combinations of side lengths of triangles.
Performance Tasks: Students will be able to see what combinations of side lengths make triangles.	Notes:
Topic 6:Pythagorean theorem	Length:1 day
Lesson Frame:	We will identify relationships between side lengths of a right triangle.
	I will look for and make use of structure of the pythagorean theorem.
Performance Tasks: Students will be able to apply the pythagorean theorem.	Notes:
Topic 7:Understanding square roots	Length:2 days
Lesson Frame:	We will find values of square roots by estimation.
	I will reason quantitatively and look for and make use of the structure of a square root.
Performance Tasks: Students will be able to understand the definition of square roots and irrational numbers.	Notes:
Topic 8:Real numbers	Length:2 days
Lesson Frame:	We will convert terminating and repeating decimals into fractions.
	I will look for and make use of structure when converting decimals to fractions.
Performance Tasks: Students will be able to distinguish rational numbers from irrational numbers.	Notes:
Topic 9:Applications of pythagorean theorem	Length:1 day
Lesson Frame:	We will use the pythagorean theorem to solve everyday real life problems.
	I will make sense of problems and persever in solving them with the pythagorean theorem.
Performance Tasks: Students will be able to apply the pythagorean theorem to word problems.	Notes:
Topic 10:Pythagorean theorem in three dimensions	Length:1 day
Lesson Frame:	We will use the pythagorean theorem to solve everyday real life three dimensional problems.
	I will use the appropriate tool to solve pythagorean theorem real world problems.

Unit Name:Angles and the Pythagorean Theorem	Length:17 days
Standards:M.8.EE.A.2M.8.G.A.5M.8.G.B.6M.8.G.B.7M.8.G.B.8M.8.NS.A.1M.8.NS.A.2	Outcomes:Students will find the measurements of missing angles made by lines that interesect parallel lines.
Essential Questions:What do I know about this triangle?	Learning Targets:Students will be able to determine if two triangles are similar by looking at their angles.
Performance Tasks: Students will be able to apply the pythagorean theorem to problems involving three dimensions.	Notes:

Topic 11:Pythagorean theorem proofs	Length:1 day
Lesson Frame:	We will proof why the pythagorean theorem works.
	I will construct viable arguments and critique the reasoning of others as I explain proofs of the pythagorean theorem.

Performance Tasks: Students will be able to explain a proof of the pythagorean theorem.	Notes:

Unit Name:Surface Area and Volume	Length:16 days
Standards:M.8.EE.A.2M.8.G.C.9	Outcomes:Students will find the volumes of non-rectangular shapes, including cylinders, pyramids, cones and spheres.
Essential Questions:Am I measuring in one, two, or three dimensions?	Learning Targets:Students will be able to find the surface areas of cylinders and pyramids.
Topic 1:Cube roots	Length:1 day
Lesson Frame:	We will find the length of a side of the cube given the volume.
	I will reason quantitatively as I find volume or side lengths of cubes.
Performance Tasks: Students will be able to find the volume of a cube.	Notes:
Topic 2:Surface area and volume of cylinders	Length:1 day
Lesson Frame:	We will compare the process of finding SA and volume of cylinders and rectangular prisms.
	I will attend to precision when distinguishing between surface area and volume.
Performance Tasks: Students will be able to find surface area and volume of cylinders.	Notes:
Topic 3:Volumes of cones and pyramids	Length:1 day
Lesson Frame:	We will demonstrate that the volume of a prism is three times the volume of a cone.
	I will create mathematical models to demonstrate how the volume of a prism and pyramid compare.
Performance Tasks: Students will be able to compare the volume of a cylinder and a cone with the same dimensions.	Notes:
Topic 4:Volume of a sphere	Length:1 day
Lesson Frame:	We will generalize the formula for a sphere through collecting data.
	I will make sense of problems and persevere in solving problems involving the volume of a sphere.
Performance Tasks: Students will be able to find the volume of a sphere.	Notes:
Topic 5:Applications of volume	Length:2 days
Lesson Frame:	We will apply our knowledge of volume to solve real world word problems involving volume.
	I will make sense of and perseve in solving problems involving cones and spheres.
Performance Tasks: Students will be able to create a cone with a maximum volume.	Notes:
Topic 6:Inderect measurement	Length:2 days
Lesson Frame:	We will solve triangle problems connected to real life situations.
	I will describe the connections between slope and triangles.
Performance Tasks: Students will be able to solve problems requiring them to use length, slope and angles.	Notes:
Topic 7:Finding unknowns	Length:2 days
Lesson Frame:	We will solve problems involving values that are unknown.
	I will solve real world problems where I need to find a missing value.
Performance Tasks: Students will be able to solve problems involving equivalent and unknown vallues.	Notes:
Topic 8:Analyzing data to identify a trend	Length:2 days
Lesson Frame:	We will determine rates and percents from a trend line.
	I will identify trend lines from data that creates scatterplots.
Performance Tasks: Students will be able to graph data given to them in different forms.	Notes:

September	October	November	December	January	February	March	April	May	June
Unit 1	Unit 2	Finish unit 3	Finish unit 4	Finish unit 5	Unit 7	Unit 8	Unit 9	Unit 10	
	Start unit 3	Start unit 4	Start unit 5	Unit 6					

Course Name:	Core Connections Algebra CPM		
Credits:	1		
Prerequisites:	None		
Description:	This course is designed to introduce the student to the topics needed to go into the upper level Algebra courses. It stresses rational expressions and problem solving with variables, number sets and real numbers, solving linear equations, graphing linear equations, writing linear equations, solving and graphing linear inequalities, systems of linear equations and inequalities, exponential functions, polynomials and factoring, rational expressions and equations, matrices, and radicals.		
Academic Standards:	Wisconsin State Standards in Mathematics		
Units:11	Unit Length:	Unit Standards:	Unit Outcomes:
Functions	14 Days	M.F.IF.A.1 (F2Y), .F.IF.A.2 (F2Y) M. F.IF.C.7a (F2Y), .F.IF.C.7e, M.A. REI.D.10, (F2Y), M.F.IF.B.4 (F2Y), M.A.REI.D.10 (F2Y), M.F.IF.B.4 (F2Y), M.F.IF.C.7b,M.F.IF.B.5	Students will explore nonlinear functions and learn how to describe a function completely.
Linear Relationships	14 Days	M.A.CED.A.2 (F2Y)M.A.REI.D.10 (F2Y)M.A. SSE.A.1aM.A.SSE.A.1bM.F.BF.A.1aM.F.IF.B.4 (F2Y)M.F.IF.B.6M.F.IF.C.7a (F2Y)M.F.IF.C. 7bM.F.IF.C.9M.F.LE.A.1 (F2Y)M.F.LE.A.1a (F2Y)M.F.LE.A.1b (F2Y)M.F.LE.A.2 (F2Y)M.F. LE.B.5 (F2Y)M.N.Q.A.1 (F2Y)M.N.Q.A.2 (F2Y)	Students will look for connections between the multiple representations of linear functions: table, graph, equatio, and situation.
Simplifying and Solving	15 Days	M.A.APR.A.1M.A.CED.A.4 (F2Y)M.A.REI.A.1 (F2Y)M.A.REI.B.3 (F2Y)M.A.SSE.A.1aM.A. SSE.B.3a	Students will multiply and solve equations.
Systems of Equations	15 Days	M.A.CED.A.1 (F2Y)M.A.REI.C.5 (F2Y)M.A. REI.C.6 (F2Y)M.A.REI.D.10 (F2Y)M.A.SSE.A. 1bM.F.LE.A.1b (F2Y)M.N.Q.A.1 (F2Y)M.N.Q. A.2 (F2Y)	Students will learn how to solve word problems by writing a system of equations.
Sequences	16 Days	M.F.BF.A.2M.F.IF.7eM.F.IF.A.3 (F2Y)M.F.IF. B.6M.F.LE.A.1a (F2Y)M.F.LE.A.1c (F2Y)M.F. LE.A.2 (F2Y)M.F.LE.A.3 (F2Y)M.N.Q.A.2 (F2Y)	Students will look for patterns and make tables to write algebraic equations describing sequences of numbers.
Modeling Two-Variable Data	16 Days	M.N.Q.A.1 (F2Y)M.N.Q.A.3 (F2Y)M.SP.ID.B. 6a (F2Y)M.SP.ID.B.6c (F2Y)M.SP.ID.C.7 (F2Y) M.SP.ID.C.8 (F2Y)M.SP.ID.C.9 (F2Y)	Students will use scatterplots of data to create lines and curves that model the data.
Exponential Functions	15 Days	M.A.CED.A.1 (F2Y)M.A.CED.A.2 (F2Y)M.A. REI.D.10 (F2Y)M.A.SSE.A.1bM.A.SSE.B.3cM. F.BF.A.1aM.F.IF.7bM.F.IF.7eM.F.IF.B.4 (F2Y) M.F.IF.B.5M.F.IF.B.6M.F.IF.C.7bM.F.IF.C.8 (F2Y)M.F.IF.C.9M.F.LE.A.1a (F2Y)M.F.LE.A.1c (F2Y)M.F.LE.A.2 (F2Y)	Students will simplify and rewrite exponential expresions while working with fractional exponents.

Quadratic Functions	14 Days	M.A.CED.A.2 (F2Y)M.A.REI.B.4 (F2Y)M.A.SSE.A.1bM.A.SSE.B.3aM.A.SSE.B.3bM.F.BF.A.1aM.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7a (F2Y)M.F.IF.C.8 (F2Y)M.F.IF.C.9M.N.Q.A.1 (F2Y)	Students will find connections between the different representations of a quadratic function.
Solving Quadratics and Inequalities	15 Days	M.A.CED.A.2 (F2Y)M.A.REI.B.4 (F2Y)M.A.SSE.A.1bM.A.SSE.B.3aM.A.SSE.B.3bM.F.BF.A.1aM.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7a (F2Y)M.F.IF.C.8 (F2Y)M.F.IF.C.9M.N.Q.A.1 (F2Y)	Students will learn how to deal with two expressions that are not of equal value, inequalities.
Solving Complex Equations	18 Days	M.A.REI.A.1 (F2Y)M.A.REI.B.3 (F2Y)M.A.REI.B.4 (F2Y)M.A.REI.C.7 (F2Y)M.A.REI.D.11 (F2Y)M.A.SSE.A.1bM.A.SSE.B.3cM.N.RN.B.3M.SP.ID.B.5 (F2Y)	Students will solve equations with square roots, absolute value, variable exponents, and messy fractions.
Functions and Data	20 Days	M.A.CED.A.1 (F2Y)M.A.CED.A.3 (F2Y)M.A.SSE.B.3M.F.BF.B.4M.F.IF.A.1 (F2Y)M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7a (F2Y)M.F.IF.C.8 (F2Y)M.F.LE.A.1a (F2Y)M.F.LE.A.1c (F2Y)M.F.LE.A.2 (F2Y)M.F.LE.B.5 (F2Y)M.N.Q.A.2 (F2Y)M.N.Q.A.3 (F2Y)M.SP.ID.A.1 (F2Y)M.SP.ID.A.2 (F2Y)	Students will learn how to change and "undo" functions.

Unit Name:Functions	Length: 14 days
Standards:M.F.IF.A.1 (F2Y), .F.IF.A.2 (F2Y) M.F.IF.C.7a (F2Y), .F.IF.C.7e, M.A.REI.D.10, (F2Y), M.F.IF.B.4 (F2Y), M.A.REI.D.10 (F2Y), M.F.IF.B.4 (F2Y), M.F.IF.C.7b,M.F.IF.B.5	Outcomes:Students will explore nonlinear functions and learn how to describe a function completely.
Essential Questions:Can I identify imprtant quantities in situations and describe their relationshps using graphs?	Learning Targets:Students will be able to describe nonlinear functions completely.
Topic 1:Solving Puzzles in Teams	Length:1 day
Standard(s):F-IF.1, F-IF.2	Academic Vocabulary:Team roles
Lesson Frame:	We will be able to work in teams.
	I will know the main roles in a team.
Performance Tasks: Students will be able to ideltify multiple representations of linear functions.	Notes:
Topic 2 Investigating Growth Patterns	Length:2 days
Standard(s):F-IF.7a, F-IF.7e	Academic Vocabulary:Growth Patterns
Lesson Frame:	We will collect and anayze data.
	I will use tables and graphs to collect and anayze data.
Performance Tasks: Students will be able to collect and analyze data with tables and graphes.	Notes:
Topic 3 Investigating Graphs of Quadratic Functions	Length:1 day
Standard(s):A-REI.10, F-IF.4, F-IF.7a	Academic Vocabulary:Linear Function, inverse variation, exponential functions
Lesson Frame:	We will describe a parabola using intercepts, minima, maxima, vertex, and symmetry.
	I will be able to desribe the key characteristics of parabolas.
Performance Tasks: Students will be able to describe a parabola.	Notes:
Topic 4 Describing a Graph	Length:2 days
Standard(s):A-REI.10, F-IF.4, F-IF.7b	Academic Vocabulary:Diamond problem
Lesson Frame:	We will write summary staments describing graphs.
	I will be able to write a summary statement from a square root graph.
Performance Tasks: Students will be able to write summary statements describing the graph of square roots.	Notes:
Topic 5 Cube Roots and Absolute Value Functions	Length:1 days
Standard(s):A-REI.10, F-IF.7b	Academic Vocabulary:Cube root and absolute value
Lesson Frame:	We will graph and describe cube root and absolue value functions.
	I will accurately graph and describe cube root and absolute value functions.
Performance Tasks: Students will be able to graph and describe cube roots and absolute value functions.	Notes:
Topic 6 Function Machines	Length:1 days
Standard(s):F-IF.1, F-IF.2	Academic Vocabulary:Quadratic Function,
Lesson Frame:	We will understand the input/output nature of functions.
	I will understand the limitations for the domain and range of a function.
Performance Tasks: Students will be able to understand the input/output nature of functions.	Notes:
Topic 7 Functions	Length:1 days
Standard(s):F-IF.1, F-IF.2	Academic Vocabulary:Function
Lesson Frame:	We willdetermine which relationships are functions.
	I willidentify graphs and tables that are functions.
Performance Tasks: Students will be able to determine which relationships are functions and which are not.	Notes:
Topic 8 Domain and Range	Length:1 days
Standard(s):F-IF.1, F-IF.2, F-IF.5	Academic Vocabulary:Domain, range
Lesson Frame:	We will describe the domain and range of a function.
	I will look at an equation and graph and determine the domain and range.
Performance Tasks: Students will be able to describe the domain and range of a function.	Notes:

Unit Name:Linear Relationships	Length: 14 days
Standards:M.A.CED.A.2 (F2Y)M.A.REI.D.10 (F2Y)M.A.SSE.A.1aM.A.SSE.A.1bM.F.BF.A.1aM.F.IF.B.4 (F2Y)M.F.IF.B.6M.F.IF.C.7a (F2Y)M.F.IF.C.7bM.F.IF.C.9M.F.LE.A.1 (F2Y)M.F.LE.A.1a (F2Y)M.F.LE.A.1b (F2Y)M.F.LE.A.2 (F2Y)M.F.LE.B.5 (F2Y)M.N.Q.A.1 (F2Y)M.N.Q.A.2 (F2Y)	Outcomes:Students will look for connections between the multiple representations of linear functions: table, graph, equation, and situation.
Essential Questions:Can I create a representation of a problem, consider the units involved, and understand the meaning of the quantities using tables, graphs and equations?	Learning Targets:Students will be able to find connections between multiple representations of a linear function.
Topic 1:Seeing Growth in Linear Representations	Length:1 day
Standard(s):F-IF.7a, F-LE.1a, F-LE.2, F-LE.5	Academic Vocabulary:Linear representation
Lesson Frame:	We will write linear algebraic equations relating the figure number of a geometric pattern.
	I will work with tiles to look for growth patterns in a geometric pattern.

Performance Tasks: Students will be able to write linear functions from a geometric pattern.	Notes:

Topic 2 Slope	Length:1 day
Standard(s):F-IF.7a, F-LE.1a, F-LE.2, F-LE.5	Academic Vocabulary:Slope triangle, lattice points
Lesson Frame:	We will gain abstract understanding of slope.
	I will discover that slope is a relationship between the change in Y and change in X.
Performance Tasks: Students will be able to understand slope abstractly.	Notes:

Topic 3 Comparing Change in Y and Change in X	Length: 1 day
Standard(s):F-IF.4, F-IF.7a, F-LE.1a, F-LE.5	Academic Vocabulary:Trends
Lesson Frame:	We will compare relative steepness of lines.
	I will use slope triangles to build intuition about positive, negative and zero slopes.

Performance Tasks: Students will be able to use slope triangles to compare steepness.	Notes:

Topic 4 Slope Intercept Form	Length:1 day
Standard(s):A-SSE.1a, A-SSE.1b, A-REI.10, F-IF.4, F-IF.7a, F-BF.1a, F-LE.1a, F-LE.2, F-LE.5	Academic Vocabulary:Variables, parameters, coefficient
Lesson Frame:	We will formulize y=mx+b form.
	I willexplore information that is needed to determine a line in slope intercept form.

Performance Tasks: Students will be able to formalize Y=MX + B	Notes:

Topic 5 Slope as Motion	Length:1 day
Standard(s):A-CED.2, F-IF.4, F-IF.7a, F-BF.1a, F-LE.1b, F-LE.2, F-LE.5	Academic Vocabulary:Motion
Lesson Frame:	We will apply their knowledge of finding the equation of a line from a graph to a motion problem.
	I willbegin to connect slope as a rate.

Performance Tasks: Students will be able to apply their knowledge of of slope to a motion problem.	Notes:

Topic 6 Rate of Change	Length:2 days
Standard(s):N-Q.1, N-Q.2, A-CED.2, F-IF.4, F-IF.6, F-IF.7a, F-IF.7b, F-IF.9, F-BF.1a, F-LE.1b, F-LE.2, F-LE.5	Academic Vocabulary:Rate of change, Piecewise graph
Lesson Frame:	We will understand speed as a rate.
	I will apply contextual meaning to m and b.

Performance Tasks: Students will be able to understand speed as a rate.	Notes:

Topic 7 Equations of Lines in Situations	Length:1 day
Standard(s):N-Q.2, A-CED.2, F-IF.4, F-IF.7a, F-BF.1a, F-LE.1b, F-LE.2, F-LE.5	Academic Vocabulary:X and Y intercept
Lesson Frame:	We will practice finding slopes and writing linear equations.
	I will solve challenging team puzzles finding slopes.

Performance Tasks: Students will be able to find slopes and write equations from a puzzle.	Notes:

Topic 8 Finding an Equation Given a Slope and a Point	Length:1 day
Standard(s):N-Q.2, A-CED.2, F-IF.4, F-IF.7a, F-BF.1a, F-LE.1b, F-LE.2, F-LE.5	Academic Vocabulary:Representation chart
Lesson Frame:	We will employ multiple methods to fin the y intercept of a line givens its slop and one point.
	I will learn how to solve for the y intercept algebraically.

Unit Name:Linear Relationships	Length: 14 days
Standards:M.A.CED.A.2 (F2Y)M.A.REI.D.10 (F2Y)M.A.SSE.A.1aM.A.SSE.A.1bM.F.BF.A.1aM.F.IF.B.4 (F2Y)M.F.IF.B.6M.F.IF.C.7a (F2Y)M.F.IF.C.7bM.F.IF.C.9M.F.LE.A.1 (F2Y)M.F.LE.A.1a (F2Y)M.F.LE.A.1b (F2Y)M.F.LE.A.2 (F2Y)M.F.LE.B.5 (F2Y)M.N.Q.A.1 (F2Y)M.N.Q.A.2 (F2Y)	Outcomes:Students will look for connections between the multiple representations of linear functions: table, graph, equation, and situation.
Essential Questions:Can I create a representation of a problem, consider the units involved, and understand the meaning of the quantities using tables, graphs and equations?	Learning Targets:Students will be able to find connections between multiple representations of a linear function.
Performance Tasks: Students will be able to find the Y intercept of a graph given a slope and a point.	Notes:

Topic 9 Finding the Equation of a Line Through Two Points	Length:1 day
Standard(s):A-REI.10, F-IF.7a, F-BF.1a, F-LE.2	Academic Vocabulary:Slope intercept form
Lesson Frame:	We will use their knowledge of slope intercept form to fin the equations of lines.
	I will use a table or graph to write equations of lines.

Performance Tasks: Students will be able to find an equation fiven to points.	Notes:

Unit Name:Simplifying and Solving	Length:15 days
Standards:M.A.APR.A.1M.A.CED.A.4 (F2Y)M.A.REI.A.1 (F2Y)M.A.REI.B.3 (F2Y)M.A.SSE.A.1aM.A.SSE.B.3a	Outcomes:Students will multiply and solve equations.
Essential Questions:How can algebra tiles and area models help me better understand multiplication?	Learning Targets:Students will be able to solve polynomial equations.
Topic 1:Simplifying Exponential Expressions	Length:1 day
Standard(s):A-SSE.3c	Academic Vocabulary:Exponent
Lesson Frame:	We will expand exponential expressions.
	I will use repeated multiplication to expand exponential functions.

Performance Tasks: Students will be able to simplify expressions with exponents.	Notes:

Topic 2 Zero and negative exponents	Length:1 day
Standard(s):A-SSE.3c	Academic Vocabulary:Negative exponents
Lesson Frame:	We will formulize laws of exponents.
	I will deduce the mean of zero and negative exponents.

Performance Tasks: Students will be able to simplify expressions with zero and negative exponents.	Notes:

Topic 3 Equations using algebra tiles	Length:2 days
Standard(s):A-REI.1, A-REI.3	Academic Vocabulary:Algebra tiles, Equation mat, counterexample
Lesson Frame:	We will use alegbra tiles to represent equations and expressions.
	I will begin to understand the foundation of equation solving with algebra tiles.

Performance Tasks: Students will be able to represent equations with algebra tiles.	Notes:

Topic 4 Exploring an area model	Length:1 day
Standard(s):A-SSE.3a	Academic Vocabulary:Factors, generic rectangle
Lesson Frame:	We will start to identify dimensions of rectangles formed with algebra tiles.
	I will write the area as a sum and as a product.

Performance Tasks: Students will be able to demonstrate how to multiply using the area model.	Notes:

Topic 5 Multiplying binomials and the distributive property	Length:1 day
Standard(s):A-APR.1	Academic Vocabulary:Distributive property, whole numbers, closed set, polynomial, binomial
Lesson Frame:	We will multiply polynomial epressions using algebra tiles.
	I will apply the distributive property using algebra tiles.

Performance Tasks: Students will be able to multiply bimomials.	Notes:

Topic 6 Using generic rectangles to multiply	Length:1 day
Standard(s):A-APR.1	Academic Vocabulary:Generic rectangle, product, associative property, commutative property
Lesson Frame:	We willcontinue to practice multiplying expressions.
	I willfind missing dimensions of generic rectangles given the area.

Performance Tasks: Students will be able to use generic rectangles to multiply polynomials.	Notes:

Topic 7 Solving equations with multiplication and absolute value.	Length:1 day
Standard(s):A-REI.1, A-REI.3, (A-REI.3.1)	Academic Vocabulary:Inverse
Lesson Frame:	We will solve linear equations that involve multiplication.
	I willsolve problems that involve absolute value.

Performance Tasks: Students will be able to solve equations with multiplaction and absolute value in them.	Notes:

Topic 8 Working with multi-variable equations	Length:2 days

Unit Name:Simplifying and Solving	Length:15 days
Standards:M.A.APR.A.1M.A.CED.A.4 (F2Y)M.A.REI.A.1 (F2Y)M.A.REI.B.3 (F2Y)M.A.SSE.A.1aM.A.SSE.B.3a	Outcomes:Students will multiply and solve equations.
Essential Questions:How can algebra tiles and area models help me better understand multiplication?	Learning Targets:Students will be able to solve polynomial equations.
Standard(s):A-REI.1, A-REI.3, (A-REI.3.1)	Academic Vocabulary:Standard form
Lesson Frame:	We will solve multi-variable equations for one of the variables.
	I will work with algebra tiles to solve multi step multi variable equations.

Performance Tasks: Students will begin working with equations with more than one variable.	Notes:

Topic 9 Summary of Solving Equations	Length:1 day
Standard(s):A-CED.4, A-REI.3	Academic Vocabulary:Area as a product and sum
Lesson Frame:	We will solve single and multi variable equations.
	I will solve single and multiple varaible equations given to me in different forms.

Performance Tasks: Students will be able to solve equations in a variety of settings.	Notes:

Unit Name:Systems of Equations	Length:15 days
Standards:M.A.CED.A.1 (F2Y)M.A.REI.C.5 (F2Y)M.A.REI.C.6 (F2Y)M.A.REI.D.10 (F2Y)M.A.SSE.A.1bM.F.LE.A.1b (F2Y)M.N.Q.A.1 (F2Y)M.N.Q.A.2 (F2Y)	Outcomes:Students will learn how to solve word problems by writing a system of equations.
Essential Questions:Am I using correct vocabulary and clear explanations in discussions with my team, while paying attention to small details?	Learning Targets:Students will be able to solve systems of equations.
Topic 1:Solving word problems by writing equations	Length:2 days
Standard(s):N-Q.2, A-SSE.1b, A-CED.1, A-REI.6, F-LE.1b	Academic Vocabulary:math sentence, let statement, models, line of best fit
Lesson Frame:	We will define variables and write equations to solve word problems.
	I will review the connections between a graph, table, and an equation.
Performance Tasks: Students will be able to write equations from word problems.	Notes:
Topic 2 One equation or two	Length:1 day
Standard(s):N-Q.2, A-CED.1, A-CED.2, A-REI.6	Academic Vocabulary:Equal values method, system of equations
Lesson Frame:	We will continue to learn how to write equations from word problems.
	I will solve a system of equations by rewriting one of the equations.
Performance Tasks: Students will be able to decide the number of equations that need to be written given specific information.	Notes:
Topic 3Solving systems of equations using substituation	Length:1 day
Standard(s):A-REI.6	Academic Vocabulary:Substitution method, form, nonlinear, associations, outlier, strength
Lesson Frame:	We will understand how to use substitution to solve systems of linear equations.
	I will recognize the benefits of using substitution in certain situations.
Performance Tasks: Students will be able to solve equations using substitution.	Notes:
Topic 4 Systems, solutions and graphs	Length:1 day
Standard(s):N-Q.2, A-REI.5, A-REI.6, A-REI.10	Academic Vocabulary:Substitution method, solution
Lesson Frame:	We will examine how a solution to a system of equations relates to those equations.
	I will graph equations to see how the solution connections to equations.
Performance Tasks: Students will be able to connect equations, graphs and word problems that represent each other.	Notes:

Topic 5 Solving systems with elimination	Length:1 day
Standard(s):A-REI.5, A-REI.6	Academic Vocabulary:Elimination method
Lesson Frame:	We will develop the elimination method for solving a system of equations.
	I will solve systems of equations using the elimination method.
Performance Tasks: Students will be able to solve systems of equations using elimination	Notes:
Topic 6 More elimination	Length:1 day
Standard(s):A-REI.5, A-REI.6	Academic Vocabulary:Point slope form
Lesson Frame:	We will study complex applications of the elimination method.
	I will learn that multiplying both sides of an equation by a constant can create an equivalent expression.
Performance Tasks: Students will be able to use elimination when co-efficients aren't alike.	Notes:
Topic 7 Choosing a strategy to solve systems	Length:1 day
Standard(s):A-REI.5, A-REI.6	Academic Vocabulary:Intersect, parallel, coincide
Lesson Frame:	We will review strategies to solve systems of equations and choose the best strategy.
	I will learn that solutions will remain the same no matter which method is used.
Performance Tasks: Students will be able to choose the appropriate startegy for solving a system of equations.	Notes:
Topic 8 Pulling it all together.	Length:3 days
Standard(s):N-Q.1, A-CED.2	Academic Vocabulary:Rule
Lesson Frame:	We will continue to make connections between solving, graphing, and manipulating equations and expressions.
	I will solve problems based on different methods to solve systems of equations.
Performance Tasks: Students will be able to apply their knowledge of systems of equations to tables, graphs, equations, and situations.	Notes:

Unit Name:Sequences	Length: 16 days
Standards:M.F.BF.A.2M.F.IF.7eM.F.IF.A.3 (F2Y)M.F.IF.B.6M.F.LE.A.1a (F2Y)M.F.LE.A.1c (F2Y)M.F.LE.A.2 (F2Y)M.F.LE.A.3 (F2Y)M.N.Q.A.2 (F2Y)	Outcomes:Students will look for patterns and make tables to write algebraic equations describing sequences of numbers.
Essential Questions:When patterns are repeated, can I find shortcuts that lead to an equation?	Learning Targets:Students will be able to write equations of sequences.
Topic 1:Representing Exponential Growth	Length:2 days
Standard(s):N-Q.2, F-LE.1c	Academic Vocabulary:Exponential function, growth
Lesson Frame:	We will represent exponential growth in a table, graph, and diagram.
	I will write descriptions of exponential growth based on patterns I see.
Performance Tasks: The students will be able to write exponential equations given a situation.	Notes:
Topic 2 Rebound ratios	Length:1 day
Standard(s):F-LE.1c	Academic Vocabulary:Ratio, continuous, discrete, independent, dependent
Lesson Frame:	We will generate data and model the data in tables, equations, and graphs.
	I will calculate the rebound rate from the data collected.
Performance Tasks: The students will identify rebound ratios and make a connection to exponential equations.	Notes:
Topic 3 Exponential decay	Length:1 day
Standard(s):F-IF.7e, F-LE.1c	Academic Vocabulary:Exponential decay,
Lesson Frame:	We will investigate exponential decay.
	I will compare exponential decay functions to linear functions.
Performance Tasks: The students will be able to write equations represented by exponential decay situations.	Notes:
Topic 4 Generating and investigating sequences	Length:2 days
Standard(s):F-BF.2, F-LE.2	Academic Vocabulary:Sequence, 1st term, arithmetic sequence, geometric sequence
Lesson Frame:	We will sort sequences into groups based on patterns in their representations.
	I will identify sequences grenerated by adding a constant and by multiplying by a constant.
Performance Tasks: Students will be able to identify patterns in sequences.	Notes:
Topic 5 Arithmetic sequences	Length:1 day
Standard(s):F-IF.3, F-BF.2, F-LE.2	Academic Vocabulary:Common difference,
Lesson Frame:	We will learn the volcabulary and notation for arithmetic sequences.
	I will develop equations in the nth term.
Performance Tasks: Students will be able to write equations from arithmetic sequences.	Notes:

Topic 6 Recursive sequences	Length:1 day		
Standard(s):F-IF.3, F-BF.2, F-LE.2	Academic Vocabulary:Explicit, recursive		
Lesson Frame:	We will write sequences from recursive equations.		
	I will convert between explicit and recursive equations in arithmetic sequences.		
Performance Tasks: Students will be able to write equations for recursive sequences.	Notes:		
Topic 7 Patterns of growth in tables and graphs	Length:1 day		
Standard(s):F-IF.6, F-LE.1a, F-LE.3	Academic Vocabulary:Patterns		
Lesson Frame:	We will compare patterns of growth in linear and eponential tables.		
	I will identify patterns of growth in various tables.		
Performance Tasks: Students will be able to identify growth patterns from both tables and graphs.	Notes:		
Topic 8 Using multipliers to solve problems	Length:2 days		
Standard(s):F-LE.1c, F-LE.2	Academic Vocabulary:Multiplier		
Lesson Frame:	We will find equations for geometric sequences .		
	I will see relationships between geometric sequences and exponential sequences.		
Performance Tasks: Students will be able to use multipliers from situations to solve word problems.	Notes:		
Topic 9 Comparing functions to sequences	Length:1 day		
Standard(s):F-IF.3, F-BF.2, F-LE.2	Academic Vocabulary:		
Lesson Frame:	We will recognize that all sequences are functions with domains limited to positive integers.		
	I will use graphical methods to solve exponential equations.		
Performance Tasks: Students will be able to see similarities and differences between functions and related sequences.	Notes:		

Unit Name:Modeling Two-Variable Data	Length:16 days
Standards:M.N.Q.A.1 (F2Y)M.N.Q.A.3 (F2Y)M.SP.ID.B.6a (F2Y)M.SP.ID.B.6c (F2Y)M.SI	Outcomes:Students will use scatterplots of data to create lines and curves that model the data.
Essential Questions:Can I model relationships mathematically in order to describe, analy	Learning Targets:Students will be able to write equations of lines of best fit from scatterplots.
Topic 1:Line of best fit	Length:1 day
Standard(s):N-Q.1, S-ID.6a, S-ID.6c, S-ID.7	Academic Vocabulary:Strong and weak correlation
Lesson Frame:	We will review drawing a line of best fit.
	I will make predictions based on the linear model and will interpret slope and y intercept in context.
Performance Tasks: Students will be able to find the line of best bit given a set of data.	Notes:
Topic 2 Residuals	Length:1 day
Standard(s):N-Q.1, S-ID.6a, S-ID.6c	Academic Vocabulary:Residual, slope, extrapolating
Lesson Frame:	We will learn how to calculate and interpret a residual.
	I will extrapolate data within a statistical model.
Performance Tasks: Students will be able to identify residuals from a set of data.	Notes:
Topic 3 Upper and lower bounds	Length:1 day
Standard(s):N-Q.1, N-Q.3, S-ID.6a, S-ID.6c	Academic Vocabulary:Bounds
Lesson Frame:	We will graphically determine the upper and lower bounds.
	I will make a prediction from a linear best fit model.
Performance Tasks: Students will be able to identify upper and lower bounds from a given set of data.	Notes:
Topic 4 Least squares regression line	Length: 2 days
Standard(s):N-Q.1, S-ID.6a, S-ID.6c	Academic Vocabulary:Least squares regression line
Lesson Frame:	We will find the least squares regression line using their calculators.
	I will understand that the line minimizes the sum of the squares of the residuals.
Performance Tasks: Students will be able to develop a least squares regression line from a given set of data.	Notes:
Topic 5 Residual plots	Length:2 days
Standard(s):N-Q.1, S-ID.6a, S-ID.6b	Academic Vocabulary:Residual plot

Lesson Frame:	We will observe the ipact of an outlier on the LSRL.
	I will determine if a linear model is a good fit for the data by creating and visually analyzing residual plots.

Performance Tasks: Students will be able create residial plots from a set of data points.	Notes:

Topic 6 Correlations	Length:1 day
Standard(s):N-Q.1, S-ID.6a, S-ID.8	Academic Vocabulary:Correlation coeifficient
Lesson Frame:	We will calculate the correlation coefficient and observe the scatter for various extremes of r.
	I will describe the association between two variables in more mathematical terms.

Performance Tasks: Students will be able to identify correlations from plots and tables.	Notes:

Topic 7 Association is not a causation	Length:1 day
Standard(s):N-Q.1, S-ID.6a, S-ID.9	Academic Vocabulary:Associations, lurking variable
Lesson Frame:	We will understand that cause and effect cannot be determined from a study that reports an association.
	I will analyze how associations impact cause and effect.

Performance Tasks: Students will understand the associations do not necessarily always lead to a specific res	Notes:

Topic 8 Interpreting correlations in a context	Length:1 day
Standard(s):N-Q.1, S-ID.6a, S-ID.8	Academic Vocabulary:Correlations
Lesson Frame:	We will interpret correlation coefficient square in context.
	I will identify the correlation coefficient square within a word problem.

Performance Tasks: Students will be able to understand correlations in the setting of a word problem.	Notes:

Topic 9 Curved best-fit models	Length:2 days
Standard(s):N-Q.1, S-ID.6a	Academic Vocabulary:r squared
Lesson Frame:	We will fit a non-linear model to data that shows a curved trend.
	I will identify the differences between linear and non-linear models and their trends.

Performance Tasks: Students will be able to fit a curve to model a set of data in a graph or table.	Notes:

Unit Name:Exponential Functions	Length:15 days
Standards:M.A.CED.A.1 (F2Y)M.A.CED.A.2 (F2Y)M.A.REI.D.10 (F2Y)M.A.SSE.A.1bM.A.SSE.B.3cM.F.BF.A.1aM.F.IF.7bM.F.IF.7eM.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.B.6M.F.IF.C.7bM.F.IF.C.8 (F2Y)M.F.IF.C.9M.F.LE.A.1a (F2Y)M.F.LE.A.1c (F2Y)M.F.LE.A.2 (F2Y)	Outcomes:Students will simplify and rewrite exponential expresions while working with fractional exponents.
Essential Questions:Am I making connections between the multiple representations and making sense of the situations?	Learning Targets:Students will be able to simplify exponential expressions and equations.
Topic 1:Investigating slope intercept form	Length:2 days
Standard(s):F-IF.4, F-IF.7e	Academic Vocabulary:Asymptotes
Lesson Frame:	We will investigate the family of functions y=b to the x.
	I will make and justify statements about the behaviors of graphs in this family.
Performance Tasks: Students will be able to apply slope intercept form to different situations.	Notes:
Topic 2 Multiple representations of exponential functions.	Length:1 day
Standard(s):A-CED.1, A-CED.2, F-IF.7e, F-IF.8b, F-LE.1c, F-LE.2, F-LE.5	Academic Vocabulary:Representations
Lesson Frame:	We will deepend and extend their understanding of exponential functions.
	I will examin the multiplier and starting point in different representations.
Performance Tasks: Students will be able to identify exponential functions from graphs, equations, tables, and situations.	Notes:
Topic 3 Applications of exponential growth	Length:1 day
Standard(s):A-SSE.1b, A-CED.1, A-CED.2, F-IF.7b, F-IF.7e, F-IF.8b, F-LE.1a, F-LE.1c, F-LE.2, F-LE.5	Academic Vocabulary:Compound interest, simple interest
Lesson Frame:	We will use what we know about linear and exponential functions to investigate the relationship between simple and compound interest.
	I will explore simple and compound interest within real world situations.
Performance Tasks: Students will be able to apply exponential growth in a variety of situations.	Notes:
Topic 4 Exponential decay	Length:2 days
Standard(s):A-SSE.3c, A-CED.1, A-CED.2, F-IF.7e, F-IF.8b, F-LE.1c, F-LE.2, F-LE.5	Academic Vocabulary:Exponential decay, half-life
Lesson Frame:	We will represent exponential decay in multiple ways.
	I will further investigage the effect when the exponent is zero or a negative.

Performance Tasks: Students will be able to work with exponential decay from tables, equations, graphs, and situations.	Notes:
Topic 5 Graph to equation	Length:1 day
Standard(s):A-CED.1, A-CED.2, F-IF.4, F-IF.5, F-IF.7b, F-IF.7e, F-IF.8b, F-LE.1c, F-LE.2, F-LE.5	Academic Vocabulary:Step function
Lesson Frame:	We will write equations for exponential functions.
	I will study graphs in order to write exponential functions.
Performance Tasks: Students will be able to graph various types of equations.	Notes:
Topic 6 Completing the multiple reresentations web	Length:1 day
Standard(s):N-Q.1, N-Q.2, A-CED.1, A-CED.2, F-IF.4, F-IF.5, F-IF.7e, F-IF.8b, F-IF.9, F-LE.1c, F-LE.2, F-LE.5	Academic Vocabulary:Scatterplot
Lesson Frame:	We will complete the exponential multiple representations web.
	I will make connections between tables, equations, graphs and situations of an exponential function.
Performance Tasks: Students will be able to work with growth and decay problems in various settings.	Notes:
Topic 7 Curve fitting and fractional exponents	Length:1 day
Standard(s):N-RN.1, N-RN.2, F-IF.5, F-IF.7e, F-BF.1a, F-LE.2	Academic Vocabulary:Curve fitting
Lesson Frame:	We will find equations of liner and exponential functions with missing parameters.
	I will interpret fractional exponenets.
Performance Tasks: Students will be able to work with exponents that are fractions.	Notes:
Topic 8 Curve fitting	Length:1 day
Standard(s):A-REI.10, F-IF.7e, F-BF.1a, F-LE.2	Academic Vocabulary:
Lesson Frame:	We will find linear and exponential functions.
	I will use two points to write exponential functions.
Performance Tasks: Students will be able to fit curves to equations and data points.	Notes:
Topic 9 Solving a system of exponential functions graphically	Length:1 day

Standard(s):N-Q.2, F-IF.7e, F-BF.1a, F-LE.1c	Academic Vocabulary:Exponential Systems
Lesson Frame:	We will write a system of exponential functions the context of used car prices.
	I will use a graph to write and solve a system of equations.
Performance Tasks: Students will be able to solve systems of exponential functions.	Notes:

Unit Name:Quadratic Functions	Length:14 days
Standards:M.A.CED.A.2 (F2Y)M.A.REI.B.4 (F2Y)M.A.SSE.A.1bM.A.SSE.B.3aM.A.SSE.B.3bM.F.BF.A.1aM.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7a (F2Y)M.F.IF.C.8 (F2Y)M.F.IF.C.9M.N.Q.A.1 (F2Y)	Outcomes:Students will find connections between the different representations of a quadratic function.
Essential Questions:Can I explain my understanding of mathematics accurately to others?	Learning Targets:Students will be able to make connections of different representations of quadratic equations.
Topic 1: Factoring quadratics	Length:1 day
Standard(s):A-SSE.3a	Academic Vocabulary:Factoring, trinomial
Lesson Frame:	We will review how to build rectangles with tiles and learn shortcuts for finding the dimensions.
	I will discover that the products fo the terms in each diagonal are equal.
Performance Tasks: Students will be able to factor basic quadratic functions	Notes:
Topic 2 Factoring with generic rectangles	Length:1 day
Standard(s):A-SSE.3a	Academic Vocabulary:Factored form
Lesson Frame:	We will develop an algorithm to factor quadratic expresions.
	I will factor quadratic expressions without using algebra tiles.
Performance Tasks: Students will be able to factor using generic rectangles.	Notes:
Topic 3 Factoring special cases	Length:1 day
Standard(s):A-SSE.3a	Academic Vocabulary:Standard quadratic form
Lesson Frame:	We will practice factoring while learning about special quadratic cases.
	I will solve quadratics with missing terms and not in standard form.
Performance Tasks: Students will be able to factor special square quadratics.	Notes:
Topic 4 Factoring completely	Length:1 day
Standard(s)A-SSE.2, A-SSE.3a	Academic Vocabulary:Factoring completely
Lesson Frame:	We will complete their focus on factoring by finding common factors.
	I will factor quadratics using the quadratic factoring method.
Performance Tasks: Students will be able to facotr quadratics completely.	Notes:
Topic 5 Factoring shortcuts	Length:1 day

Standard(s):A-SSE.2, A-SSE.3a	Academic Vocabulary:Common factor
Lesson Frame:	We will learn a quick way to factor perfect square trinomials.
	I will learn the difference of squares.

Performance Tasks: Students will be able to discover shortcuts for factoring.	Notes:

Topic 6 More Quadratic Function	Length:1 day
Standard(s):N-Q.1, A-SSE.3a, A-CED.2, F-IF.4, F-IF.5, F-IF.7a, F-IF.8a, F-IF.9, F-BF.1a, (F-LE.6)	Academic Vocabulary:Rules
Lesson Frame:	We will make connections between differenent representations of quadratics.
	I will connect the intercepts and vertex of a parabola to a situation.

Performance Tasks: Students will be able to factor quadratics with leading coefficients other than 1.	Notes:

Topic 7 Zero product property	Length:1 day
Standard(s):A-SSE.3a, A-CED.2, A-REI.4b, F-IF.8a, F-BF.1a	Academic Vocabulary:Zero product,
Lesson Frame:	We will sketch the graph of a quadratic equation using intercepts.
	I will apply the zero product property to discover the intercepts.

Performance Tasks: Students will be able to apply the zero product property.	Notes:

Topic 8 Finding x intercepts	Length:1 day
Standard(s):A-SSE.3a, A-CED.2, A-REI.4b, F-IF.4, F-IF.7a, F-IF.8a, F-BF.1a	Academic Vocabulary:Graphing form
Lesson Frame:	We will use graphing calculators to find the x intercepts and vertex of a parabola.
	I will use graphing form to find the intercepts.

Performance Tasks: Students will be able to find the x intercepts of quadratic functions.	Notes:

Topic 9 Completing the quadratic web	Length:1 day
Standard(s):A-SSE.3a, A-CED.2, F-IF.4, F-IF.7a, F-IF.8a, F-IF.9, F-BF.1a	Academic Vocabulary:Quadratic web
Lesson Frame:	We will practice moving from a table, graph or situation to a rule.
	I will discover the rule from a graph.

Performance Tasks: Students will be able to find the connections between tables, equations, graphs and situations in a quadratic context.	Notes:
Topic 10 Completing the Square	Length:1 day
Standard(s):A-SSE.1b, A-SSE.3b, A-REI.4a, F-IF.7a, F-IF.8a	Academic Vocabulary:Completing the square
Lesson Frame:	We will convert the equation of a graph into graphing form.
	I will complete the square to write an equation in graphing form.
Performance Tasks: Students will be able to solve quadratics by completing the square	Notes:

Unit Name:Solving Quadratics and Inequalities	Length:15 days
Standards:M.A.CED.A.2 (F2Y)M.A.REI.B.4 (F2Y)M.A.SSE.A.1bM.A.SSE.B.3aM.A.SSE.B.3bM.F.BF.A.1aM.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7a (F2Y)M.F.IF.C.8 (F2Y)M.F.IF.C.9M.N.Q.A.1 (F2Y)	Outcomes:Students will learn how to deal with two expressions that are not of equal value, inequalities.
Essential Questions:Can I look closely to see a pattern or structure in these functions?	Learning Targets:Students will be able to solve inequalities within equations and graphs.
Topic 1:Solving quadratic equations	Length:1 day
Standard(s):A-SSE.3b, A-REI.4a, A-REI.4b	Academic Vocabulary:irrational numbers, radical form
Lesson Frame:	We will apply the zero product property so solve quadratic equations.
	I will develop a method of completing the square to solve equations.
Performance Tasks: Students will be able to solve quadratic equations algebraicly.	Notes:
Topic 2 Quadratic Formula	Length:1 day
Standard(s):A-REI.4a, A-REI.4b	Academic Vocabulary:Quadratic formula, perfect square form
Lesson Frame:	We will begin to understand the quadratic formula.
	I will use the quadratic formula to solve quadratic equations.
Performance Tasks: Students will be able to use the quadratic formula to solve quadratic equations.	Notes:
Topic 3 More solving quadratic equations.	Length:1 day
Standard(s):A-CED.1, A-CED.2, A-REI.4a, A-REI.4b, F-IF.8a, (F-LE.6)	Academic Vocabulary:Zeros
Lesson Frame:	We will continue to sole quadratic equations.
	I will solve quadratic equations that have one or no solutions.
Performance Tasks: Students will be able to solve complex quadratics algabraicly.	Notes:
Topic 4 Choosing a strategy	Length:1 day
Standard(s):A-CED.1, A-CED.2, A-REI.4a, A-REI.4b, F-IF.8a, (F-LE.6)	Academic Vocabulary:Real numbers
Lesson Frame:	We will investigate quadratic equations using a variety of methods.
	I will create graphs and tables to estimate solutions.
Performance Tasks: Students will identify the best strategy for solving a quadratic equation.	Notes:
Topic 5 Solving linear one step inequalities.	Length:1 day

Standard(s):A-CED.1, A-REI.3	Academic Vocabulary:Inequalities
Lesson Frame:	We will learn how to solve linear inequalities with one variable.
	I will represent solutions to inequalities on a number line.

Performance Tasks: Students will be able to solve simple inequalities.	Notes:
Topic 6 2 step inequalities	Length:1 day
Standard(s):N-Q.2, A-CED.1, A-REI.3	Academic Vocabulary:Infinite
Lesson Frame:	We will develop our ability to solve linear one variable inequalities by finding a boundary point.
	I will use inequalities to solve word problems.

Performance Tasks: Students will be able to solve two step inequalities.	Notes:
Topic 7Graphing 2 variable inequalities	Length:1 day
Standard(s):A-REI.10, A-REI.12, A-CED.3	Academic Vocabulary:Solution set
Lesson Frame:	We will learn to graph two variable inequalities.
	I will discover the solution set to two variable inequalities on a graph.

Performance Tasks: Students will be able to graph 2 variable inequalities.	Notes:
Topic 8 Linear and nonlinear inequalities	Length:1 day
Standard(s):A-REI.12	Academic Vocabulary:Constraint, boundary point
Lesson Frame:	We will graph linear and nonlinear inequalites.
	I will solve inequalites by graphing.
Performance Tasks: Students will be able to graph both linear and parabolic inequalities.	Notes:
Topic 9 Systems of inequalities.	Length:1 day
Standard(s):N-Q.2, A-CED.3, A-REI.12	Academic Vocabulary:Systems of inequalities
Lesson Frame:	We will discover constraints to a system of linear inequalities.
	I will solve a system of inequalites by graphing.

Performance Tasks: Students will be able to solve systems of inequalities.	Notes:
Topic 10 Applying inequalties to solve word problems.	Length:1 day

Standard(s):N-Q.2, A-CED.3, A-REI.12	Academic Vocabulary:
Lesson Frame:	We will continue to graph systems of inequalities.
	I will apply my understanding of systems and inequalites to solve word problems.
Performance Tasks: Students will be able to solve word problems involving inequalities.	Notes:

Unit Name:Solving Complex Equations	Length:18 days
Standards:M.A.REI.A.1 (F2Y)M.A.REI.B.3 (F2Y)M.A.REI.B.4 (F2Y)M.A.REI.C.7 (F2Y) M.A.REI.D.11 (F2Y)M.A.SSE.A.1bM.A.SSE.B.3cM.N.RN.B.3M.SP.ID.B.5 (F2Y)	Outcomes:Students will solve equations with square roots, absolute value, variable exponents, and messy fractions.
Essential Questions:Am I considering all of the available tools as I approach this problem?	Learning Targets:Students will be able to solve equations other than quadratic and linear equations.
Topic 1:Association in two way tables	Length:2 days
Standard(s):	Academic Vocabulary:Independent variables, categorical data, mutually exclusive
Lesson Frame:	We will calculate the probabilities and determine the association from data in a two way table.
	I will create conditional relative frequency tables.
Performance Tasks: Students will be able to identify connections within a two way table.	Notes:
Topic 2Solving by rewriting	Length:1 day
Standard(s):A-SSE.3c, A-REI.3	Academic Vocabulary:Equivalent equations,
Lesson Frame:	We will learn how to solve complicated equations.
	I will solve simple exponential equations by rewriting and solving simpler equations.
Performance Tasks: Students will be able to solve problems by rewriting given information.	Notes:
Topic 3 Fraction Busters	Length:1 day
Standard(s):A-REI.1, A-REI.3	Academic Vocabulary:Fraction Buster
Lesson Frame:	We will solve complicated quadratic equations.
	I will rewrite and solve equivalent equations.
Performance Tasks: Students will be able to work with fractions by using the fraction buster method.	Notes:
Topic 4Mutipple methods for solving equations.	Length:1 day
Standard(s):A-SSE.1b, A-REI.1	Academic Vocabulary:Imaginary numbers
Lesson Frame:	We will learn multiple methods for solving single variable equations.
	I will solve single variable square root equations.
Performance Tasks: Students will be able to solve various types of equations in multiple ways.	Notes:
Topic 5 Determing the number of solutions.	Length:1 day
Standard(s):A-REI.4b	Academic Vocabulary:Approximate form, exact form

Lesson Frame:	We will determine the number of solutions to an absolute value equation or a quadratic equations.
	I will express my solution in exact and approximate form.

Performance Tasks: Students will be able to determine the number of solutions an equation has.	Notes:

Topic 6 Driving the quadratic formula and the number system.	Length:1 day
Standard(s):N-RN.3, A-REI.4a, A-REI.4b	Academic Vocabulary:Complex numbers
Lesson Frame:	We will dervice the quadratic formula by completing the square.
	I will discover how imaginary numbers fall in the number system.

Performance Tasks: Students will discover how the quadratic formula was created.	Notes:

Topic 7 Applications of the quadratic formula	Length:1 day
Standard(s):A-SSE.1b, A-REI.1, A-REI.3, (A-REI.3.1), A-REI.4b, (F-LE.6)	Academic Vocabulary:Isolate
Lesson Frame:	We will practice solving various equations using various methods.
	I will select the best method to solve quadratic inequalities.

Performance Tasks: Students will apply the quadratic formula in mutliple settings.	Notes:

Topic 8 Intersections of two functions.	Length: 2 days
Standard(s):A-REI.7, A-REI.11	Academic Vocabulary:Intersect, intersection
Lesson Frame:	We will distinguish between intercepts and intersections.
	I will use intersections to find solutions to related single variable equations.

Performance Tasks: Students will be able to identify the meaning of the intersection of two functions.	Notes:

Topic 9 Number of parabola interstections	Length:1 day
Standard(s):A-REI.7, A-REI.11	Academic Vocabulary:Parabola
Lesson Frame:	We will investigate possible ways two parabols intersect.
	I will find the points of intersection algebraically.

Performance Tasks: Students will be able to determine the number of intersections of parabolas.	Notes:

Topic 10 Solving quadratic and absolute value inequalties.	Length:1 day

Standard(s):A-REI.3, (A-REI.3.1)	Academic Vocabulary:
Lesson Frame:	We will solve complicated single variable inequalities.
	I will solve absolute value inequalities with squared terms.
Performance Tasks: Students will be able to solve quadratic and absolute value inequalities.	Notes:

September	October	November	December	January	February	March	April	May	June
Unit 1	Unit 3	2nd half of unit 4	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	
Unit 2	First half of unit 4	Unit 5							

Unit Name:Functions and Data	Length:20 days
Standards:M.A.CED.A.1 (F2Y)M.A.CED.A.3 (F2Y)M.A.SSE.B.3M.F.BF.B.4M.F.IF.A.1 (F2Y)M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7a (F2Y)M.F.IF.C.8 (F2Y)M.F.LE.A.1a (F2Y) M.F.LE.A.1c (F2Y)M.F.LE.A.2 (F2Y)M.F.LE.B.5 (F2Y)M.N.Q.A.2 (F2Y)M.N.Q.A.3 (F2Y) M.SP.ID.A.1 (F2Y)M.SP.ID.A.2 (F2Y)	Outcomes:Students will learn how to change and "undo" functions.
Essential Questions:Am I taking advantage of everything I have learned this year to really engage with the mathematics and understanding the problems I am solving?	Learning Targets:Students will be able to work with inverse functions.
Topic 1:Transforming functions	Length:2 days
Standard(s):M.F.IF.A.1 (F2Y), M.F.IF.C.7a (F2Y), M.F.BF.B.3	Academic Vocabulary:Data
Lesson Frame:	We will add and multiply by a constant.
	I will transform linear, quadratic and exponential functions by multiplying.

Performance Tasks: Students will be able to understand how to change functions within a problem.	Notes:

Topic 2 Inverse functions	Length:1 day
Standard(s):M.F.BF.B.4	Academic Vocabulary:Inverse functions
Lesson Frame:	We will undo functions.
	I will find inverses to functions.

Performance Tasks: Students will be able to solve and work with inverse functions.	Notes:

Topic 3 Investigating data representations	Length:2 days
Standard(s):M.SP.ID.A.1 (F2Y), M.SP.ID.A.3 (F2Y)	Academic Vocabulary:Statistic, Quartiles
Lesson Frame:	We will see the differences between graphical representations.
	I will investigate single variable data to identify differences.

Performance Tasks: Students will be able to work and apply information represented in various models.	Notes:

Topic 4 Comparing data	Length:2 days
Standard(s):M.SP.ID.A.1 (F2Y), M.SP.ID.A.2 (F2Y), M.SP.ID.A.3 (F2Y)	Academic Vocabulary:Range
Lesson Frame:	We will compare the center, shape, spread and outliers of two sets of data.
	I will analyze and compare two different sets of data.

Performance Tasks: Students will be able to compare data from different models.	Notes:

Topic 5 Standard deviation	Length:1 day
Standard(s):M.SP.ID.A.1 (F2Y), M.SP.ID.A.2 (F2Y), M.SP.ID.A.3 (F2Y)	Academic Vocabulary:Standard deviation
Lesson Frame:	We will find the standard deviation from a set of data.
	I will interpret the meaning of the standard deviation of a set of numbers.
Performance Tasks: Students will be able to identify the standard deviation of a set of numbers.	Notes:
Topic 6 Using a line of best fit to make a prediction	Length:2 days
Standard(s):M.SP.ID.B.6a (F2Y), M.SP.ID.B.6b, M.SP.ID.B.6c, M.SP.ID.C.7 (F2Y), M. SP.ID.C.8 (F2Y)	Academic Vocabulary:Symmetric
Lesson Frame:	We will summarize the mathematics that we learned this year by applying a line of best fit to data.
	I will make sense of word problems and data by identifying a line of best fit.
Performance Tasks: Students will be able to make a prediction from a line of best fit.	Notes:
Topic 7 Investigating complex function	Length:1 day
Standard(s):M.F.IF.B.5	Academic Vocabulary:Relations, complex functions
Lesson Frame:	We will use the domain and range to identify the relationship of functions.
	I will apply my knowledge of intercepts and symmetry to solve word problems.
Performance Tasks: Students will be able to identify characteristics fo complex functions.	Notes:
Topic 8 Using Algebra to find a Maximum	Length:2 days.
Standard(s):M.F.IF.B.5	Academic Vocabulary:Maximum and minimums
Lesson Frame:	We will use multiple representations to maximize a set of quadratic data.
	I will interpret algebraic and graphical results.
Performance Tasks: Students will be able to find a maximum from a set of data a graph.	Notes:

Course Name:	Geometry		
Credits:	1		
Prerequisites:	Algebra		
Description:	A logical approach to the study of real objects and shapes: i.e. parallel lines, triangles, circles, solids, etc. Emphasis is placed on algebraic applications.		
Academic Standards:	Wisconsin State Standards		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Shapes and Transformations	17 days	M.G.CO.A.2M.G.CO.A.3M.G.CO.A.4M.G.CO.A.5M.G.CO.B.6M.G.CO.C.10M.G.GMD.C.4 (F2Y)M.G.GPE.B.5 (F2Y)	In this unit students willbecome familiar with basic geometric shapes and learn how to describe each one using it attribues.
Angles and Measurement	15 days	M.G.CO.C.10M.G.CO.C.9 (F2Y)M.G.SRT.C.8 (F2Y)	Students will deepen their understanding between pairs of angles formed by transversals and the angles in a triangle.
Justification and Similarity	14 days	M.G.C.A.1 (F2Y)M.G.CO.A.2 (F2Y)M.G.CO.A.3 (F2Y)M.G.CO.D.12 (F2Y)M.G.SRT.A.1a (F2Y)M.G.SRT.A.1b (F2Y)M.G.SRT.A.2 (F2Y)M.G.SRT.A.3 (F2Y)M.G.SRT.B.5 (F2Y)	Students will learn how to support a mathematical statement using a flowchart and conditional statements.
Trigonometry and Probability	15 days	M.G.SRT.C.6M.G.SRT.C.8M.SP.CP.A.1M.SP.CP.B.7M.SP.MD.B.6	Students will learn the trigonometric ratios.
Completing the Triangle Toolkit	16 days	M.G.SRT.B.4 (F2Y),M.G.SRT.C.7 (F2Y),M.G.CO.C.10 (F2Y),M.G.SRT.C.6 (F2Y)M.G.SRT.C.8M.G.SRT.D.10+M.G.SRT.D.9+	Students will learn to recongnize and use special right triangles.
Congruent Triangles	14 days	M.G.CO.A.5 (F2Y)M.G.CO.B.6 (F2Y)M.G.CO.B.7 (F2Y)M.G.CO.B.8 (F2Y)M.G.CO.C.10 (F2Y)M.G.CO.C.9 (F2Y)M.G.GMD.C.4 (F2Y)M.G.GMD.C.6 (F2Y)M.G.GMD.C.A (F2Y)M.G.GPE.B.7 (F2Y)M.G.SRT.A.2 (F2Y)M.G.SRT.B.5 (F2Y)M.SP.MD.B.7	Students will identify the information that is needed in order to conclude that two triangles are congruent.
Proof and Quadrilaterals	18 days	M.G.CO.A.1 (F2Y)M.G.CO.C.10 (F2Y),M.G.GMD.C.6 (F2Y)M.G.GPE.B.4 (F2Y),M.G.GPE.B.5M.G.GPE.B.6M.G.GPE.B.7M.G.SRT.B.4M.G.SRT.B.5	Students will understand the relationships of the sides. angles and diagonals of special quadrilaterals.
Polygons and Circles	16 days	M.G.C.B.2 (F2Y)M.G.GMD.A.1M.G.GMD.C.4M.G.GMD.C.6 (F2Y)M.G.SRT.B.5	Students will learn about special types of polygons.
Solids and Constructions	13 days	M.G.C.A.1 (F2Y)M.G.CO.C.10 (F2Y)M.G.CO.C.9 (F2Y)M.G.CO.D.12 (F2Y)M.G.CO.D.13 (F2Y)M.G.GMD.A.1 (F2Y)M.G.GMD.A.2 (F2Y)M.G.GMD.C.4 (F2Y)	Students will find the surface area and volume of three-dimensional solids.
Circles and Conditional Probability	20 days	M.G.C.A.1 (F2Y)M.G.C.B.2 (F2Y)M.G.GMD.C.4 (F2Y)M.SP.CP.A.2 (F2Y)M.SP.CP.A.3 (F2Y)M.SP.CP.A.4 (F2Y)M.SP.CP.A.5 (F2Y)	Students will explore the relationships between angles, arcs and chords.
Solids and Circles	16 days	M.G.C.A.1 (F2Y)M.G.C.B.2 (F2Y)M.G.GMD.A.1 (F2Y),M.G.GMD.B.3M.G.GMD.C.4M.G.MGD.A.2 (F2Y),	Students will find the volume and surface area of pyramids, cones and spheres.

Conics and Closure	14 days	M.G.GMD.B.3 (F2Y)M.G.GMD.C.6 (F2Y)M.G.GPE.A.1M.G.GPE.A.2+M.G.GPE.B.4 (F2Y)M.SP.MD.B.7	Students will extend their geometric understanding of circles to write algebraic equations.

Unit Name:Shapes and Transformations	Length:17 days
Standards:M.G.CO.A.2M.G.CO.A.3M.G.CO.A.4M.G.CO.A.5M.G.CO.B.6M.G.CO.C.10M.G.GMD.C.4 (F2Y)M.G.GPE.B.5 (F2Y)	Outcomes:In this unit students willbecome familiar with basic geometric shapes and learn how to describe each one using it attribues.
Essential Questions:How can I communicate my ideas precisely to others?	Learning Targets: Students will investigate three basic rigid transformation: flip, turn, and slide.
Topic 1:Creating a quilt using symmetry	Length:1 day
Lesson Frame:	We will build a symmetrical shape using basic shapes.
	I will: model mathematics as I construct a symmetrical design.
Performance Tasks: Students will be able to work together to build symmetrical designs using the same basic shapes.	Notes:
Topic 2:Making predictions investigating results	Length:1 day
Lesson Frame:	We will use mobious strips to represent situations.
	I will investigate and make predictions to solve constructions.
Performance Tasks: Students will generate questions to investigae, make predictions, and test their predictions.	Notes:
Topic 3 Perimeterrs and areas of enlarging tile patterns	Length:1 day
Lesson Frame:	We will build an understanding of area and perimeter.
	I will investigate how the perimeter and area of a shape changed with dialations.
Performance Tasks: Students will build an understanding of area and perimeter.	Notes:
Topic 4 Logical arguments	Length:1 day
Lesson Frame:	We will develop convincing arguments.
	I will critque the reasoning of others.
Performance Tasks: Students will be introduced to howto develop a convincing argument.	Notes:
Topic 5 Building a kaleidoscope	Length:1 day
Lesson Frame:	We will build understanding of what an angle is and how ti is measured.
	I will investigate complicated shapes composed of triangles.
Performance Tasks: Students will build understanding of what an angle is and how it is measured.	Notes:
Topic 6 Spatial visualization and reflections	Length:1 day
Lesson Frame:	We will use spatial visualization to investigate reflections.
	I will look for and use structure in refelctions.
Performance Tasks: Students will use their spatial visualization skills to investigate reflection.	Notes:
Topic 7 Rigid transformations	Length:1 day
Lesson Frame:	We will discover properties of translations, reflections, and rotations.
	I will investigate the relationship between corresponding parts.
Performance Tasks: Students will understand the three rigid transofrmations and will learn some connections between them.	Notes:
Topic 8 Slopes of parallel and perpendicular lines	Length:1 day
Lesson Frame:	We will discover that objects and their images are equidistant from lines of reflection.
	I will recognize that the slopes of perpendicular linres are opposite reciprocals.
Performance Tasks: Students will discover that objects and their images are equidistant from the line of reflection.	Notes:
Topic 9 Defining transformations	Length:1 day
Lesson Frame:	We will analyze shapes to look for reflectional symmetry.
	I will learn how to translate a geometric figure on a coordinate grid.

Unit Name:Shapes and Transformations	Length:17 days
Standards:M.G.CO.A.2M.G.CO.A.3M.G.CO.A.4M.G.CO.A.5M.G.CO.B.6M.G.CO.C.10M.G.GMD.C.4 (F2Y)M.G.GPE.B.5 (F2Y)	Outcomes:In this unit students willbecome familiar with basic geometric shapes and learn how to describe each one using it attribues.
Essential Questions:How can I communicate my ideas precisely to others?	Learning Targets: Students will investigate three basic rigid transformation: flip, turn, and slide.
Performance Tasks: Students will begin to develop an understanding of reflection symmetry. Students will learn how to translate geometric figures in a coordinate grid.	Notes:
Topic 10 Using transformations to create shapes	Length:1 day
Lesson Frame:	We will use what they know about transformations to make other shapes.
	I will model mathematics and use appropriate tools.
Performance Tasks: Students will use their knowledge of transformations to make other shapes.	Notes:
Topic 11 Symmetry	Length:1 day
Lesson Frame:	We will identify common shapes that have types of symmetry.
	I will learn about reflection, rotation, and translation symmetry.
Performance Tasks: Students will learn about reflection, rotation and translations symmetry.	Notes:
Topic 12 Attributes and characteristics of shapes	Length:1 day
Lesson Frame:	We will review geometric vocabulary and concepts.
	I will classify shapes by their attributes.
Performance Tasks: Students will classify shapes by their attributes.	Notes:
Topic 13 More characteristics of shapes	Length:1 day
Lesson Frame:	We will use formal geometric terms to attend to precision.
	I will become farmiliar with how to mark diagrams to help communicate attribues such as equal length and right angles.
Performance Tasks: Students will formalize their vocabulary of shapes and their attributes of the shapes.	Notes:

Unit Name:Angles and Measurement	Length:15 days
Standards:M.G.CO.C.10M.G.CO.C.9 (F2Y)M.G.SRT.C.8 (F2Y)	Outcomes:Students will deepen their understanding between pairs of angles formed by transversals and the angles in a triangle.
Essential Questions:How can I justify my conclusions?	Learning Targets:Students will investigae the relationship among the sides and angles of a right triangle.
Topic 1:Complementary, supplementary and vertical angles.	Length:1 day
Lesson Frame:	We will work with mirrors to look at angle relationships.
	I will:discover that vertical angles are congruent.

Performance Tasks: Students will learn how to name angles and the three main relationships for angle measures.	Notes:

Topic 2:Angles formed by transversals	Length:1 day
Lesson Frame:	We will use parallel lines and transversals to identify angle relationships.
	I will identify that corresponding angles are congruent.

Performance Tasks: Students will determine that corresponding angles are congruent.	Notes:

Topic 3 More angles formed by transversals	Length:1 day
Lesson Frame:	We will apply our knowledge of corresponding angles to develop theorems.
	I will use mirrors to create corresponding angles.

Performance Tasks: Students will develop theorems about alternate interior and same side interior angles.	Notes:

Topic 4 Angles in a triangle	Length:1 day
Lesson Frame:	We will analyze triangles to look for patterns in angles.
	I will discover that the angles of a triangle will always add up to 180 degrees.

Performance Tasks: Students will discover that the angles of a triangle add up to 180 degrees.	Notes:

Topic 5 Applying angle relationships	Length:1 day
Lesson Frame:	We will make sense of hinged mirrors to reason abstractly to solve problems.
	I will learn converses of angle theorems.

Performance Tasks: Students will learn the converses of their angle theorems.	Notes:

Topic 6 Units of measure	Length:1 day
Lesson Frame:	We will use appropriate tools as we look at way to measure.
	I will learn that measurement of an object depends on the units being used.

Performance Tasks: Students will gain geometric sense of length and area.	Notes:

Topic 7 Areas of triangles and composite shapes	Length:1 day
Lesson Frame:	We will use tools strategically to find areas of different shapes.
	I will develop multiple methods to find area of composite shapes formed by rectangles.

Performance Tasks: Students will develop multiple ways to find the area of triangles.	Notes:

Topic 8 Areas of parallelograms and trapezoids	Length:1 day
Lesson Frame:	We will make use of structure to find areas of trapezoids and parallelograms.
	I will develop algoritms to find areas of trapezoids.

Performance Tasks: Students will use rectangles and triangles to develop algorithms to find the area of new shapes.	Notes:

Topic 9 Heights and areas	Length:1 day
Lesson Frame:	We will use models to explore heights of triangles.
	I will find areas of composite shapes using what I know of triangles, parallelograms, and trapezoids.

Unit Name:Angles and Measurement	Length:15 days
Standards:M.G.CO.C.10M.G.CO.C.9 (F2Y)M.G.SRT.C.8 (F2Y)	Outcomes:Students will deepen their understanding between pairs of angles formed by transversals and the angles in a triangle.
Essential Questions:How can I justify my conclusions?	Learning Targets:Students will investigae the relationship among the sides and angles of a right triangle.
Performance Tasks: Students will explore how to find height of a trianlge given that one side has been spcified as the base.	Notes:
Topic 10 Triangle inequality	Length:1 day
Lesson Frame:	We will analyze the lengths of sides that can and can't make triangles.
	I will use appropriate toools to determine what lengths are necessary to make a triangle.
Performance Tasks: Students will develop a strategy to fin the length of the hypotenuse of a right triangle with the lengths of the legs.	Notes:
Topic 11 The pythagorean theorem	Length:1 day
Lesson Frame:	We will prove the pythagorean theorem.
	I will use structure to manimpulate triangles within a square to find the pythagorean theorem.
Performance Tasks: Students will develop and prove the Pythagorean Theorem.	Notes:

Unit Name:Justification and Similarity	Length:14 days
Standards:M.G.C.A.1 (F2Y)M.G.CO.A.2 (F2Y)M.G.CO.A.3 (F2Y)M.G.CO.D.12 (F2Y)M.G.SRT.A.1a (F2Y)M.G.SRT.A.1b (F2Y)M.G.SRT.A.2 (F2Y)M.G.SRT.A.3 (F2Y)M.G.SRT.B.5 (F2Y)	Outcomes: Students will learn how to support a mathematical statement using a flowchart and conditional statements.
Essential Questions:Can I apply the mathematics that I know to problems in everyday life?	Learning Targets:Students wil determine if triangles are similar or congruent.
Topic 1:Dilations	Length:1 day
Lesson Frame:	We will use tools to dilate shapes and make use of structure to find patterns.
	I will determine that dilations have equal angles and proportional side lengths.

Performance Tasks: Students will learn about the concept of dilation and its characteristics.	Notes:

Topic 2: Similarity	Length:1 day
Lesson Frame:	We will use equivalent ratios to find missing lengths of sides in similar figures.
	I will use precision and zoom factor to differentiate between original and enlarged figures.

Performance Tasks: Students will discover that figures are related through a sequence of transformations.	Notes:

Topic 3 Using ratios of similarity	Length:1 day
Lesson Frame:	We will make use of structure to look for connectiosn between side lengths, perimeters, and areas of dialated shapes.
	I will solve equations to proportional problems.

Performance Tasks: Students will examine the ratio of the perimeters of similar figures.	Notes:

Topic 4 Applications and notations	Length:1 day
Lesson Frame:	We will apply proportional reasoning to write similarity statements.
	I will make sense of problems and model mathematics to solve problems.

Performance Tasks: Students will apply proportional reasoning and will learn how to write similarity statements.	Notes:

Topic 5 Conditions of triangle similarity	Length:1 day
Lesson Frame:	We will use appropriate tools to test for similarity.
	I will discover teh SAS and AA triangle similarity theorem.

Performance Tasks: Students will learn the SAS and AA conditions for determinging triangle similarity.	Notes:

Topic 6 Creating a flowchart	Length:1 day
Lesson Frame:	We will use flowcharts to organize our arguments to prove SAS and AA similarity.
	I will communicate mathematically using flowchart proofs.

Performance Tasks: Students will learn how to use flowcharts to organize their arguments for triangle similarity.	Notes:

Topic 7 Triangle similarity and congruence	Length:1 day
Lesson Frame:	We will construct viable arguments as we work on flowchart proofs.
	I will investigate the fact that if two triangles are similar and a side is equal, then the triangles are congruent.

Performance Tasks: Students will further investigate the fact that if two triangles are similar and the common ratio between the lengths of their sides is 1, then the triangles must be congruent.	Notes:

Topic 8 More conditions for triangle similarity	Length:1 day
Lesson Frame:	We will attend to precision to communicate the conditions of triangle similarity.
	I will investigate the SSS triangle similarity theorem.

Performance Tasks: Students will complete their list of triangle similary conditions by learning SSS.	Notes:

Topic 9 Determining similarity	Length:1 day

Unit Name:Justification and Similarity	Length:14 days		
Standards:M.G.C.A.1 (F2Y)M.G.CO.A.2 (F2Y)M.G.CO.A.3 (F2Y)M.G.CO.D.12 (F2Y)M.G.SRT.A.1a (F2Y)M.G.SRT.A.1b (F2Y)M.G.SRT.A.2 (F2Y)M.G.SRT.A.3 (F2Y)M.G.SRT.B.5 (F2Y)	Outcomes: Students will learn how to support a mathematical statement using a flowchart and conditional statements.		
Essential Questions:Can I apply the mathematics that I know to problems in everyday life?	Learning Targets:Students wil determine if triangles are similar or congruent.		
Lesson Frame:	We will use a flowchart to diagram a multi-step argument.		
	I will construct viable arguments within a proof.		
Performance Tasks: Students will organize their reasoning into a multi-step flowchart.	Notes:		
Topic 10 Applying similarity	Length:1 day		
Lesson Frame:	We will apply my knowledge of similar triangles to multiple contexts.		
	I will make sense of problems and persevere in solving them.		
Performance Tasks: Students will apply their knowledge fo similar triangles to multiple contexts.	Notes:		

Unit Name:Trigonometry and Probability	Length:15 days
Standards:M.G.SRT.C.6M.G.SRT.C.8M.SP.CP.A.1M.SP.CP.B.7M.SP.MD.B.6	Outcomes: Students will learn the trigonometric ratios.
Essential Questions:Can I use the available tools to solve problems and decide which tool might be the most helpful?	Learning Targets: Students will apply the trigonometric ratios to find missing measurements of triangles in a real world setting.
Topic 1:Constant ratios in right triangles	Length:1 day
Lesson Frame:	We will begin to connect specific slope to a specific angle measurement and ratio.
	I will use structure to look for patterns in slope.

Performance Tasks: Students will recognize that all the slope triangles on a line are similar to each other.	Notes:

Topic 2: Connecting slope ratios to specific angles	Length:1 day
Lesson Frame:	We will look and make sense of structure as we find patterns in ratios.
	I will analyze slope ratios of 11, 22, 18, and 45 degree angles.

Performance Tasks: Students will connect specific slope ratios to find missing sides and angles of triangles.	Notes:

Topic 3 Expanding the trig table	Length:1 day
Lesson Frame:	We will use technology to gererate slope ratios.
	I will use appropriate toolls strategically.

Performance Tasks: Students will use technology to generate slope ratios for new angles.	Notes:

Topic 4 The tangent ratio	Length:1 day
Lesson Frame:	We will reason abstractly to create representations connected to trig ratios.
	I will observe how slope ratios impact side length,

Performance Tasks: Students will use slope ratios to find the length of a leg of a right triangle.	Notes:

Topic 5 Applying the tangent ratio	Length:1 day
Lesson Frame:	We will apply our knowledge of tangent to find missing triangle measurements.
	I will model with mathematics as I draw diagrams and use trig to solve everyday problems.

Performance Tasks: Students will apply their knowledge of tangent rations to find measurements.	Notes:

Topic 6 Using an area model	Length:1 day
Lesson Frame:	We will use a probability area model to represent a situation of chance.
	I will model with mathematics as I look at real life problems and predict outcomes.

Performance Tasks: Students will learn how to use a probability area model to represent a situation of chance.	Notes:

Topic 7 Using a tree diagram	Length:1 day
Lesson Frame:	We will develope complex tree diagrams to model probabilities of events.
	I will reason abstractly as I create representations of problems involving probability.

Performance Tasks: Students will develop more complex tree diagrams to model probabilities.	Notes:

Topic 8 Probability models	Length:1 day
Lesson Frame:	We will use tree diagrams and area models to represent and solve probability problems.
	I will use appropriate tools strategically as I decide which tool is bettter for modeling certain situations.

Performance Tasks: Students will combine area models and tree diagrams to discover probabilities.	Notes:

Topic 9 Unions, intersections, and complements	Length:1 day
Lesson Frame:	We will learn mathematical language for calculating probabilities of unions, intersections and complements of events.
	I will make sense of a problem and persevere in solving probability problems.

Unit Name:Trigonometry and Probability	Length:15 days
Standards:M.G.SRT.C.6M.G.SRT.C.8M.SP.CP.A.1M.SP.CP.B.7M.SP.MD.B.6	Outcomes: Students will learn the trigonometric ratios.
Essential Questions:Can I use the available tools to solve problems and decide which tool might be the most helpful?	Learning Targets: Students will apply the trigonometric ratios to find missing measurements of triangles in a real world setting.
Performance Tasks: Students will use mathematical language for calculating probabilities of unions, intersections, and complements.	Notes:

Topic 10 Expected value	Length:1 day
Lesson Frame:	We will learn how to find the expected value of a game of chance.
	I will make sense of problems involving chance and analyze and make conjectures of outcomes.

Performance Tasks: Students will learn how to find the expected value of a game of chance.	Notes:

Unit Name:Completing the Triangle Toolkit	Length:16 days
Standards:M.G.SRT.B.4 (F2Y),M.G.SRT.C.7 (F2Y),M.G.CO.C.10 (F2Y),M.G.SRT.C.6 (F2Y)M.G.SRT.C.8M.G.SRT.D.10+M.G.SRT.D.9+	Outcomes:Students will learn to recongnize and use special right triangles.
Essential Questions:Which tool should I use to find missing parts of triangles?	Learning Targets: Students will apply trigonometric ratios to find missing measurement of right triangles including the Law of Sines and Law of Cosines.
Topic 1: Sine and Cosine Ratios	Length:1 day
Lesson Frame:	We will discover sine and cosine ratios.
	I will apply mathematics to everyday life with models.
Performance Tasks: Students will learn sine and cosine ratios.	Notes:
Topic 2: Selecting a trig tool	Length:1 day
Lesson Frame:	We will develop strategies to recognize which trig ratio to use.
	I will use tools appropriately to find shortcuts to solve trig ratio problems.
Performance Tasks: Students will develop strategies to recognize which trig ratio to use.	Notes:
Topic 3 Inverse trigonometry	Length:1 day
Lesson Frame:	We will understand how to use trig ratios to find unknown angle measurements.
	I will reason abstractly as I work backwards to solve problems.
Performance Tasks: Students will udnerstand how to use trig ratios and will be introduced to the concept of inverse.	Notes:
Topic 4 Trigonometric applications	Length:1 day
Lesson Frame:	We will use sine, cosine, and tangent ratios to solve application problems.
	I will model with mathematics as I apply me trig tools to everyday problem situations.
Performance Tasks: Students will use trig functions to solve application problems.	Notes:
Topic 5 Special right triangles	Length:1 day
Lesson Frame:	We will recognize the similarity ratios in 30, 60, 90 and 45, 45, 90 triangles.
	I will make use of structure as I find patterns to find relationships in special right triangles.
Performance Tasks: Students will recognize similar ratios in 30, 60, 90 and 45, 45, 90 triangles.	Notes:
Topic 6 Pythagorean triples	Length:1 day
Lesson Frame:	We will recognize 3,4,5 and 5,12, 13 triangles and find othe examples of pythagorean triples.
	I will make use of structure as I look for patterns in pythagorean triples.
Performance Tasks: Students will recognize 3,4,5 and 5, 12, 13 right triangles.	Notes:
Topic 7 Finding missing parts of triangles	Length:1 day
Lesson Frame:	We will develop methods to solve for missing sides and angles of non right traingles.
	I will makes sense of problems and persevere in solving for missing parts of triangles.
Performance Tasks: Students will apply their tools to finding missing sides and angles of right triangles in preparation for the Law of Sines.	Notes:
Topic 8 Law of sines	Length:1 day
Lesson Frame:	We will recognize the relationship between a side and the angle opposite the side.
	I will look for and express regularity in repeated reasoning as I develop the ratios for the Law of Sines.
Performance Tasks: Students will develop the Law of Sines and use it to find missing side and angle measurements.	Notes:
Topic 9 Law of cosines	Length:1 day
Lesson Frame:	We will develop the law of cosines.
	I will make sense of problems and persevere in solving them using the law of cosines.

Unit Name:Completing the Triangle Toolkit	Length:16 days
Standards:M.G.SRT.B.4 (F2Y),M.G.SRT.C.7 (F2Y),M.G.CO.C.10 (F2Y),M.G.SRT.C.6 (F2Y)M.G.SRT.C.8M.G.SRT.D.10+M.G.SRT.D.9+	Outcomes:Students will learn to recongnize and use special right triangles.
Essential Questions:Which tool should I use to find missing parts of triangles?	Learning Targets: Students will apply trigonometric ratios to find missing measurement of right triangles including the Law of Sines and Law of Cosines.
Performance Tasks: Students will complete theri Triangle Toolkit by developing the Law of Cosines.	Notes:
Topic 10 Ambiguous triangles	Length:1 day
Lesson Frame:	We will learn that multiple triangles are sometimes possible when two side lengths and an angle not between them is given.
	I will make sense of ambiguous triangles and I look for repeated reasoning of how many triangles can be constructed.
Performance Tasks: Students will discover that sometimes multiple triangles are possible when given SSA.	Notes:
Topic 11 Choosing a tool	Length:2 days
Lesson Frame:	We will solve multiple problems and applications use various trig ratios.
	I will strategically use tools I have learned to make sense of problems and persevere in solving them.
Performance Tasks: Students will apply their knowledge of triangles to solve application problems.	Notes:

Unit Name:Congruent Triangles	Length:14 days
Standards:M.G.CO.A.5 (F2Y)M.G.CO.B.6 (F2Y)M.G.CO.B.7 (F2Y)M.G.CO.B.8 (F2Y)M.G.CO.C.10 (F2Y)M.G.CO.C.9 (F2Y)M.G.GMD.C.4 (F2Y)M.G.GMD.C.6 (F2Y)M.G.GMD.C.A (F2Y)M.G.GPE.B.7 (F2Y)M.G.SRT.A.2 (F2Y)M.G.SRT.B.5 (F2Y)M.SP.MD.B.7	Outcomes:Students will identify the information that is needed in order to conclude that two triangles are congruent.
Essential Questions:How can I use information to construct arguments, justify my conclusions and respond to the argument presented by others?	Learning Targets:Students will organize a flowchart that concludes two triangles are congruent.
Topic 1:Congruent triangles	Length:1 day
Lesson Frame:	We will identify congruent triangles using AAS.
	I will construct viable arguments as I make statements to prove trianlge similarity.
Performance Tasks: Students will identify congruent triangles by first identifying similarity.	Notes:
Topic 2:Conditions for triangle congruence	Length:1 day
Lesson Frame:	We will develop conditions that guarantee triangles are congruent.
	I will look for and make use of structure as I investigate all conditions that prove triangles congruent.
Performance Tasks: Students will develop congruency conditions fo ASA, AAS, HL, and SAS.	Notes:
Topic 3 Congruence of triangles through rigid transformations	Length:1 day
Lesson Frame:	We will show triangle congruency conditions are done using rigid transformations.
	I will attend to recision as I identify corresponding parts of triangles.
Performance Tasks: Students will show that triangle congruence conditions are true using rigid transformations.	Notes:
Topic 4 Flowcharts for congruence	Length:1 day
Lesson Frame:	We will extend our use of flowcharts to document triangle congruency facts.
	I will make use of structure as I see complicated figures being compposed of many parts.
Performance Tasks: Students will use flowcharts to from triangle congruency.	Notes:
Topic 5 Converses	Length:1 day
Lesson Frame:	We will recognize the converse relationship between conditional statements.
	I will use conterexamples as I construct viable arguments.
Performance Tasks: Students will recognize the converse relationships between conditional statements.	Notes:
Topic 6 Angles on a pool table	Length:1 day
Lesson Frame:	We will review angle relationships, trig, and similar triangles.
	I will model with mathematics as I apply what I have learned about triangles to everyday situations.
Performance Tasks: Students will review angle relationships, trigonometry and similar triangles.	Notes:
Topic 7 Investigating a triangle	Length:1 day
Lesson Frame:	We will review area and perimeter of a triangle, tri, the pythagorean theorem, and triangle angle sum theorem.
	I will attend to precision and use tools appropriately as I investigate a triangle.
Performance Tasks: Students will apply the Pythagorean Theorme and the Triangle Angle Sum Theorem to application problems.	Notes:
Topic 8 Creating a mathematical model	Length:1 day
Lesson Frame:	We will review building models, similarity, and inverse trig ratios.
	I will model with mathematics was I apply similarity and inverse trig ratios.
Performance Tasks: Students will continue to work with building models, similarity, and inverse trig ratios.	Notes:
Topic 9 Analyzing a game	Length:1 day

Unit Name:Congruent Triangles	Length:14 days		
Standards:M.G.CO.A.5 (F2Y)M.G.CO.B.6 (F2Y)M.G.CO.B.7 (F2Y)M.G.CO.B.8 (F2Y)M.G.CO.C.10 (F2Y)M.G.CO.C.9 (F2Y)M.G.GMD.C.4 (F2Y)M.G.GMD.C.6 (F2Y)M.G.GMD.C.A (F2Y)M.G.GPE.B.7 (F2Y)M.G.SRT.A.2 (F2Y)M.G.SRT.B.5 (F2Y)M.SP.MD.B.7	Outcomes:Students will identify the information that is needed in order to conclude that two triangles are congruent.		
Essential Questions:How can I use information to construct arguments, justify my conclusions and respond to the argument presented by others?	Learning Targets:Students will organize a flowchart that concludes two triangles are congruent.		
Lesson Frame:	We will analyze the probability of winning and losing a game from a television show.		
	I will make sense of and persevere in solve the monty hall problem.		
Performance Tasks: Students will collect experimental data and construct a probability model to represent a game.	Notes:		
Topic 10 Using transformations and symmetry to design snowflakes	Length:1 day		
Lesson Frame:	We will review transformations and symmetry		
	I will use appropriate tools strategically and attend to precision as I make connections among shapes and topics I learned thus far.		
Performance Tasks: Students will review transformations and symmetry.	Notes:		

Unit Name:Proof and Quadrilaterals	Length:18 days
Standards:M.G.CO.A.1 (F2Y)M.G.CO.C.10 (F2Y),M.G.GMD.C.6 (F2Y)M.G.GPE.B.4 (F2Y),M.G.GPE.B.5M.G.GPE.B.6M.G.GPE.B.7M.G.SRT.B.4M.G.SRT.B.5	Outcomes:Students will understand the relationships of the sides. angles and diagonals of special quadrilaterals.
Essential Questions:How can I use the given information to construct arguments, how can I justify my conclusions, and how can I respond to the arguments of others?	Learning Targets:Students will be able to write a proof in a variety of formats such as a flowchart and a two-column proof.
Topic 1: Properties of circles	Length:1 day
Lesson Frame:	We will specify constants like radius and diameter.
	I will explore Reuleaux curves and square wheels.

Performance Tasks: Students will explore properties of a circle	Notes:

Topic 2: Building a tetrhedron	Length:1 day
Lesson Frame:	We will begin to undertand how area of a shape changes as it is enlarged.
	I will review shapes and their properites as I fold a circle to create a tetrahedron.

Performance Tasks: Students will begin to understand how the area of a shape changes as it is enlarged.	Notes:

Topic 3 Shortest distance problems	Length:2 days
Lesson Frame:	We will lay the foundation for understanding the surface of a three dimensional object.
	I will anayze and solve distance problems to understand reflection and similarity.

Performance Tasks: Students will analyze and solve several shortest distance problems to undestand reflection and similarity.	Notes:

Topic 4 Using symmetry to study polygons	Length:1 day
Lesson Frame:	We will use a hinged mirror to create regular polygons.
	I will learn about the diagonals of a rhombi.

Performance Tasks: Students will use their understanding of reflection to identify central angles.	Notes:

Topic 5 Special quadrilaterals and proof	Length:1 day
Lesson Frame:	We will learn the properties of kites.
	I will learn and apply the properties of parallelograms.

Performance Tasks: Students will develop proofs to learn properties of kites.	Notes:

Topic 6 Properties of rhombi	Length:1 day
Lesson Frame:	We will practice using flowcharts to organize a proof.
	I will prove the properties of a rhobmi through congruent triangles.

Performance Tasks: Students will discover the properties of rhombi through congruent triangles.	Notes:

Topic 7 More proofs with congruent triangles	Length:1 day
Lesson Frame:	We will prove all rectangles are parallelograms.
	I will being to start to develop flowchart proofs as a way to communicate.

Performance Tasks: Students will create logical arguments about rectangles and parallelograms.	Notes:

Topic 8 More properties of quadrilaterals	Length:1 day
Lesson Frame:	We will use flowcharts to demonstrate properties of quadrilaterals.
	I will relate quadrilaterals with characterics of isosceles triangles.

Performance Tasks: Students will create flowcharts to discover attributes of isosceles triangles and quadrilaterals.	Notes:

Topic 9 Two-column proofs	Length:1 day
Lesson Frame:	We will continue to learn the components of a convincing argument.
	I will be introduced to a two column proof.

Unit Name:Proof and Quadrilaterals	Length:18 days
Standards:M.G.CO.A.1 (F2Y)M.G.CO.C.10 (F2Y),M.G.GMD.C.6 (F2Y)M.G.GPE.B.4 (F2Y),M.G.GPE.B.5M.G.GPE.B.6M.G.GPE.B.7M.G.SRT.B.4M.G.SRT.B.5	Outcomes:Students will understand the relationships of the sides. angles and diagonals of special quadrilaterals.
Essential Questions:How can I use the given information to construct arguments, how can I justify my conclusions, and how can I respond to the arguments of others?	Learning Targets:Students will be able to write a proof in a variety of formats such as a flowchart and a two-column proof.
Performance Tasks: Students will be introduced to two column proofs to help create arguments.	Notes:
Topic 10 Explore conjecture prove	Length:1 day
Lesson Frame:	We will start to work with proofs based off of similar triangles.
	I will prove new properties of triangles and quadrilaterals.
Performance Tasks: Students will use auxiliary lines to help write proofs of quadrilaterals.	Notes:
Topic 11 Studying quadrilaterals on a coordinate grid	Length:1 day
Lesson Frame:	We will investigate quadrilaterals for parallel lines and right angles.
	I will analyze shapes on a coordinate grid using my algebra skills.
Performance Tasks: Students will analyze shapes on a coordinate grid.	Notes:
Topic 12 Coordinate geometry and midpoints	Length:1 day
Lesson Frame:	We will study coordinate geometry.
	I will develop ways to find the midpoint of a segment.
Performance Tasks: Students will discover methods of finding midpoint.	Notes:
Topic 13 Identifying quadrilaterals on a coordiante grid	Length:1 day
Lesson Frame:	We will analyze quadrilaterals on a coordinate grid.
	I will identify quadrilaterals represented on a coordinate grid.
Performance Tasks: Students will identify quadrilaterals after analyzing them on a coordinate grid.	Notes:

Unit Name:Polygons and Circles	Length:16 days
Standards:M.G.C.B.2 (F2Y)M.G.GMD.A.1M.G.GMD.C.4M.G.GMD.C.6 (F2Y)M.G.SRT.B.5	Outcomes:Students will learn about special types of polygons.
Essential Questions:Can I find the shortcuts and generalize the rules for finding perimeters and areas of polygons?	Learning Targets: Students will learn how the measures of interior and exterior angles of a regular polygon are related to the number of sides of the polygon.
Topic 1:Pinwheels and polygons	Length:1 day
Lesson Frame:	We will learn that the central angle is always 360/n.
	I will determine if a shape is convex or concave.

Performance Tasks: Students will build regular polygons from congruent isosceles triangles.	Notes:

Topic 2: Interior angles of polygons	Length:1 day
Lesson Frame:	We will apply the formula for interior angles to solve problems in a real world context.
	I will investigate problems involving various polygons.

Performance Tasks: Students will learn to find the sum of the interior angles of a polygon.	Notes:

Topic 3 Angles of regular polygons	Length:1 day
Lesson Frame:	We will decide if a polygon is regular.
	I will identify the connection between angles and sides that make polygons regular.

Performance Tasks: Students will discover how to find the interior and exterior angle measures of a regular polygon.	Notes:

Topic 4 Regular polygon angle connections	Length:1 day
Lesson Frame:	We will develop strategies to find the measure of interior angles.
	I will apply strategies for finding interior and exterior angles to word problems.

Performance Tasks: Students will develop strategies to find the measures of different angles of regular polygons.	Notes:

Topic 5 Finding areas of regular polygons	Length:2 days
Lesson Frame:	We will develop an algorithm for finding the area of all regular polygons.
	I will test my algorithm on various regular and nonregular polygons.

Performance Tasks: Students will develop algorithms to find the area of polygons.	Notes:

Topic 6 Area ratios of similar figures	Length:1 day
Lesson Frame:	We will identify the zoom factor as the ratio of similarity.
	I will use the ratio of similarity to find the area of similar shapes.

Performance Tasks: Students will discover how to find the area of similar figures.	Notes:

Topic 7 Ratios of similarity	Length:1 day
Lesson Frame:	We will discover how the area and perimeter of a shape are changed when a shape is dialated.
	I will identify the zoom factor given the perimeter of two similar shapes.

Performance Tasks: Students will identify the ratios needed to find that area of similar shapes.	Notes:

Topic 8 A special ratio	Length:1 day
Lesson Frame:	We will looks for patterns and connections between the perimeter and aread of a circle.
	I will discover the formula for circumference through investigation.

Performance Tasks: Students will discover how to find area and circumference formulas.	Notes:

Topic 9 Area and circumference of a circle	Length:1 day
Lesson Frame:	We will develop a method of finding area and circumference of all cirlces.
	I will investigate how to find the area of sectors.

Unit Name:Polygons and Circles	Length:16 days
Standards:M.G.C.B.2 (F2Y)M.G.GMD.A.1M.G.GMD.C.4M.G.GMD.C.6 (F2Y)M.G.SRT.B.5	Outcomes:Students will learn about special types of polygons.
Essential Questions:Can I find the shortcuts and generalize the rules for finding perimeters and areas of polygons?	Learning Targets: Students will learn how the measures of interior and exterior angles of a regular polygon are related to the number of sides of the polygon.
Performance Tasks: Students will discover how to find area and circumference of shapes with different radias.	Notes:

Topic 10 Circles in context	Length:2 days
Lesson Frame:	We will work to find the areas of circulor and polygonal regions within a word problem.
	I will apply my knowledge of sectors to find real world answers.

Performance Tasks: Students will use problem solving strategies to find areas of circular and polygonal regions.	Notes:

Unit Name:Solids and Constructions	Length:13 days
Standards:M.G.C.A.1 (F2Y)M.G.CO.C.10 (F2Y)M.G.CO.C.9 (F2Y)M.G.CO.D.12 (F2Y) M.G.CO.D.13 (F2Y)M.G.GMD.A.1 (F2Y)M.G.GMD.A.2 (F2Y)M.G.GMD.C.4 (F2Y)	Outcomes:Students will find the surface area and volume of three-dimensional solids.
Essential Questions:How can I represent it, what tools can I use, and how can I construct it?	Learning Targets:Students will determine the changes to volume when a three-dimensional solid is enlarged.
Topic 1:Three dimensional solids	Length:1 day
Lesson Frame:	We will work with volume as a form of measurement.
	I will create mat plans to represent three dimensional objects.

Performance Tasks: Students will represent three dimensional solids using side and mat views.	Notes:

Topic 2: Volumes and surface areas of prisms	Length:1 day
Lesson Frame:	We will learn how to find the surface are of a solid.
	I will represent a solid by creating a net.

Performance Tasks: Students will work with nets of prisms.	Notes:

Topic 3 Prisms and cylinders	Length:1 day
Lesson Frame:	We will understand the volume of a cylnder remains a constant if the solid is slanted.
	I will learn how to sketch prisms and cylinders on paper.

Performance Tasks: Students will practice finding surface area and volume of prisms and cylinders.	Notes:

Topic 4 Volumes of similar solids	Length:1 day
Lesson Frame:	We will use scale factor to find the volume of similar solids.
	I will identify how the volume changes from one solid to another.

Performance Tasks: Students will develop an understanding of ratios with volumes of similar figures.	Notes:

Topic 5 Ratios of similarity	Length:1 day
Lesson Frame:	We will apply my knowledge to solve everyday volume problems.
	I will analyze how solids impact everyday life.

Performance Tasks: Students will apply their understanding of the ratios of similarity.	Notes:

Topic 6 Introduction to constructions	Length:1 day
Lesson Frame:	We will construct angle and line segments using a compass and ruler.
	I will contruct the incenter of a triangle and a circle.

Performance Tasks: Students will become aquainted with basic construction techniques.	Notes:

Topic 7 Constructing bisectors	Length:1 day
Lesson Frame:	We will construct perpendicular bisector and angle bisector.
	I will understand the properties of diagonals of a rhombus and how it helps in construction.

Performance Tasks: Students will work to construct perpendicular bisector and angle bisectors.	Notes:

Topic 8 More explorations with constructions	Length:1 day
Lesson Frame:	We will learn how to copy triangles.
	I will learn how to construct a square through a given point.

Performance Tasks: Students will construct a line parallet to a given line through a given point.	Notes:

Topic 9 Other constructions	Length:1 day
Lesson Frame:	We will identify medians and centroids of a triangle.
	I will construct medians and centroids when given a triangle.

Performance Tasks: Students will explore geometric constructions using a compass and a straight edge.	Notes:

Unit Name:Solids and Constructions	Length:13 days		
Standards:M.G.C.A.1 (F2Y)M.G.CO.C.10 (F2Y)M.G.CO.C.9 (F2Y)M.G.CO.D.12 (F2Y) M.G.CO.D.13 (F2Y)M.G.GMD.A.1 (F2Y)M.G.GMD.A.2 (F2Y)M.G.GMD.C.4 (F2Y)	Outcomes:Students will find the surface area and volume of three-dimensional solids.		
Essential Questions:How can I represent it, what tools can I use, and how can I construct it?	Learning Targets:Students will determine the changes to volume when a three-dimensional solid is enlarged.		

Unit Name:Circles and Conditional Probability	Length:20 days
Standards:M.G.C.A.1 (F2Y)M.G.C.B.2 (F2Y)M.G.GMD.C.4 (F2Y)M.SP.CP.A.2 (F2Y)M.SP.CP.A.3 (F2Y)M.SP.CP.A.4 (F2Y)M.SP.CP.A.5 (F2Y)	Outcomes:Students will explore the relationships between angles, arcs and chords.
Essential Questions:What tools do I have available to help me solve this problem?	Learning Targets: Students will analyze probabilities.
Topic 1:Introduction to chords	Length:1 day
Lesson Frame:	We will identify the relationship between chords and perpendicular bisector in circles.
	I will discover the relationship between major and minor arcs.
Performance Tasks: Students will observe that the perpendicular bisector of a chord will always pass through the center of a circle.	Notes:
Topic 2: Angles and arcs	Length:1 day
Lesson Frame:	We will discover the relationship between inscribed angles and arcs that intercept.
	I will learn the difference between arc measure and arc length.
Performance Tasks: Students will identify the relationships between inscribed angles and their arcs.	Notes:
Topic 3 Chords and angles	Length:1 day
Lesson Frame:	We will develop different methods to find the length of a chord.
	I will inscribe angles in a semicircle creating 90 degree angles.
Performance Tasks: Students will observe that inscribed angles in a semi circle will be 90 degrees.	Notes:
Topic 4 Tangents and secants	Length:1 day
Lesson Frame:	We will solve problems involving tangents and secants of circles.
	I will construct circles with tangents through specific points.
Performance Tasks: Students will learn that a line tangent to a circle is perpendicular to the radius of a circle.	Notes:
Topic 5 Problem solving with circles	Length:1 day
Lesson Frame:	We will find a circle that circumscribes a triangle.
	I will apply distance to identify the radius of a circumscribed circle.
Performance Tasks: Students will consolidate their understanding of angles, arcs, chords and tangents of a circle to solve application problems.	Notes:
Topic 6 Conditional probability and independence	Length:1 day
Lesson Frame:	We will connect independence to association of two variables.
	I willconnect by understanding of indepence with the mathematical definition.
Performance Tasks: Students will begin to develop the concept of conditional probability.	Notes:
Topic 7 Two way tables	Length:2 days
Lesson Frame:	We will determine if two categorical variables, presented in two way tables are associated.
	I will identify conditional probabilities from data arranged in relative frequency and two way tables.
Performance Tasks: Students will calculate conditional probabilities from data arranged in a frequency table.	Notes:
Topic 8 Applications of probability	Length:1 day
Lesson Frame:	We will learn the multiplication rule and alternate definition of independince in probability situations.
	I will apply my knowledge of indepence in various application problems.
Performance Tasks: Students will compare and contrast area models with two way tables.	Notes:
Topic 9 Fundamental principle of counting	Length:1 day
Lesson Frame:	We will discover the fundamental principle of counting.
	I will apply the fundamental principle of counting to many real world situations.

Unit Name:Circles and Conditional Probability	Length:20 days
Standards:M.G.C.A.1 (F2Y)M.G.C.B.2 (F2Y)M.G.GMD.C.4 (F2Y)M.SP.CP.A.2 (F2Y)M.SP.CP.A.3 (F2Y)M.SP.CP.A.4 (F2Y)M.SP.CP.A.5 (F2Y)	Outcomes:Students will explore the relationships between angles, arcs and chords.
Essential Questions:What tools do I have available to help me solve this problem?	Learning Targets: Students will analyze probabilities.
Performance Tasks: Students will apply the fundamental principle of counting to count permutations	Notes:
Topic 10 Permutations	Length:1 day
Lesson Frame:	We will develop two formulas for calculating permutations.
	I will apply the formulas to various application problems.
Performance Tasks: Students will develop two formulas for calculating permutations.	Notes:
Topic 11 Combinations	Length:1 day
Lesson Frame:	We will discover the relationship between permutations and combinations.
	I will learn counting permutations is the first step in counting combinations.
Performance Tasks: Students will describe the differences between permutations and combinations.	Notes:
Topic 12 Categorizing counting problems	Length:1 day
Lesson Frame:	We will determine counting methods for order specific situations.
	I will determine couthing methods for order specific situations with no repeating.
Performance Tasks: Students will determine counting methods for a variety of situations.	Notes:
Topic 13 Challenging probability problems	Length:1 day
Lesson Frame:	We will solve challenging problems using probability tools.
	I will work with multifacited probability problems in a real world setting.
Performance Tasks: Students will apply their knowledge of probability to a variety of application problems.	Notes:

September	October	November	December	January	February	March	April	May	June
Unit 1	Finish Unit 2	Unit 4	Unit 5	Unit 6	Finish Unit 7	Unit 9	Finish Unit 10	Unit 12	
Start of Unit 2	Unit 3			Start Unit 7	Unit 8	Start Unit 10	Unit 11		

Unit Name:Solids and Circles	Length:16 days
Standards:M.G.C.A.1 (F2Y)M.G.C.B.2 (F2Y)M.G.GMD.A.1 (F2Y),M.G.GMD.B.3M.G.GMD.C.4M.G.MGD.A.2 (F2Y),	Outcomes:Students will find the volume and surface area of pyramids, cones and spheres.
Essential Questions:What information do I need, what do I already know, and how can I use this information to solve the problem?	Learning Targets: Students will discover the properties of special polyhedra.
Topic 1: Platonic solids	Length:2-3 days
Lesson Frame:	We will create 5 Platonic Solids
	I will describe polyhedra using the number of faces.
Performance Tasks: Students will identify which solids have congruent faces.	Notes:
Topic 2:Pyramids	Length:1 day
Lesson Frame:	We will find the total surface area using the slant height.
	I will define how to name a pyramid.
Performance Tasks: Students will discover the definition of a pyramid.	Notes:
Topic 3 Volume of a pyramid	Length:2 days
Lesson Frame:	We will create the formula for finding the volume of a pyramid.
	I will discover the relationship between the volume of a pyramid and prism.
Performance Tasks: Students will observe the relationship of the volume of a prism and a pyramid.	Notes:
Topic 4 Surface area and volume of a cone	Length:1 day
Lesson Frame:	We will practice calculating the volume of pyramids and cones.
	I will solve application problems using cones.
Performance Tasks: Students will learn how to find the volume and surface area of a cone.	Notes:
Topic 5 Surface area and volume of a sphere	Length:1 day
Lesson Frame:	We will express regularity in repeated reasoning.
	I will investigate the relationships of cones, spheres and cylinders and their volumes.
Performance Tasks: Students will learn how to find the volume and surface area of a sphere.	Notes:
Topic 6 Coordinates on a sphere	Length:1 day
Lesson Frame:	We will explore the characteristics of a great cirlce.
	I will learn how to caclulate the distance between two locations on earth.
Performance Tasks: Students will work with spheres within a spherical coordinate system.	Notes:
Topic 7 Tangents and arcs	Length:1 day
Lesson Frame:	We will learn the relationship between the measures of arcs and angles.
	I will create constructs of arcs formed when two lines are tangent to the circle.
Performance Tasks: Students will study the relationship between the measures of the arcs and angles formed wihen two tangent lines intersect.	Notes:
Topic 8 Secant and tangent relationships	Length:2 days
Lesson Frame:	We will investigate the relationship between arcs and secants.
	I will study circles and the angles that are formed with secants and tangents.
Performance Tasks: Students will discover the relationship between two intersecting secants.	Notes:

Unit Name:Conics and Closure	Length:14 days
Standards:M.G.GMD.B.3 (F2Y)M.G.GMD.C.6 (F2Y)M.G.GPE.A.1M.G.GPE.A.2+M.G.GPE.B.4 (F2Y)M.SP.MD.B.7	Outcomes:Students will extend their geometric understanding of circles to write algebraic equations.
Essential Questions:How can I connect these ideas to previous topics, and can I make it simpler or make a generalization?	Learning Targets:Students will investigate the cross-sections of cones to understand parabolas.
Topic 1: The equation of a circle	Length:1 day
Lesson Frame:	We will discover the equation for a circles.
	I will relate the points on a graph with the equation that corresponds to a circle.

Performance Tasks: Students will learn how to write the equation of a circle.	Notes:

Topic 2: Completing the square for equations of a circle	Length:1 day
Lesson Frame:	We will rewrite the equation of a circle in equation form.
	I will write the equation of a circle by completing the square.

Performance Tasks: Students will complete the square to write the equations of a circle.	Notes:

Topic 3 Introduction to conic sections	Length:1 day
Lesson Frame:	We will investigate how the position of the focus and directrix affect the shape and direction of a parabola.
	I will learn the geometric definition of a parabola.

Performance Tasks: Students will identify and name the cross sections of a cone.	Notes:

Topic 4 Graphing a parabola using the focus and directrix	Length:1 day
Lesson Frame:	We will graph various parabolas on focus directric paper.
	I will begin to work with ellipses.

Performance Tasks: Students will graph parabolas using the focus and the directrix.	Notes:

Topic 5 Using coordinate geometry and constructions to explore shapes	Length:1 day
Lesson Frame:	We will prove conjectures based on quadrilaterals.
	I will construct midpoints with a compass and a ruler.

Performance Tasks: Students will learn that a quadrilateral formed by joining consecutive midpoints of any quadrilateral is a parallelogram.	Notes:

Topic 6 Euler's formula of polyhedra	Length:1 day
Lesson Frame:	We will investigate the attributes of polyhedra.
	I will compare faces, vertices, and edges of various polyhedra.

Performance Tasks: Students will review their understanding of polyhedra.	Notes:

Topic 7 The golden ratio	Length:1 day
Lesson Frame:	We will study several different contexts where phi arises.
	I will write and solve quadratic equations in an infinite series.

Performance Tasks: Students will be introduced to phi and the golden ratio and will apply it to application problems.	Notes:

Topic 8 Using geometry to find probabilities	Length:1 day
Lesson Frame:	We will find areas of complex regions on a coordinate plane.
	I will use probability to solve challenging real world problems.

Performance Tasks: Students will find the areas of complex regions using probability.	Notes:

Course Name:	Advanced Algebra(Algebra 2)		
Credits:	1		
Prerequisites:	Geometry		
Description:	In this course, students will work in cooperative groups to solve problems, explain their thinking, and listen to others explanations on their thinking.		
Academic Standards:	M.F.IF.B.4M.F.IF.B.5M.F.IF.C.7bM.F.IF.C.9 M.A.CED.A.2 (F2Y)M.A.SSE.A.1aM.F.BF.B.3 M.A.APR.A.1M.A.APR.C.4M.A.APR.D.7M.A.SSE.A.1aM.A.SSE.A.2 M.A.CED.A.2 (F2Y)M.A.CED.A.3 (F2Y)M.A.REI.A.2M.A.REI.D.11 M.A.CED.A.4 M.A.CED.A.2M.F.BF.A.1bM.F.IF.C.7e,M.F.LE.A.4M.F.LE.B.5(F2Y)M.F.BF.A.1bM.F.BF.B.3M.F.BF.B.4M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.B.8 (F2Y)M.F.IF.C.7eM.F.IF.C.9M.F.LE.A.4(F2Y)M.A.SSE.A.1bM.A.SSE.A.2M.F.IF.B.5 M.F.BF.B.3M.F.IF.C.7eM.F.IF.C.9M.F.TF.A.1M.F.TF.A.2M.F.TF.B.5 M.A.APR.B.2M.A.APR.B.3M.A.APR.D.6M.A.SSE.A.2M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7c M.SP.IC.A.1M.SP.IC.A.2M.SP.IC.B.3M.SP.IC.B.4M.SP.IC.B.6M.SP.ID.A.4 M.A.APR.C.4M.A.APR.C.5+M.A.SSE.A.1bM.A.SSE.A.2M.A.SSE.B.4M.F.IF.C.8M.F.LE.A.4 M.SP.IC.A.1M.SP.IC.A.2M.SP.IC.B.4M.SP.IC.B.5M.SP.IC.B.6M.SP.MD.B.6M.SP.MD.B.7 M.F.TF.B.6+M.F.IF.C.7eM.F.IF.C.8 (F2Y)M.F.TF.B.5M.F.TF.C.9+		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Investigations and functions	16 days	M.F.IF.B.4M.F.IF.B.5M.F.IF.C.7bM.F.IF.C.9	Outcomes:Students will work with graphing calculators to help discover qualities of functions.
Transformations of parent graphs	20 days	M.A.CED.A.2 (F2Y)M.A.SSE.A.1aM.F.BF.B.3	Outcomes:Students will change an equation of a parabola to make it fit a set of nonlinear data.
Equivalent forms	14 days	M.A.APR.A.1M.A.APR.C.4M.A.APR.D.7M.A.SSE.A.1aM.A.SSE.A.2	Outcomes:Students will rewrite expressions and equations to create simpler versions.
Solving and intersections	14 days	M.A.CED.A.2 (F2Y)M.A.CED.A.3 (F2Y)M.A.REI.A.2M.A.REI.D.11 (F2Y)M.A.SSE.A.1bM.A.SSE.A.2M.F.IF.B.5	Outcomes:Students will write and solve equations and systems of equations.
Inverses and logarithms	14 days	M.A.CED.A.4 (F2Y)M.F.BF.A.1bM.F.BF.B.3M.F.BF.B.4M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.B.8 (F2Y)M.F.IF.C.7eM.F.IF.C.9M.F.LE.A.4	Outcomes:Students will examine inverse functions ang create composite functions
3-D graphing and logarithms	14 days	M.A.CED.A.2M.F.BF.A.1bM.F.IF.C.7e,M.F.LE.A.4M.F.LE.B.5	Outcomes:Students will graph points, equations, and systems of equations in three dimensions.
Trigonometric functions	17 days	M.F.BF.B.3M.F.IF.C.7eM.F.IF.C.9M.F.TF.A.1M.F.TF.A.2M.F.TF.B.5	Outcomes:Students will use their understanding of trigonometric ratios to build their understanding of new functions.
Polynomials	16 days	M.A.APR.B.2M.A.APR.B.3M.A.APR.D.6M.A.SSE.A.2M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7c	Outcomes:Students will investigate the relationships between equations and graphs.
Randomization and normal distributions	12 days	M.SP.IC.A.1M.SP.IC.A.2M.SP.IC.B.3M.SP.IC.B.4M.SP.IC.B.6M.SP.ID.A.4	Outcomes:Students will learn the basic techniques of performing opinion surveys along with their limitations and pitfalls.
Series	14 days	M.A.APR.C.4M.A.APR.C.5+M.A.SSE.A.1bM.A.SSE.A.2M.A.SSE.B.4M.F.IF.C.8M.F.LE.A.4	Outcomes:Students will write series and find their sums.
Simulating sampling variability	13 days	M.SP.IC.A.1M.SP.IC.A.2M.SP.IC.B.4M.SP.IC.B.5M.SP.IC.B.6M.SP.MD.B.6M.SP.MD.B.7	Outcomes:Students will use computer simulations to model complex probabilities.
Analytic trigonometry	16 days	M.F.TF.B.6+M.F.IF.C.7eM.F.IF.C.8 (F2Y)M.F.TF.B.5M.F.TF.C.9+	Outcomes:Students will learn the characteristics of trigonometric ratios secant, cosecant, and cotangent.

Unit Name:Investigations and functions	Length:16 days
Standards:M.F.IF.B.4M.F.IF.B.5M.F.IF.C.7bM.F.IF.C.9	Outcomes:Students will work with graphing calculators to help discover qualities of functions.
Essential Questions:Am I analyzing the function thoroughly and clearly communicating my reasoing to others?	Learning Targets:Students will be able to find multiple ways to represent a geometric relationship and compare them to other relationships.
Topic 1:Solving puzzles in teams	Length:1 day
Lesson Frame:	We will represent a series of connected functions to create the desired output.
	I will model geometric objects with mathematics using functions.
Performance Tasks: Students will be able to represent geometric objects.	Notes:
Topic 2:Using a graphing calculator to explore a function	Length:2 days
Lesson Frame:	We will identify possible inputs, outputs and key points for describing graphs.
	I will make sense of problems an persevere in solving them while graphing functions.
Performance Tasks: Students will be able to draw complete graphs of functions.	Notes:
Topic 3:Domain and range	Length:1 day
Lesson Frame:	We will work on graphing skills while identifying the domain and range.
	I will construct viable arguments to defend what the domain and range is of a function.
Performance Tasks: Students will be able to identify the domain and range of a function.	Notes:
Topic 4:Points of intersection in multiple representations	Length:1 day
Lesson Frame:	We will use multiple representations to find the point of interection.
	I will look for structure while identifying the intersection point from a graph, table, or equation.
Performance Tasks: Students will be able to find point of interstection of functions.	Notes:
Topic 5:Modeling a geometric relationship	Length:3 days
Lesson Frame:	We will investigate a function defined by a geometric relationship.
	I will model with mathematics while creating multiple representations.
Performance Tasks: Students will be able to generate multiple algebraic representations of a function.	Notes:
Topic 6:Function investigation	Length:2 days
Lesson Frame:	We will develop our understanding of functions as we look at hyperbolas.
	I will look for and make use of the structure of hyperbolas.
Performance Tasks: Students will be able to investigate functions.	Notes:
Topic 7:The family of linear functions	Length:1 day
Lesson Frame:	We will determine whether relationships in tables and situations are linear.
	I will attend to precision while investigating linear relationships.
Performance Tasks: Students will be able to identify commonalities in a family of linear functions.	Notes:
Topic 8:Function investigation challenge	Length:1 day
Lesson Frame:	We will investigate functions that are non-linear.
	I will construct viable arguments about what makes functions linear and non-linear.
Performance Tasks: Students will be able to identify non-linear functions.	Notes:

Unit Name:Transformations of parent graphs	Length:20 days
Standards:M.A.CED.A.2 (F2Y)M.A.SSE.A.1aM.F.BF.B.3	Outcomes:Students will change an equation of a parabola to make it fit a set of nonlinear data.
Essential Questions:How can I model this everyday situation with mathematics?	Learning Targets:Students will be able to apply the concepts of transformation to other parent functions.
Topic 1:Modeling non-linear data	Length:1 day
Lesson Frame:	We will make predictions from an equation.
	I will reason abstractly and quantitatively in order to make predictions.
Performance Tasks: Students will be able to collect non-linear data and fit an equation to the data.	Notes:
Topic 2:Parabola investigation	Length:2 days
Lesson Frame:	We will identify comparisons of graphs and equations after transformations.
	I will look for and make use of structure while identifying the characteristics of transformations.
Performance Tasks: Students will be able to connect tranformations of parabolas with equations.	Notes:
Topic 3:Graphing a parabola without a table	Length:1 day
Lesson Frame:	We will rewrite quadratic equations in graphing form in order to graph.
	I will make use of structure to identify equations written in graphing form.
Performance Tasks: Students will be able to graph quadratic equations.	Notes:
Topic 4:Rewriting in graphing form	Length:2 days
Lesson Frame:	We will compare graphing using intercepts and completing the square.
	I will make viable arguments when determining which method of graphing should be used.
Performance Tasks: Students will be able to use intercepts to graph quadratic equations.	Notes:
Topic 5:Mathematical modeling with parabolas	Length:1 day
Lesson Frame:	We will develop an algebraic strategy for finding the value of the stretch factor.
	I will look for structure while writing equations in graphing form.
Performance Tasks: Students will be able to write equations in graphing form.	Notes:
Topic 6:Transforming other parent graphs	Length:3 days
Lesson Frame:	We will transform exponential, square root, and absolute value functions.
	I will make use of structure to identify how transformations impact functions.
Performance Tasks: Students will be able to transform graphs.	Notes:
Topic 7:Describing (h,k) for each family of functions	Length:2 days
Lesson Frame:	We will make connections between functions and point slope form.
	I will reason abstractly and quantitatively while identifying similarities of different types of functions.
Performance Tasks: Students will be able to identify the main points of hyperbolic, cubic, absolute value, exponential, and square root functions.	Notes:
Topic 8:Transforming of functions	Length:1 day
Lesson Frame:	We will compare functions with parent functions.
	I will make use of structure to identify how functions relate to their parent functions.
Performance Tasks: Students will be able to reflect functions across the y axis.	Notes:
Topic 9:Transforming of non-functions	Length:2 days
Lesson Frame:	We will transform circles.
	I will look for and express regularity while transforming functions and circles.
Performance Tasks: Students will be able to transform non-functions.	Notes:
Topic 10:Transforming piecewise-defined functions	Length:2 days
Lesson Frame:	We will use what we know about transformations to relocate and reorient a piecewise function.
	I will make sense of a persevere in solve piecewise functions.
Performance Tasks: Students will be able to graph piecewise functions.	Notes:

Unit Name:Equivalent forms	Length:14 days		
Standards:M.A.APR.A.1M.A.APR.C.4M.A.APR.D.7M.A.SSE.A.1aM.A.SSE.A.2	Outcomes:Students will rewrite expressions and equations to create simpler versions.		
Essential Questions:How can I show that these forms are equivalent?	Learning Targets:Students will be able to use properties to rewrite and simplify rational expressions.		
Topic 1:Equivalent expressions	Length:1 day		
Lesson Frame:	We will develop algabraic strategies for demonstrating equivalence.		
	I will look for and make use of structure to help identify equal expressions.		
Performance Tasks: Students will be able to identify equivalent expressions.	Notes:		
Topic 2:Rewriting expressions and determining equivalence	Length:2 days		
Lesson Frame:	We will make the structure of expressions apparent by multiplying and factoring expressions.		
	I will look for and make use of structure in order to rewrite expressions in the form wanted.		
Performance Tasks: Students will be able to rewrite expressions using substitution.	Notes:		
Topic 3:Solving by rewriting	Length:2 days		
Lesson Frame:	We will rewrite equations in order to be able to solve the system.		
	I will look for and make use of structure in order to solve systems of equations.		
Performance Tasks: Students will be able to solve systems of equations.	Notes:		
Topic 4:Investigating rational functions	Length:1 day		
Lesson Frame:	We will explore graphs of several rational funtions.		
	I will make sense of problems and persevere in solving rational functions.		
Performance Tasks: Students will be able to visualize the effects of dividing polynomials.	Notes:		
Topic 5:Simplifying rational expressions	Length:1 day		
Lesson Frame:	We will compare and analyze rational expressions.		
	I will look for and make use of the structure of rational expressions.		
Performance Tasks: Students will be able to analyze rational expressions.	Notes:		
Topic 6:Multiplying and dividing rational expressions	Length:1 day		
Lesson Frame:	We will simplify rational expressions by multiplying and dividing.		
	I will look for and make use of structure to identify how to simplify an expression.		
Performance Tasks: Students will be able to multiply and divide rational expressions.	Notes:		
Topic 7:Adding and subtracting rational expressions	Length:1 day		
Lesson Frame:	We will simplify rational expressions by combining like terms with adding and subtracting.		
	I will look for and make use of structure when identifying like terms.		
Performance Tasks: Students will be able to add and subtract rational expressions.	Notes:		
Topic 8:Creating new functions	Length:2 days		
Lesson Frame:	We will simplify expressions and check our work.		
	I will make sense of rational expressions and persevere in simplifying them.		
Performance Tasks: Students will be able to simplify expressions with all four operations.	Notes:		

Unit Name:Solving and intersections	Length:14 days		
Standards:M.A.CED.A.2 (F2Y)M.A.CED.A.3 (F2Y)M.A.REI.A.2M.A.REI.D.11 (F2Y)M.A.SSE.A.1bM.A.SSE.A.2M.F.IF.B.5	Outcomes:Students will write and solve equations and systems of equations.		
Essential Questions:Which tools can I use to solve the problems and verify my solutions?	Learning Targets:Students will be able to solve systems of equations and systems of inequalities.		
Topic 1:Strategies for solving equations	Length:1 day		
Lesson Frame:	We will discuss different methods of solving equations.		
	I will justify my strategies strategically of solving an equation.		
Performance Tasks: Students will be able to solve equations.	Notes:		
Topic 2:Solving equations and systems graphically	Length:2 days		
Lesson Frame:	We will use two methods of solving one variable equations graphically.		
	I will look for an make use of the structure of the equation to solve.		
Performance Tasks: Students will be able to use graphs to validate algebraic solutions.	Notes:		
Topic 3:Finding multiple solutions to systems of equations	Length:1 day		
Lesson Frame:	We will determine the number of solutions for a system and what that means graphically.		
	I will reason abstractly and quantitatively while determining the number of solutions a system has.		
Performance Tasks: Students will be able to solve systems of linear and non-linear equations.	Notes:		
Topic 4:Using systems of equations to solve problems	Length:1 day		
Lesson Frame:	We will write and solve equations for real life applications.		
	I will make sense of and persevere in solving real life problems.		
Performance Tasks: Students will be able to write equations for real life problems.	Notes:		
Topic 5:Solving inequalities with one or two variables	Length:2 days		
Lesson Frame:	We will identify similar characteristics in solving inequalities and standard equations.		
	I will attend to precision while solving inequalities.		
Performance Tasks: Students will be able to solve systems of inequalities.	Notes:		
Topic 6:Using systems to solve a problem	Length:1 day		
Lesson Frame:	We will solve inequalities derived from real world problems.		
	I will make sense of word problems and persevere in solving them.		
Performance Tasks: Students will be able to solve word problems involving inequalities.	Notes:		
Topic 7:Application of systems of linear inequalities	Length:1 day		
Lesson Frame:	We will solve inequalities derived from real world problems.		
	I will make sense of word problems and persevere in solving them.		
Performance Tasks: Students will be able to solve more complex sistems of linear inequalities.	Notes:		
Topic 8:Using graphs to find solutions	Length:1 day		
Lesson Frame:	We will identify the function family that a function comes from and how different functions relate.		
	I will look for and make use of the structure of a function in order to identify its family.		
Performance Tasks: Students will be able to identify the relationships between the functions.	Notes:		

Unit Name:Inverses and logarithms	Length:14 days		
Standards:M.A.CED.A.4 (F2Y)M.F.BF.A.1bM.F.BF.B.3M.F.BF.B.4M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.B.8 (F2Y)M.F.IF.C.7eM.F.IF.C.9M.F.LE.A.4	Outcomes:Students will examine inverse functions ang create composite functions		
Essential Questions:How can I use the reflective nature of inverse graphs to find the equations for inverse?	Learning Targets:Students will be able to identify key components of inverse and logarithmic functions.		
Topic 1:Undo equations	Length:1 day		
Lesson Frame:	We will develop strategies to justify why equations undo functions.		
	I will reason abstractly and quantitatively while identify equations.		
Performance Tasks: Students will be able to find equations that undo functions.	Notes:		
Topic 2:Using a graph to find an inverse	Length:2 days		
Lesson Frame:	We will reflect across y=x and write equations of the inverses.		
	I will use appropriate tools strategically while reflecting equations.		
Performance Tasks: Students will be able to graph inverse functions.	Notes:		
Topic 3:Finding inverses and justifying algebraically	Length:1 day		
Lesson Frame:	We will learn how to switch x and y in a function in order to find the inverse.		
	I will make use of structure while writing inverse functions.		
Performance Tasks: Students will be able to find an inverse algebraically.	Notes:		
Topic 4:Finding the inverse of an exponential function	Length:1 day		
Lesson Frame:	We will look for the inverse of expontal equations.		
	I will look for and make use of structures while exploring exponential inverses.		
Performance Tasks: Students will be able to find the inverse of parent equations.	Notes:		
Topic 5:Defining the inverse of an exponential function	Length:1 day		
Lesson Frame:	We will make the connection between logarithms and inverses.		
	I will look for and make use of structure to identify the connection between logarithms and exponential functions.		
Performance Tasks: Students will be able to define the term logarithm.	Notes:		
Topic 6:Investigating the family of logarithmic functions	Length:1 day		
Lesson Frame:	We will identify the characteristics of logarithmic functions.		
	I will construct viable arguments while identifying key components of logarithmic functions.		
Performance Tasks: Students will be able to graph logarithmic functions.	Notes:		
Topic 7:Transformations of lorarithmic functions	Length:1 day		
Lesson Frame:	We will transform logarithmic equations.		
	I will use appropriate tools strategically as I solve logs on a calculator.		
Performance Tasks: Students will be able to use their calculator to find the base of a log.	Notes:		
Topic 8:Investigating compositions of functions	Length:2 days		
Lesson Frame:	We will make predictions about how a second function will look like the first on a graph.		
	I will look for and make use of structure while comparing graphs of two functions.		
Performance Tasks: Students will be able to write functions made of two functions.	Notes:		

Unit 3-D graphing and logarithms	Length:14 days		
Standards:M.A.CED.A.2M.F.BF.A.1bM.F.IF.C.7e,M.F.LE.A.4M.F.LE.B.5	Outcomes:Students will graph points, equations, and systems of equations in three dimensions.		
Essential Questions:How can I apply what I learned about graphs and equations in two dimensions to three dimensional solutions?	Learning Targets:Students will be able to solve equations involving logarithms.		
Topic 1:Creating a three dimensional model	Length:1 day		
Lesson Frame:	We will use isometric paper to plot and identify points in a three dimensional plane.		
	I will model with mathematics as I am plotting points in a three dimensional plane.		
Performance Tasks: Students will be able to locate points in a three dimensional plane.	Notes:		
Topic 2:Graphing equations in three dimensions	Length:1 day		
Lesson Frame:	We will graph places on a three dimensional axes.		
	I willuse appropriate tools strategically while plotting planes.		
Performance Tasks: Students will be able to graph planes in three dimensions.	Notes:		
Topic 3:Systems of three-variable equations	Length:1 day		
Lesson Frame:	We will find the points of intersection of two of the systems.		
	I will model with mathematics as I identify solutions to the systems with three variables.		
Performance Tasks: Students will be able to graph systems with three variables.	Notes:		
Topic 4:Solving systems of three equations with three unknowns	Length:1 day		
Lesson Frame:	We will determine the different ways three planes can intersect.		
	I will look for and make use of structure to identify the types of solutions to systems.		
Performance Tasks: Students will be able to solve systems with three variables algebraically.	Notes:		
Topic 5:Using systems of three equations for curve fitting	Length:2 days		
Lesson Frame:	We will identify the parabola that connects three points.		
	I will reason abstractly and quantitatively while writing quadratic equations.		
Performance Tasks: Students will be able to write the quadratic function that passes three three points.	Notes:		
Topic 6: Using logarithms to solve exponential equations	Length:1 day		
Lesson Frame:	We will develope the power property of logarithms to solve equations.		
	I will make sense of problems and persevere in solving exponential equations.		
Performance Tasks: Students will be able to solve exponential equations.	Notes:		
Topic 7:Investigating the properties of logarithms	Length:1 day		
Lesson Frame:	We will use the product and quotient properties of logarithms to rewrite equations.		
	I will look for and make use of structure when changing the bases in a log.		
Performance Tasks: Students will be able to rewrite equations with different bases.	Notes:		
Topic 8:Writing equations of exponential functions	Length:1 day		
Lesson Frame:	We will develop strategies for find the exponential equation given certain data.		
	I will look for and express regularity in writing exponential equations.		
Performance Tasks: Students will be able to write an equation given two points and an asyptote.	Notes:		
Topic 9:An application of logarithms	Length:1 day		
Lesson Frame:	We will solve a murder mystery using exponential functions.		
	I will make sense of problems nad persevere in solving exponential functions.		
Performance Tasks: Students will be able to solve exponential functions.	Notes:		

Unit Trigonometric functions	Length:17 days
Standards:M.F.BF.B.3M.F.IF.C.7eM.F.IF.C.9M.F.TF.A.1M.F.TF.A.2M.F.TF.B.5	Outcomes:Students will use their understanding of trigonometric ratios to build their understanding of new functions.
Essential Questions:How can I use what I know about right triangle trigonometry to describe functions determined by rotations about a circle?	Learning Targets:Students will be able to develop general equations for periodic and trigonometric functions.
Topic 1:Introduction to cyclic models	Length:1 day
Lesson Frame:	We will investigate a pendulum to create a sine curve.
	I will make predictions on how to change the shape of the curve.
Performance Tasks: Students will be able to identify the sine curve.	Notes:
Topic 2:Graphing the sine function	Length:2 days
Lesson Frame:	We will use experimental data to generate heights to create a sige graph.
	I will look for and make use of structure while making the sine graph.
Performance Tasks: Students will be able to graph the sine function.	Notes:
Topic 3:Unit circle to graph	Length:1 day
Lesson Frame:	We will explore the connection between the sine graph and the unit circle.
	I will look for and make use of structure to make connections between the sine graph and the unit circle.
Performance Tasks: Students will be able to understand reference angles.	Notes:
Topic 4:Graphing and interpreting the cosine function	Length:2 days
Lesson Frame:	We will draw conclusions about the relationships between sine and cosine.
	I will use appropriate tools strategically when comparing sine and cosine.
Performance Tasks: Students will be able to use the cosine function to calculate horizontal distance.	Notes:
Topic 5:Defining a radian	Length:1 day
Lesson Frame:	We will determine the number of radians in a full circle.
	I will look for and make use of structure when defining a radian.
Performance Tasks: Students will be able to construct an angle with the measure of one radian.	Notes:
Topic 6:Building a unit circle	Length:1 day
Lesson Frame:	We will use special triangles and reference angles to label exact coordinates of a unit circle.
	I will look for an make use of structure to label the unit circle.
Performance Tasks: Students will be able to give the coordinates of a unit circle.	Notes:
Topic 7:The tangent function	Length:1 day
Lesson Frame:	We will use the unit circle to create the graph of tangent.
	I will attend to precision while graphing tangent.
Performance Tasks: Students will be able to recognize the connection between tangent and the unit circle.	Notes:
Topic 8:Transformations of y=sin x	Length:1 day
Lesson Frame:	We will generate general equations for sine and cose functions.
	I will construct viable arguments while writing equations of transformed functions.
Performance Tasks: Students will be able to transform sine and cosine functions.	Notes:
Topic 9:One more parameter for a cyclic function	Length:1 day
Lesson Frame:	We will determine the placement of the parameter b in the general equation for sine and cosine.
	I will make sense of sine and cose equations and persevere in solving them.
Performance Tasks: Students will be able to identify the period of cyclic situations.	Notes:
Topic 10:Period of cyclic function	Length:1 day
Lesson Frame:	We will transform sine curves and graph them.
	I will look for and make use of structure while graphing transformed sine curves.
Performance Tasks: Students will be able to write equations and graph transformed sine curves.	Notes:
Topic 11:Graph to equation	Length:1 day
Lesson Frame:	We will identify the sine and cosine functions are just transformations of each other.

Unit Trigonometric functions	Length:17 days		
Standards:M.F.BF.B.3M.F.IF.C.7eM.F.IF.C.9M.F.TF.A.1M.F.TF.A.2M.F.TF.B.5	Outcomes:Students will use their understanding of trigonometric ratios to build their understanding of new functions.		
Essential Questions:How can I use what I know about right triangle trigonometry to describe functions determined by rotations about a circle?	Learning Targets:Students will be able to develop general equations for periodic and trigonometric functions.		
	I will look for and express regularity between sine and cosine functions.		
Performance Tasks: Students will be able to consolidate their knowledge of cylcic graphs and their equations.	Notes:		

Unit Polynomials	Length:16 days
Standards:M.A.APR.B.2M.A.APR.B.3M.A.APR.D.6M.A.SSE.A.2M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7c	Outcomes:Students will investigate the relationships between equations and graphs.
Essential Questions:How can the degree of a polynomial help me determine the nature of its graph or a possible equation?	Learning Targets:Students will be able to understand how imaginary and complex numbers are connected with systems of equations.
Topic 1:Sketching graphs of polynomial functions	Length:2 days
Lesson Frame:	We will describe the graph of a polynomial given its equation in factored form.
	I will look for and make sense of structure when describing graphs.
Performance Tasks: Students will be able to graph a polynomial.	Notes:
Topic 2:More graphs of polynomials	Length:1 day
Lesson Frame:	We will describe the graph of a polynomial given its equation in factored form.
	I will look for and make sense of structure when describing graphs.
Performance Tasks: Students will be able to describe the graphs of polynomial functions.	Notes:
Topic 3:Sketch factors for polynomial functions	Length:1 day
Lesson Frame:	We will write equations given a point and an intercept.
	I will make sense of graphing problems and persevere in writing the equations.
Performance Tasks: Students will be able to write exact equations for polynomial graphs.	Notes:
Topic 4:Introducing imaginary numbers	Length:1 day
Lesson Frame:	We will solve equations involving imaginary numbers and complex numbers.
	I will reason abstractly and quantitatively while solving polynomial equations.
Performance Tasks: Students will be able to solve equations using imaginary numbers.	Notes:
Topic 5:Complex roots	Length:1 day
Lesson Frame:	We will write equations of quadratic functions given its roots.
	I will look for and express regularity while writing quadratic functions given their roots.
Performance Tasks: Students will be able to solve quadratice equations that give them complex conjugates.	Notes:
Topic 6:More complex numbers and equations	Length:1 day
Lesson Frame:	We will work with the complex plane in order to visualize complex numbers and complex roots for quadratic functions.
	I will investigate the number of linear or quadratic factors a polynomial can have.
Performance Tasks: Students will be able to calculate the absolute value of a complex number.	Notes:
Topic 7:Polynomial division	Length:1 day
Lesson Frame:	We will use polynomial division to find the factors of polynomials.
	I will reason abstractly and quantitatively to divide polynomials.
Performance Tasks: Students will be able to find factors of polynomials.	Notes:
Topic 8:Factors and integral roots	Length:3 days
Lesson Frame:	We will use the integral zero theorem to finall the the roots of a polynomial with a degree greater than two.
	I will attend to precision while finding the roots of polynomials.
Performance Tasks: Students will be able to find integral roots of a polynomial.	Notes:
Topic 9:An application of polynomials	Length:1 day
Lesson Frame:	We will apply our knowledge of polynomials to find the maximum volume of a tank.
	I will make sense of polynomial problems and persevere in solving them.
Performance Tasks: Students will be able to maximize the volume of a tank.	Notes:

Unit Randomization and normal distributions	Length:12 days
Standards:M.SP.IC.A.1M.SP.IC.A.2M.SP.IC.B.3M.SP.IC.B.4M.SP.IC.B.6M.SP.ID.A.4	Outcomes:Students will learn the basic techniques of performing opinion surveys along with their limitations and pitfalls.
Essential Questions:How can I use the appropriate degree of precision for this problem-in my mathematics, in my vocabulary and in how I ask survey questions?	Learning Targets:Students will be able to create histograms with percentages called a relative frequency histogram.
Topic 1:Survey design	Length:1 day
Lesson Frame:	We will consider issues of bias when we write survey items.
	I will model with mathematics while I write researc questions.
Performance Tasks: Students will be able to write research questions.	Notes:
Topic 2:Samples and the role of randomness	Length:1 day
Lesson Frame:	We will compare samples selected using intentional choice with those selected randomly.
	I will model with mathematics samples of choice.
Performance Tasks: Students will be able to compare the representative nature of samples.	Notes:
Topic 3:Bias in convenience samples	Length:1 day
Lesson Frame:	We will consider populations represented by particular convenience samples.
	I will make sense of random selection problems and persevere in solving them.
Performance Tasks: Students will be able to incorporate random selection into to sampling.	Notes:
Topic 4:Testing cause and effect with experiments	Length:1 day
Lesson Frame:	We will identify the importance of randomization in an experiment.
	I will attend to precision while working with experiments.
Performance Tasks: Students will be able to understand the importance of randomization.	Notes:
Topic 5:Conclusions from studies	Length:1 day
Lesson Frame:	We will practice the main concepts of the chapter as we think about and analyze studies.
	I will make sense of studies and persevere in solving them.
Performance Tasks: Students will be able to think critically about fictitious studies.	Notes:
Topic 6:Relative frequency histograms	Length:1 day
Lesson Frame:	We will create relative frequency histograms that display percentages.
	I will attend to precision while making histograms.
Performance Tasks: Students will be able to create relative frequency histograms.	Notes:
Topic 7:The normal probability density function	Length:1 day
Lesson Frame:	We will calculate proportions from a histogram.
	I will attend to precision while solving proportions.
Performance Tasks: Students will be able to model bell shaped data on a histogram.	Notes:
Topic 8:Percentiles	Length:1 day
Lesson Frame:	We will predict into which percentiles various subjects would fall.
	I will make sense of percentile problems and persevere in solving them.
Performance Tasks: Students will be able to use normal distribution to model single peaked symmetrical data.	Notes:

Unit Series	Length:14 days
Standards:M.A.APR.C.4M.A.APR.C.5+M.A.SSE.A.1bM.A.SSE.A.2M.A.SSE.B.4M.F.IF.C.8M.F.LE.A.4	Outcomes:Students will write series and find their sums.
Essential Questions:How can I extend the pattern from smaller sums to larger sums?	Learning Targets:Students will be able to simplify some algebraic manipulations as well as solving some probability problems.
Topic 1:Introduction to arithmetic series	Length:2 days
Lesson Frame:	We will develop strategies to find sums of arithmetic series.
	I will make sense of series and persevere in solving them.
Performance Tasks: Students will be able to distinquish series from sequences.	Notes:
Topic 2:More arithmetic series	Length:1 day
Lesson Frame:	We will generalize a graphical method to add an arithmetic series and then apply it.
	I will reason abstractly and quantitatively while adding arithmetic series.
Performance Tasks: Students will be able to find the sum of an arithmetic series.	Notes:
Topic 3:General arithmetic series	Length:1 day
Lesson Frame:	We will learn how known series can be combined to form new series.
	I will make use of the structure of a series in order to form a new series.
Performance Tasks: Students will be able to find the sums of series that have a unspecified number of terms.	Notes:
Topic 4:Summation notation and combinations of series	Length:1 day
Lesson Frame:	We will use summation notation for an arithmetic series.
	I will look for and express regularity while using summation notation.
Performance Tasks: Students will be able to see an algebraic method to fin the sum of an arithmetic series.	Notes:
Topic 5:Geometric series	Length:2 days
Lesson Frame:	We will find sums of geometric series.
	I will attend to precision as I find the sum of a geometric series.
Performance Tasks: Students will be able to find sums of geometric series.	Notes:
Topic 6:Infinite series	Length:2 days
Lesson Frame:	We will find the sum of infinite series.
	I will attend to precision as I find the sum of an infinite series.
Performance Tasks: Students will be able to find the sum of infinite series.	Notes:
Topic 7:Pascal's triangle and the binomial theorem	Length:2 days
Lesson Frame:	We will create a table and connect the numbers in rows to form Pascal's Triangle.
	I will look for and make use of structure to identify Pascal's Triangle.
Performance Tasks: Students will be able to create Pascal's Triangle.	Notes:
Topic 8:The number e	Length:1 day
Lesson Frame:	We will explore the origins of the transcendental number e.
	I will make sense of structure and identify the number e.
Performance Tasks: Students will be able to identify the number e.	Notes:

September	October	November	December	January	February	March	April	May	June
Unit 1	Finish Unit 2	Unit 4	Unit 5	Unit 6	Finish Unit 7	Unit 9	Finish Unit 10	Unit 12	
Start of Unit 2	Unit 3			Start Unit 7	Unit 8	Start Unit 10	Unit 11		

Unit Simulating sampling variability	Length:13 days
Standards:M.SP.IC.A.1M.SP.IC.A.2M.SP.IC.B.4M.SP.IC.B.5M.SP.IC.B.6M.SP.MD.B.6M.SP.MD.B.7	Outcomes:Students will use computer simulations to model complex probabilities.
Essential Questions:How can I model this situation with a simulation in order to understand it better and to solve the problem?	Learning Targets:Students will be able to place a margin of error on their prediction about certain characteristics of populations.
Topic 1:Simulations of probability	Length:1 day
Lesson Frame:	We will simulate probabity of real life problems.
	I will identify theoretic probability of real life problems.
Performance Tasks: Students will be able to simulate probability.	Notes:
Topic 2:More simulations of probability	Length:1 day
Lesson Frame:	We will compute simulations to show random processes.
	I will use appropriate tools strategically to compute random processes.
Performance Tasks: Students will be able to identify random processes.	Notes:
Topic 3:Simulating sampling variability	Length:1 day
Lesson Frame:	We will determine the margin of error on a sample proportion.
	I will model with mathematics as I compute the proportion to identify the margin of error.
Performance Tasks: Students will be able to determine the natural sample to sample variability.	Notes:
Topic 4:Statistical test using sampling variability	Length:1 day
Lesson Frame:	We will determine wether a claim about a population is supported by a survey using two different sample sizes.
	I will attend to precision while determining the fairness of a survey.
Performance Tasks: Students will be able to do a hypothesis test to see the variability of a survey.	Notes:
Topic 5:Variability in experimental results	Length:1 day
Lesson Frame:	We will identify if two surveys are truly different.
	I will model with mathematics when identifying good and bad surveys.
Performance Tasks: Students will be able to analyze various sample to sample surveys.	Notes:
Topic 6:Quality control	Length:1 day
Lesson Frame:	We will use simulations to decide whether or not a manufactured part is within typical quality specifications.
	I will attend to precision while solving real life problems.
Performance Tasks: Students will be able to identify if a sample falls within a mean.	Notes:
Topic 7:Statistical process control	Length:1 day
Lesson Frame:	We will idenitfy good and bad quality control processes.
	I will model with mathematics multiple quality control situations.
Performance Tasks: Students will be able to simulate a quality control process.	Notes:
Topic 8:Analyzing decisions and strategies	Length:2 days
Lesson Frame:	We will determine if a conditional probability is representative of the whole.
	I will attend to precision when identifying if a probability is a good representation.
Performance Tasks: Students will be able to apply probabilities to analyze decisions.	Notes:

Unit Analytic trigonometry	Length:16 days
Standards:M.F.TF.B.6+M.F.IF.C.7eM.F.IF.C.8 (F2Y)M.F.TF.B.5M.F.TF.C.9+	Outcomes:Students will learn the characteristics of trigonometric ratios secant, cosecant, and cotangent.
Essential Questions:How can I rewrite this in another useful form?	Learning Targets:Students will be able to solve trigonometric equations and make statements based on the unit circle.
Topic 1:Analyzing trigonometric equations	Length:2 days
Lesson Frame:	We will deapen our understanding of the meaning of a solution.
	I will reason abstractly and quantitatively when determing what a solution means.
Performance Tasks: Students will be able to determine if a trig equation is always true.	Notes:
Topic 2:Solutions to trigonometric equations	Length:1 day
Lesson Frame:	We will represent solutions graphically, algebraically and on a unit circle.
	I will determine the number of solutions to a given equation.
Performance Tasks: Students will be able to solve trig equations.	Notes:
Topic 3:Inverses of trigonometric equations	Length:2 days
Lesson Frame:	We will recognize the restricted domains that allow inverses to also be functions.
	I will reason abstractly and quanititatively when identifying how domains restrict solutions.
Performance Tasks: Students will be able to graph the inverses of trig functions.	Notes:
Topic 4: Reciprocal trigonometric equations	Length:2 days
Lesson Frame:	We will solve equations with reciprocal trig functions.
	I will model with mathematics reciprocal trig functions.
Performance Tasks: Students will be able to graph the reciprocal of a trig function.	Notes:
Topic 5:trigonometric identities	Length:2 days
Lesson Frame:	We will use trig identities to rewrite and solve equations.
	I will reason abstractly and quanitatively while solving trig identities.
Performance Tasks: Students will be able to identify trig identities graphically.	Notes:
Topic 6:Proving trigonometric identities	Length:2 days
Lesson Frame:	We will write proofs for trig identities.
	I will attend to precision while write algebraic proofs for trig identities.
Performance Tasks: Students will be able to write algebraic proofs for trig identities.	Notes:
Topic 7:Angle sum and difference identities	Length:1 day
Lesson Frame:	We will use the relationships of a unit circle to develop the angle sum and difference identities.
	I will construct viable arguments and critique the reasoning of others while looking for the relationship between the identities and the unit circle.
Performance Tasks: Students will be able to develop the angle sum and difference identities.	Notes:

September	October	November	December	January	February	March	April	May	June
Unit 1	Finish Unit 2	Unit 4	Unit 5	Unit 6	Finish Unit 7	Unit 9	Finish Unit 10	Unit 12	
Start of Unit 2	Unit 3			Start Unit 7	Unit 8	Start Unit 10	Unit 11	Unit 13	

Course Name:	Pre-Calculus		
Credits:	1		
Prerequisites:	Advanced Algebra		
Description:	Students will work cooporatively in order to investigate the applications of functions, curves, polynomials, triangles, vectors, limits, rates and matrices.		
Academic Standards:	M.A.APR.B.3M.A.APR.C.5M.A.APR.D.6M.A.APR.D.7M.A.CED.A.1 (F2Y)M.A.CED.A.2 (F2Y)M.A.REI.C.7 (F2Y)M.A.REI.C.8M.A.REI.C.9M.A.REI.D.10 (F2Y)M.A.REI.D.11 (F2Y)M.A.SSE.A.2M.A.SSE.B.4M.F.BF.A.1M.F.BF.A.1cM.F.BF.B.3M.F.BF.B.4		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Preparing for your journey	16 days	M.A.APR.D.6M.A.CED.A.1 (F2Y)M.A.CED.A.2 (F2Y)M.A.SSE.A.2M.F.BF.A.1M.F.BF.A.1cM.F.BF.B.4M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7b	Outcomes:Students will write equations of inverse functions.
Functions and Trigonometry	16 days	M.A.REI.D.10 (F2Y)M.F.BF.B.3M.F.IF.B.4 (F2Y)M.F.IF.C.7M.F.IF.C.7eM.F.TF.A.2M.F.TF.A.3M.F.TF.A.4M.F.TF.B.6	Outcomes:Students will transform functions and write equations for transformed functions.
Algebra and area under a curve	16 days	M.A.APR.D.6M.A.APR.D.7M.A.CED.A.1 (F2Y)M.A.REI.C.7 (F2Y)M.A.REI.D.11 (F2Y)M.A.SSE.A.2M.F.BF.A.1	Outcomes:Students will use algebra to solve word problems.
Polynomial and rational functions	15 days	M.A.APR.B.3M.A.APR.D.6M.A.CED.A.1 (F2Y)M.A.CED.A.2 (F2Y)M.F.IF.B.4 (F2Y)M.F.IF.C.7cM.F.IF.C.7dM.N.CN.C.8M.N.CN.C.9	Outcomes:Students will write equations of polynomial functions from the roots.
Exponentials and logarithms	15 days	M.A.CED.A.2 (F2Y)M.F.BF.B.5M.F.IF.7eM.F.LE.A.2M.F.LE.A.4	Outcomes:Students will inivestigate some equivalent transformations.
Triangles and vectors	16 days	M.G.SRT.D.10M.G.SRT.D.11M.G.SRT.D.9M.N.VM.A.1M.N.VM.A.2M.N.VM.A.3M.N.VM.B.4M.N.VM.B.5	Outcomes:Students will prove and apply the law of sines and the law of cosines.
Limits and rates	15 days	M.G.SRT.D.10M.G.SRT.D.11M.G.SRT.D.9M.N.VM.A.1M.N.VM.A.2M.N.VM.A.3M.N.VM.B.4M.N.VM.B.5	Outcomes:Students will evaluate limits at a point and at infinity.
Extending periodic functions	16 days	M.F.TF.9M.A.CED.A.2 (F2Y)M.F.BF.B.3M.F.TF.10M.F.TF.10M.F.TF.9M.F.TF.B.7	Outcomes:Students will model situations with sinusoidal functions.
Matrices	14 days	M.A.REI.C.8M.A.REI.C.9M.N.VM.C.10M.N.VM.C.12M.N.VM.C.6M.N.VM.C.7M.N.VM.C.8M.N.VM.C.9	Outcomes:Students will use matrices to organize data and solve problems.

Conics and parametric Functions	16 days	M.F.IF.C.10M.G.GPE.A.3	Outcomes:Students will use formal definitions and properties of conic sections to determine their equations.
Polar functions and complex numbers	16 days	M.N.CN.B.6,M.N.CN.A.3,M.N.CN.B.4M.N.CN.B.5	Outcomes:Students will plot points and graph equations using polar coordinates.
Series and statistics	16 days	M.A.APR.C.5M.A.SSE.A.2M.A.SSE.B.4M.SP.MD.A.1,M.SP.MD.A.2,M.SP.MD.A.3,M.SP.MD.A.4,M.SP.MD.B.5	Outcomes:Students will evaluate sums of a series.
Precalculus finale	16 days	M.A.APR.C.5M.A.SSE.A.2M.A.SSE.B.4M.SP.MD.A.1,M.SP.MD.A.2,M.SP.MD.A.3,M.SP.MD.A.4,M.SP.MD.B.5	Outcomes:Students will evaluate limit at infinity and at points using algebraic techniques.

Unit Name:Preparing for your journey	Length:16 days
Standards:M.A.APR.D.6M.A.CED.A.1 (F2Y)M.A.CED.A.2 (F2Y)M.A.SSE.A.2M.F.BF.A.1M.F.BF.A.1cM.F.BF.B.4M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7b	Outcomes:Students will write equations of inverse functions.
Essential Questions:How do I know thour our team's graph is a function?	Learning Targets:Students will be able to investigate piecewise-defined functions.
Topic 1:Interpreting graphs	Length:1 day
Lesson Frame:	We will interpet graphs made from function families
	I will construct viable arugment and critique the reasoning of others while comparing function families.
Performance Tasks: Students will be able to understand function families.	Notes:
Topic 2:The spring problem	Length:1 day
Lesson Frame:	We will gather data the models motion of a spring.
	I will model motion and analyze periodic functions.
Performance Tasks: Students will be able to interpret periodic functions.	Notes:
Topic 3:Modeling with functions	Length:1 day
Lesson Frame:	We will model activities that optimally analyze the area under a curve.
	I will make sense of graphs and persevere in solving them.
Performance Tasks: Students will be able to informally investigate area under a curve.	Notes:
Topic 4:Rates of change	Length:1 day
Lesson Frame:	We will gain an intuitive understanding of rates of change.
	I will model with mathematics rates of change.
Performance Tasks: Students will be able to understand the rate of change.	Notes:
Topic 5:Setting up word problems	Length:1 day
Lesson Frame:	We will learn to eliminate variables so that the desired output is expressed in a single variable.
	I will make sense of word problems and persevere in solving them.
Performance Tasks: Students will be able to learn a process to solve word problems found often in calculus.	Notes:
Topic 6:Equivalent expressions	Length:1 day
Lesson Frame:	We will identify equivalent expressions.
	I will look for and make use of the structure of expressions to see if they are equivalent.
Performance Tasks: Students will be able to identify equivalent expressions.	Notes:
Topic 7: Composition of functions	Length:1 day
Lesson Frame:	We will simplify expressions involving the composition of functions.
	I will make sense of expressions and persevere in solving them.
Performance Tasks: Students will be able to evaluate expressions.	Notes:
Topic 8:Inverse functions	Length:1 day
Lesson Frame:	We will write unverse functions by undoing and verify they are inverses.
	I will look for and make use of structure in functions in order to write their inverese.
Performance Tasks: Students will be able to write inverse functions.	Notes:
Topic 9:Piecewise-defined functions and continuity	Length:1 day
Lesson Frame:	We will develop an informal definition of continuity.
	I will reason abstractlya nd quantitatively while recognizing piecewise functions.
Performance Tasks: Students will be able to recognize piecewise defined functions.	Notes:
Topic 10:Radians as a unit of measure	Length:1 day
Lesson Frame:	We will convert angle measurements from degrees to radians and vice versa.
	I will use appropriate tools strategically while converting angle measures.
Performance Tasks: Students will be able to define radains.	Notes:
Topic 11:Radian measure in the unit circle	Length:1 day
Lesson Frame:	We will locate coterminal negative and positive angles in the unit circle.

Unit Name:Preparing for your journey	Length:16 days		
Standards:M.A.APR.D.6M.A.CED.A.1 (F2Y)M.A.CED.A.2 (F2Y)M.A.SSE.A.2M.F.BF.A.1M.F.BF.A.1cM.F.BF.B.4M.F.IF.B.4 (F2Y)M.F.IF.B.5M.F.IF.C.7b	Outcomes:Students will write equations of inverse functions.		
Essential Questions:How do I know thour our team's graph is a function?	Learning Targets:Students will be able to investigate piecewise-defined functions.		
	I will look for and express regularity in repeated reasoning to identify angles within the unit circle.		
Performance Tasks: Students will be able to locate and lable commonly used angle measures.	Notes:		
Topic 12:Applications of radian measure	Length:1 day		
Lesson Frame:	We will convert units for angular and linear motion.		
	I will look for and express regularity in converted units of measure.		
Performance Tasks: Students will be able to use dimensional analysis to convert between angular and linear motion.	Notes:		

Unit Name:Functions and Trigonometry	Length:16 days
Standards:M.A.REI.D.10 (F2Y)M.F.BF.B.3M.F.IF.B.4 (F2Y)M.F.IF.C.7M.F.IF.C.7eM.F.TF.A.2M.F.TF.A.3M.F.TF.A.4M.F.TF.B.6	Outcomes:Students will transform functions and write equations for transformed functions.
Essential Questions:What are all the ways we currenlty have to describe functions?	Learning Targets:Students will be able to use the unit circle to calculate exact values of trigonometric functions.
Topic 1:Characteristics of functions	Length:1 day
Lesson Frame:	We will understand the words decreasing, increasing, maxima, minima, concave and convex when describing functions.
	I will look for and make use of structure when describing functions.
Performance Tasks: Students will be able to understand the terminology and notation for describing functions.	Notes:
Topic 2:Even and odd functions	Length:1 day
Lesson Frame:	We will analyze graphs and identify if they are odd or even.
	I will make use of structure and reason abstractly to identify odd and even functions.
Performance Tasks: Students will be able to recognize odd and even functions.	Notes:
Topic 3:Transformations of functions	Length:1 day
Lesson Frame:	We will identify the effect of replacing f(x) with f(x) +k.
	I will look for and make use of the structure of a function when applying transformation.
Performance Tasks: Students will be able to transform funtions.	Notes:
Topic 4:Special angels in the unit circle	Length:1 day
Lesson Frame:	We will determine the coordinates of the intersection of the terminal side of special angles within the unit circle.
	I will use appropriate tools strategically when identifying the coordinates of intersection.
Performance Tasks: Students will be able to recall special angles of a unit circle.	Notes:
Topic 5:Trigonometric ratios in the unit circle	Length:1 day
Lesson Frame:	We will use the unit circle to evaluate trigonometric expressions.
	I will look for and express regularity in repeated reasoning when solving trigonometric expressions.
Performance Tasks: Students will be able to develop triginometric ratios using the unit circle.	Notes:
Topic 6:Graphs of sine and cosine	Length:2 days
Lesson Frame:	We will use the unit circle to generate the graphs of sine and cosine.
	I will attend to precision while making graphs of sine and cosine.
Performance Tasks: Students will be able to generate the graphs of sine and cosine.	Notes:
Topic 7:Transformations of sine and cosine	Length:1 day
Lesson Frame:	We will vertically stretch and translate sinusoidal functions and analyze them.
	I will use appropriate tools strategically while transforming sinusoidal functions.
Performance Tasks: Students will be able to translate sinusoidal functions.	Notes:
Topic 8:Horizontal stretches of sine and cosine graphs	Length:1 day
Lesson Frame:	We will investigate the relationship of B and period.
	I will make sense of consine problems and persever in solving them.
Performance Tasks: Students will be able to stretch sine and cosine functions.	Notes:
Topic 9:Solving trigonometric equations	Length:1 day
Lesson Frame:	We will express solutions ot tringonometric equations by adding 2 pie N to the solutions.
	I will use approporiate tools strategically when solving trigonomtric equations.
Performance Tasks: Students will be able to solve basic trigonometric equations.	Notes:
Topic 10:Inverse sine and cosine	Length:1 day
Lesson Frame:	We willrestrict the domains of functions to make inverse functions.
	I will look for and make use of structure when graphing inverse functions.
Performance Tasks: Students will be able to graph inverse sine and cosine.	Notes:

Unit Name:Functions and Trigonometry	Length:16 days		
Standards:M.A.REI.D.10 (F2Y)M.F.BF.B.3M.F.IF.B.4 (F2Y)M.F.IF.C.7M.F.IF.C.7eM.F.TF.A.2M.F.TF.A.3M.F.TF.A.4M.F.TF.B.6	Outcomes:Students will transform functions and write equations for transformed functions.		
Essential Questions:What are all the ways we currenlty have to describe functions?	Learning Targets:Students will be able to use the unit circle to calculate exact values of trigonometric functions.		
Topic 11:Graphs of tangent and inverse tangent	Length:1 day		
Lesson Frame:	We will write equations for transformations of tangent.		
	I will use appropriate tools strategically when graphing tangent and its inverse.		
Performance Tasks: Students will be able to graph inverse tangent.	Notes:		

Unit Name:Algebra and area under a curve	Length:16 days		
Standards:M.A.APR.D.6M.A.APR.D.7M.A.CED.A.1 (F2Y)M.A.REI.C.7 (F2Y)M.A.REI.D.11 (F2Y)M.A.SSE.A.2M.F.BF.A.1	Outcomes:Students will use algebra to solve word problems.		
Essential Questions:How can we rewrite the expression without negative exponents so it resembles something we know?	Learning Targets:Students will be able to estimate area under a curve using rectangles.		
Topic 1:Operations with rational expressions	Length:2 days		
Lesson Frame:	We will add, subtract, multiply and divide rational expressions.		
	I will make sense of rational expressions and persevere in solving them.		
Performance Tasks: Students will be able to work with rational expressions.	Notes:		
Topic 2:Rewriting expressions and equations	Length:2 days		
Lesson Frame:	We will use substitution to simplify and factor algabraic expressions.		
	I will make sense of complex fractions and persevere in simplifying them.		
Performance Tasks: Students will be able to simplify complex fractions.	Notes:		
Topic 3:Solving nonlinear systems of equations	Length:1 day		
Lesson Frame:	We will solve systems of equations in nonlinear form.		
	I will look for and make use of structure when solving systems of equations.		
Performance Tasks: Students will be able to solve nonlinear equations.	Notes:		
Topic 4:Polynomial division	Length:1 day		
Lesson Frame:	We will divide polynomials.		
	I will look for and make use of structure when dividing polynomials.		
Performance Tasks: Students will be able to divide polynomials.	Notes:		
Topic 5:Solving classic word problems	Length:2 days		
Lesson Frame:	We will solve classic types of word problems.		
	I will make sense of word problems and persevere in solving them.		
Performance Tasks: Students will be able to solve classic types of word problems.	Notes:		
Topic 6:Using sigma notation	Length:1 day		
Lesson Frame:	We will calculate sums by expanding sigma notation.		
	I will reason abstractly and quantitativelywhile calculating with sigma notation.		
Performance Tasks: Students will be able to recognize sigma notation.	Notes:		
Topic 7:Area under a curve: Part one	Length:2 days		
Lesson Frame:	We will understand that area under a velocity curve represents distance.		
	I will use appropriate toos strategically while estimating area under a curve.		
Performance Tasks: Students will be able to estimate the area under a curve.	Notes:		
Topic 8:Area under a curve: part 2	Length:1 day		
Lesson Frame:	We will use sgma notation to express the approximations for area under a curve.		
	I will look for and make use of structure while finding area under a curve.		
Performance Tasks: Students will be able to approximate area under a curve using left and right endpoints.	Notes:		
Topic 9:Area under a curve:part 3	Length:1 day		
Lesson Frame:	We will explore methods for calculating the area under a curve and define what it means.		
	I will make sense of area problems and persevere in solving them.		
Performance Tasks: Students will be able to identify the area under the x axis is negative.	Notes:		

Unit Name:Polynomial and rational functions	Length:15 days
Standards:M.A.APR.B.3M.A.APR.D.6M.A.CED.A.1 (F2Y)M.A.CED.A.2 (F2Y)M.F.IF.B.4 (F2Y)M.F.IF.C.7cM.F.IF.C.7dM.N.CN.C.8M.N.CN.C.9	Outcomes:Students will write equations of polynomial functions from the roots.
Essential Questions:How can you tell how accurate your equation is?	Learning Targets:Students will be able to graph transformations of rational functions.
Topic 1:Graphing of polynomial functions in factored form	Length:2 days
Lesson Frame:	We will graph functions given to us in factored form.
	I will look for and make use of the structure of factored functions in order to graph.
Performance Tasks: Students will be able to graph polynomial functions.	Notes:
Topic 2:Writing equations of polynomial functions	Length:1 day
Lesson Frame:	We will write equations given the x intercept and a point.
	I will make sense of problems involving equations and persevere in solving them.
Performance Tasks: Students will be able to write equations for the graphs of polynomial functions.	Notes:
Topic 3:Identifying and using roots of polynomials	Length:1 day
Lesson Frame:	We will identify the number of real and complex roots of polynomial functions by its graph.
	I will look for the structure of a graph and identify the number of solutions.
Performance Tasks: Students will be able to identify complex roots of polynomials.	Notes:
Topic 4:Graphing transformations of y=1/x	Length:1 day
Lesson Frame:	We will transform functions into slope intercept form.
	I will look for and make use of the structure of rational expressions to rewrite them.
Performance Tasks: Students will be able to rewrite rational expressions.	Notes:
Topic 5:Graphing rational functions	Length:2 days
Lesson Frame:	We will graph rational functions with point discontinuities and slant asymptotes.
	I will look for and make use of the structure of rational expressions in order to graph them.
Performance Tasks: Students will be able to graph rational functions.	Notes:
Topic 6:Graphing reciprocal functions	Length:1 day
Lesson Frame:	We will graph reciprical function.
	I will look for and make use of the structure of a function in order to graph its reciprocal.
Performance Tasks: Students will be able to graph the reciprical of a function.	Notes:
Topic 7:Polynomial and rational inequalities	Length:1 day
Lesson Frame:	We will solve polynomial and rational inequalities.
	I will look for and make use of the structure of inequalities in order to solve them.
Performance Tasks: Students will be able to solve polynomial inequatlities.	Notes:
Topic 8:Applications of polynomial and rational functions	Length:2 days
Lesson Frame:	We will analyze everyday situations using our knowledge of polynomial and rational functions.
	I will model with mathematics everday situations in order to solve them.
Performance Tasks: Students will be able to solve problems involving polynomial and rational functions.	Notes:

Unit Name:Exponentials and logarithms	Length:15 days
Standards:M.A.CED.A.2 (F2Y)M.F.BF.B.5M.F.IF.7eM.F.LE.A.2M.F.LE.A.4	Outcomes:Students will inivestigate some equivalent transformations.
Essential Questions:Where is the locator point for the parent exponential function?	Learning Targets:Students will be able to use properties of logarithms to solve problems.
Topic 1:Applications of exponential functions	Length:2 days
Lesson Frame:	We will model everyday situations with exponential functions.
	I will make sense of problems and persevere in solving them using exponents.
Performance Tasks: Students will be able to use exponential functions.	Notes:
Topic 2:Stretching exponential functions	Length:1 day
Lesson Frame:	We will transform exponential functions to compare vertical stretches and horizontal shifts.
	I will look for and make use of structure to transform exponential functions.
Performance Tasks: Students will be able to transform exponential functions.	Notes:
Topic 3:The number e	Length:1 day
Lesson Frame:	We will solve problems involving continuous growth.
	I will reason abstractly and quantitatively while solve continuous growth problems.
Performance Tasks: Students will be able to solve problems involving e.	Notes:
Topic 4:Logarithms	Length:1 day
Lesson Frame:	We will investigate basic properties of logarithms.
	I will look for and make use of the structure of logarithms when converting them.
Performance Tasks: Students will be able to convert between exponential and logarithmic equations.	Notes:
Topic 5:Properties of logarithms	Length:2 days
Lesson Frame:	We will investigate the properties of logarithms and exponents.
	I will make sense of problems and persevere in solving logarithm and exponent problems.
Performance Tasks: Students will be able to make connections between the properties of logarithms and exponents.	Notes:
Topic 6:Solving exponential and logarithmic equations	Length:1 day
Lesson Frame:	We will solve equations with variables as exponents using logarithms.
	I will look for and make use of the structure of an equation to solve it.
Performance Tasks: Students will be able to solve equations with variables as exponents.	Notes:
Topic 7:Graphing logarithmic functions	Length:1 day
Lesson Frame:	We will graph logarithmic functions with different bases.
	I will look for and make use of the structure of the logarithmic function to graph it.
Performance Tasks: Students will be able to graph logarithmic functions.	Notes:
Topic 8:Applications of exponentials and logarithms	Length:2 days
Lesson Frame:	We will model everyday situations with exponential and logarithmic equations.
	I will model with mathematics everyday situations.
Performance Tasks: Students will be able to solve logarithmic equations.	Notes:

Unit Triangles and vectors	Length:16 days		
Standards:M.G.SRT.D.10M.G.SRT.D.11M.G.SRT.D.9M.N.VM.A.1M.N.VM.A.2M.N.VM.A.3M.N.VM.B.4M.N.VM.B.5	Outcomes:Students will prove and apply the law of sines and the law of cosines.		
Essential Questions:Why would solving a generic triangle be helpful?	Learning Targets:Students will be able to use geometry and algebra to perform operations with vectors.		
Topic 1:The law of sines and area	Length:2 days		
Lesson Frame:	We will prove, understand, and apply the law of sines.		
	I will look for and make use of structure in order to apply the law of sines.		
Performance Tasks: Students will be able to apply the law of sines.	Notes:		
Topic 2:The law of cosines	Length:1 day		
Lesson Frame:	We will derive, understand and apply the law of cosines.		
	I will look for and make use of structure in order to apply the law of cosines.		
Performance Tasks: Students will be able to apply the law of cosines.	Notes:		
Topic 3:The ambiguous case of the law of sines	Length:2 days		
Lesson Frame:	We will investigate the ambiguous case of the law of sines.		
	I will make sense of the law of sines and persevere in understanding it.		
Performance Tasks: Students will be able to understand the ambiguous case of the law of sines.	Notes:		
Topic 4:An introduction to vectors	Length:1 day		
Lesson Frame:	We will determine the magnitude, direction, and components of vectors.		
	I will look for and make use of the structure of a vector to understand them.		
Performance Tasks: Students will be able to understand vectors and vector notation.	Notes:		
Topic 5:Operations with vectors	Length:2 days		
Lesson Frame:	We will add, subtract, and scale vectors.		
	I will look for and make use of the structure of vectors to add and subtract them.		
Performance Tasks: Students will be able to add, subtract, and scale vectors.	Notes:		
Topic 6:Applications of vectors	Length:2 days		
Lesson Frame:	We will apply vectors to real world situations.		
	I will make sense of a real world problem and persevere in solving it using vectors.		
Performance Tasks: Students will be able to use vectors in real world applications.	Notes:		
Topic 7:The dot product	Length:2 days		
Lesson Frame:	We will calculate the angle between two vectors.		
	I will reason abstractlya nd quantitatively while computing the angle between two vectors.		
Performance Tasks: Students will be able to use the dot product.	Notes:		

Unit Limits and rates	Length:15 days
Standards:M.G.SRT.D.10M.G.SRT.D.11M.G.SRT.D.9M.N.VM.A.1M.N.VM.A.2M.N.VM.A.3M.N.VM.B.4M.N.VM.B.5	Outcomes:Students will evaluate limits at a point and at infinity.
Essential Questions:What does it mean for a limit to exist at a point?	Learning Targets:Students will be able to calculate rates of change for a variety of different situations.
Topic 1:An introduction to limits	Length:1 day
Lesson Frame:	We will investigate limits.
	I will look for and make use of structure while investigating limits.
Performance Tasks: Students will be able to start to understand the concept of a limit.	Notes:
Topic 2:Working with one sided limits	Length:1 day
Lesson Frame:	We will work with one sided limits at infinity.
	I will use appropriate tools strategically while looking at one sided limits.
Performance Tasks: Students will be able to interpret limit statements.	Notes:
Topic 3:The definition of a limit	Length:1 day
Lesson Frame:	We will evaluate limits using graphs and tables.
	I will use appropriate tools strategically as I use graphs to evaluate a limit.
Performance Tasks: Students will be able to evaluate a limit.	Notes:
Topic 4:Limits and continuity	Length:1 day
Lesson Frame:	We will apply the formal definition of continuity to identify a limit.
	I will construct viable arguments and critique the reasoning of others while defining continuity.
Performance Tasks: Students will be able to apply the formal definition of continuity.	Notes:
Topic 5:Special limits	Length:1 day
Lesson Frame:	We will analyze limits with trigonometric functions.
	I will make sense of limit problems and persevere in solving them.
Performance Tasks: Students will be able to examine limits of indeterminate forms.	Notes:
Topic 6:Rates of change from data	Length:1 day
Lesson Frame:	We will calculate the average rate of change using secant lines.
	I will look for and make use of the structure of secant lines in order to find slope.
Performance Tasks: Students will be able to calculate average rate of change.	Notes:
Topic 7:Slope and rates of change	Length:1 day
Lesson Frame:	We will use functions to find the average rate of change.
	I will reason abstractly and quantitatively in order to calculate the rate of change.
Performance Tasks: Students will be able to calculate average rate of change from equations.	Notes:
Topic 8:Average velocity and rates of change	Length:1 day
Lesson Frame:	We will calculate the average rate of change as intervals get smaller and smaller.
	I will look for and express regularity in repeated reasoning while calculating average rate of change.
Performance Tasks: Students will be able to calculate the average rate of change on small intervals.	Notes:
Topic 9:Moving from aroc to iroc	Length:2 days
Lesson Frame:	We will calculate instantaneous rate of change using limits and averages.
	I will look for and express regularity in repeated reasoning while calculating instantaneous rates of change.
Performance Tasks: Students will be able to make connections between limits and rates of change.	Notes:
Topic 10:Rates of change application	Length:1 day
Lesson Frame:	We will recognize rates of change in everyday situations.
	I will make sense of problems and persevere in solving them.
Performance Tasks: Students will be able to see how rates of change will be used in calculus.	Notes:

Unit Extending periodic functions	Length:16 days
Standards:M.F.TF.9M.A.CED.A.2 (F2Y)M.F.BF.B.3M.F.TF.10M.F.TF.10M.F.TF.9M.F.TF.B.7	Outcomes:Students will model situations with sinusoidal functions.
Essential Questions:How would you solve the equation?	Learning Targets:Students will be able to solve more complex trigonometric equations.
Topic 1:Graphing y=asin(b(x-h))+k	Length:1 day
Lesson Frame:	We will model transformations within trigonometric problems.
	I will look for and make use of structure while graphing transformations of trigonometric problems.
Performance Tasks: Students will be able to combine horizontal stretch and vertical shifts to a function.	Notes:
Topic 2:Modeling with periodic functions	Length:2 days
Lesson Frame:	We will model real world problems using trigonometric functions.
	I will model real world problems with mathematics.
Performance Tasks: Students will be able to generate trigonometric models for real world applications.	Notes:
Topic 3:Improving the spring problem	Length:1 day
Lesson Frame:	We will model a spring problem by incorporating exponents with a periodic function.
	I will model the spring problem with mathematics.
Performance Tasks: Students will be able to incorporate exponential with a periodic function.	Notes:
Topic 4:Graphing reciprocal trigonometric functions	Length:2 days
Lesson Frame:	We will graph reciprocal trigonometric functions.
	I will look for and make use of structure to graph trigonometric functions.
Performance Tasks: Students will be able to graph csc, sec, and cot.	Notes:
Topic 5:Trigonometric functions, geometrically	Length:1 day
Lesson Frame:	We will use geometry to visualize the trigonometric functions.
	I will use appropriate tools strategically to visualize trigonometric functions.
Performance Tasks: Students will be able to visualize geometric functions.	Notes:
Topic 6:Simplifying trigonometric expressions	Length:1 day
Lesson Frame:	We will determine special angles for trigonometric ratios from the unit circle.
	I will use appropriate tools strategically while determining angle measurement.
Performance Tasks: Students will be able to simplify trigonometric functions in terms of sine and cosine.	Notes:
Topic 7:Proving trigonometric identities	Length:1 day
Lesson Frame:	We will prove trigonometric identities.
	I will use appropriate tools strategically while proving trigonometric identities.
Performance Tasks: Students will be able to prove trigonometric identities.	Notes:
Topic 8:Angle sum and difference identities	Length:2 days
Lesson Frame:	We will discover the angle sum and difference identities for sine, cosine, and tangent.
	I will attend to precisions while discovering the angle sum and difference identities.
Performance Tasks: Students will be able to derive the angle sum and difference identities.	Notes:
Topic 9:Double angle and half angle identities	Length:1 day
Lesson Frame:	We will use angle sum and difference identities to develop double angle and half angle identities.
	I will use appropriate tools strategically in order to develop double and half angle identities.
Performance Tasks: Students will be able to develop double angle and half angle identities.	Notes:
Topic 10:Solving complex trigonometric equations	Length:1 day
Lesson Frame:	We will solve trigonometric equations using identities.
	I will look for and make use of structure while solving trigonometric equations.
Performance Tasks: Students will be able to solve trigonometric equations.	Notes:

Unit Matrices	Length:14 days
Standards:M.A.REI.C.8M.A.REI.C.9M.N.VM.C.10M.N.VM.C.12M.N.VM.C.6M.N.VM.C.7M.N.VM.C.8M.N.VM.C.9	Outcomes:Students will use matrices to organize data and solve problems.
Essential Questions:Does the order of the matrices matter when adding and subtracting?	Learning Targets:Students will be able to solve systems of equations usinng matrices.
Topic 1:Introduction to matrices	Length:1 day
Lesson Frame:	We will add, subtract, and begin to multiply matrices.
	I will look for and make use of structure while working with matrices.
Performance Tasks: Students will be able to add, subtract, and multiply matrices.	Notes:
Topic 2:Matrix multiplication	Length:2 days
Lesson Frame:	We will use matrix multiplication to solve problems.
	I will look for and make use of structure in order to multiply matrices.
Performance Tasks: Students will be able to multiply a vector by a matrix.	Notes:
Topic 3:Determinants and inverse matrices	Length:2 days
Lesson Frame:	We will calculate the determinant and inverse of a matrix by hand and with a graphing calculator.
	I will make sense of problems and persevere in solving them using a graphing calculator.
Performance Tasks: Students will be able to calculate the determinant.	Notes:
Topic 4:Solving systems using matrix equations	Length:2 days
Lesson Frame:	We will consider whether or not the inverse of a matrix exists.
	I will look for and make use of structure to see if an inverse of a matrix exists.
Performance Tasks: Students will be able to write systems of equations as matrix equations.	Notes:
Topic 5:Linear transformations	Length:1 day
Lesson Frame:	We will use matrices to perform linear transformations.
	I will look for and make use of structure to transform things linearly.
Performance Tasks: Students will be able to perform linear transformations.	Notes:
Topic 6:Compositions of transformations	Length:1 day
Lesson Frame:	We will use matrices to combine linear transformations.
	I will look for and express regularity in repeated reasoning when combining linear transformations.
Performance Tasks: Students will be able to combine linear transformations.	Notes:
Topic 7:Properties of linear transformations	Length:1 day
Lesson Frame:	We will investigate properties of linear transformations.
	I will look for and make use of the structure of linear transformations.
Performance Tasks: Students will be able to identify properties of linear transformations.	Notes:

Unit Conics and parametric functions	Length:16 days		
Standards:M.F.IF.C.10M.G.GPE.A.3	Outcomes:Students will use formal definitions and properties of conic sections to determine their equations.		
Essential Questions:How does an ellipse connect to your everyday life?	Learning Targets:Students will be able to identify conic sections from their equations.		
Topic 1:Circles and completing the square	Length:1 day		
Lesson Frame:	We will practice completing the square by writing the equation of a circle.		
	I will look for and make use of structure while writing the equation of a circle.		
Performance Tasks: Students will be able to derive the equation of a circle.	Notes:		
Topic 2:Ellipses	Length:2 days		
Lesson Frame:	We will write the equation of an ellipse given the foci.		
	I will attend to precision while writing equations of an ellipse.		
Performance Tasks: Students will be able to derive the equation of an ellipse.	Notes:		
Topic 3:Hyperbolas	Length:2 days		
Lesson Frame:	We will use the foci and the difference in distances to write the equation of a hyperbola.		
	I will reason abstractly and quantitativley in order to write the equation of a hyperbola.		
Performance Tasks: Students will be able to derive the equation of an hyperbola.	Notes:		
Topic 4:Parabolas	Length:2 days		
Lesson Frame:	We will write the equation of a parabola given the focus and directrix.		
	I will look for and make use of the structure of a parabola in order to write its equation.		
Performance Tasks: Students will be able to derive the equation of a parabola.	Notes:		
Topic 5:Identifying and graphing conic sections	Length:1 day		
Lesson Frame:	We will identify where a graph of an equation is a circle, ellipse, parabolca, or hyperbola using its equation.		
	I will look for and make use of structure to identify the type of graph given the equation.		
Performance Tasks: Students will be able to complete the square in order to write an equation in standard form.	Notes:		
Topic 6:Parametrically defined functions	Length:1 day		
Lesson Frame:	We will be introduced to parametric equations.		
	I will look for and make use of structure to identify parametric equations.		
Performance Tasks: Students will be able to use parametric equations.	Notes:		
Topic 7:Applications of parametrically defined functions	Length:2 days		
Lesson Frame:	We will solve real world problems involving parametric equations.		
	I will reason abstractly and quantitatively while solving real world parametric equations.		
Performance Tasks: Students will be able to solve problems involving parametric equations.	Notes:		
Topic 8:Conic sections in parametric form	Length:1 day		
Lesson Frame:	We will use rectangular form in order to rewrite parametric equations.		
	I will look for and make use of structure in order to rewrite parametric equations.		
Performance Tasks: Students will be able to rewrite parametric equations representing conic sections.	Notes:		

Unit Polar functions and complex numbers	Length:16 days
Standards:M.N.CN.B.6,M.N.CN.A.3,M.N.CN.B.4M.N.CN.B.5	Outcomes:Students will plot points and graph equations using polar coordinates.
Essential Questions:Which operations are more or less efficient when working with comp	Learning Targets:Students will be able to work with complex numbers in both standard and polar form.
Topic 1:Plotting polar coordinates	Length:1 day
Lesson Frame:	We will plot points using polar coordinates.
	I will look for and make use of structure in order to plot points using polar coordinates.
Performance Tasks: Students will be able to plot polar coordinates.	Notes:
Topic 2:Graphs of polar functions	Length:2 days
Lesson Frame:	We will graph polar functions.
	I will look for and express regularity in repeated reasoning while graphing polar functions.
Performance Tasks: Students will be able to graph polar functions.	Notes:
Topic 3:Families of polar functions	Length:2 days
Lesson Frame:	We will group a variety of polar functions into families.
	I will make use of structure while grouping polar functions.
Performance Tasks: Students will be able to identify a varity of polar functions.	Notes:
Topic 4:Converting between polar and rectangular forms	Length:2 days
Lesson Frame:	We will convert between polar and rectangular forms.
	I will look for and make use of structure while converting between forms.
Performance Tasks: Students will be able to convert between polar and rectangular forms.	Notes:
Topic 5:Using the complex plane	Length:1 day
Lesson Frame:	We will be introduced to the basics of graphing simple complex numbers.
	I will use appropriate tools strategically while graphing complex numbers.
Performance Tasks: Students will be able to graph basix complex numbers.	Notes:
Topic 6:Operations with complex numbers geometrically	Length:1 day
Lesson Frame:	We will use conjugates to determine moduli and quotients of complex numbers.
	I will look for and make use of structure while representing operations with complex numbers.
Performance Tasks: Students will be able to represent operations with complex number geometrically.	Notes:
Topic 7:Polar form of complex numbers	Length:1 day
Lesson Frame:	We will represent complex numbers in a variety of ways.
	I will look for and make use of structure in order to show complex numbers in a variety of forms.
Performance Tasks: Students will be able to represent complex numbers in polar and rectangular forms.	Notes:
Topic 8:Operations with complex numbers in polar form	Length:1 day
Lesson Frame:	We will be given complex numbers in polar form and we will multiply them.
	I will reason abstractly and quantitatively as I multiply complex numbers.
Performance Tasks: Students will be able to multiply and divide complex numbers.	Notes:
Topic 9:Powers and roots of complex numbers	Length:2 days
Lesson Frame:	We will compute powers and roots of complex numbers.
	I will attend to precision as I compute powers and roots of complex numbers.
Performance Tasks: Students will be able to computer powers and roots.	Notes:

Unit Series and statistics	Length:16 days
Standards:M.A.APR.C.5M.A.SSE.A.2M.A.SSE.B.4M.SP.MD.A.1,M.SP.MD.A.2,M.SP.MD.A.3,M.SP.MD.A.4,M.SP.MD.B.5	Outcomes:Students will evaluate sums of a series.
Essential Questions:Will this work for an arithmetic/geometric series?	Learning Targets:Students will be able to calculate the mean and expected value of a discrete random variable.
Topic 1:Arithmetic series	Length:1 day
Lesson Frame:	We will develop a formula for the sum of an arithmetic sequence.
	I will look for and make use of structure while finding the sum of an arithmetic sequence.
Performance Tasks: Students will be able to find the sum of an arithmetic sequence.	Notes:
Topic 2:Geometric series	Length:1 day
Lesson Frame:	We will develop a formula for the sum of an geometric sequence.
	I will look for and make use of structure while finding the sum of an geometric sequence.
Performance Tasks: Students will be able to find the sum of a geometric sequence.	Notes:
Topic 3:Infinite geometric series	Length:1 day
Lesson Frame:	We will develop a formula for the sum of an infinite geometric sequence.
	I will look for and make use of structure while finding the sum of an infinite geometric sequence.
Performance Tasks: Students will be able to find the sum of a infinite geometric sequence.	Notes:
Topic 4:Applications of geometric series	Length:2 days
Lesson Frame:	We will solve every day problems involving geometric series.
	I will make sense of geometric series problems and persevere in solving them.
Performance Tasks: Students will be able to solve problems involving geometric series.	Notes:
Topic 5:The sum of harmonic series	Length:1 day
Lesson Frame:	We will show that the harmonic series has an infinite sum.
	I will reason abstractly and quantitiatively to show the sum of a harmonic series.
Performance Tasks: Students will be able to identify the sum of a haromic series.	Notes:
Topic 6:The binomial theorem	Length:2 days
Lesson Frame:	We will apply Pascal's triangle and the binomial theorem in order to expand binomials.
	I will look for and make use of structure in order to expand binomials.
Performance Tasks: Students will be able to expand binomials.	Notes:
Topic 7:Binomial probabilities	Length:1 day
Lesson Frame:	We will calculate binomial probabilities.
	I will look for and make use of structure in order to calculate binomial probabiliities.
Performance Tasks: Students will be able to calculate binomial probabilities.	Notes:
Topic 8:Expected value of a discrete random variable	Length:2 days
Lesson Frame:	We will graph probability distributions associated with random variables.
	I will calculate and interpret the mean and expected value of a discrete random variable.
Performance Tasks: Students will be able to develop the concept of a random variable for discrete random variables.	Notes:
Topic 9:Expected value and decision making	Length:2 days
Lesson Frame:	We will use the expected value to make decisions based on real world problems.
	I will make sense of problems and persevere in solving them.
Performance Tasks: Students will be able to calculate the expected value of a discrete random variable.	Notes:

Unit Precalculus finale	Length:16 days
Standards:M.A.APR.C.5M.A.SSE.A.2M.A.SSE.B.4M.SP.MD.A.1,M.SP.MD.A.2,M.SP.MD.A.3,M.SP.MD.A.4,M.SP.MD.B.5	Outcomes:Students will evaluate limit at infinity and at points using algebraic techniques.
Essential Questions:Why does this order make sense?	Learning Targets:Students will be able to approcimate area under a curve using trapezoids.
Topic 1:A race to infinity	Length:1 day
Lesson Frame:	We will understand the formal meaning of limits.
	I will use dominant terms to evaluate limits to infinity.
Performance Tasks: Students will be able to identify what a domimant term is.	Notes:
Topic 2:Limits to infinity	Length:1 day
Lesson Frame:	We will apply dominant terms to rational functions.
	I will look for and make use of structure while applying dominant terms.
Performance Tasks: Students will be able to apply dominant terms to rational functions.	Notes:
Topic 3:Evaluating limits at a point algebraically	Length:1 day
Lesson Frame:	We will algabraically solve limits at a point.
	I will make sense of a limit problems and persevere in solving them.
Performance Tasks: Students will be able to evaluate limits at a points.	Notes:
Topic 4:Another look at e	Length:1 day
Lesson Frame:	We will investigate the number e in the inderterminate form.
	I will attend to precision when evaluating with e.
Performance Tasks: Students will be able to understand the number e in a limit.	Notes:
Topic 5:Trapping area with trapezoids	Length:1 day
Lesson Frame:	We will approximate the area of a curve using trapezoids.
	I will attend to precisions while using trapezoids to find the area under a curve.
Performance Tasks: Students will be able to find the area under a curve using trapezoids.	Notes:
Topic 6:Area as a function	Length:1 day
Lesson Frame:	We will develop an etool to approximate the area under a curve.
	I will use appropriate tools strategically to find the area under a curve.
Performance Tasks: Students will be able to express the area under a curve as a function.	Notes:
Topic 7:Going all to pieces:writing an area program	Length:1 day
Lesson Frame:	We will create a calculator program to find the area under the curve.
	I will use appropriate tools strategically to find the area under a curve.
Performance Tasks: Students will be able to write a calculator program to find the area under the curve.	Notes:
Topic 8:Rocket launch	Length:1 day
Lesson Frame:	We will solve everyday problems using function models.
	I will make sense of function model problems and persevere in solving them.
Performance Tasks: Students will be able to solve everyday problems using area function models.	Notes:
Topic 9:Velocity and position graphs	Length:1 day
Lesson Frame:	We will develop connections between two types of graphs.
	I will make sense of problems involving graphs and persevere in solving them.
Performance Tasks: Students will be able to sketch velocity graphs.	Notes:
Topic 10:Instantaneous velocity	Length:2 days
Lesson Frame:	We will use instantaneous velocity to develop slope graphs.
	I will look for and make use of structure to develop slope graphs.
Performance Tasks: Students will be able to develop slope graphs.	Notes:
Topic 11:Slope functions	Length:1 day
Lesson Frame:	We will write slope functions using instantaneous rate.
	I will look for and express regularity in repeated reasoning while writing slope functions.

Unit Precalculus finale	Length:16 days		
Standards:M.A.APR.C.5M.A.SSE.A.2M.A.SSE.B.4M.SP.MD.A.1,M.SP.MD.A.2,M.SP.MD.A.3,M.SP.MD.A.4,M.SP.MD.B.5	Outcomes:Students will evaluate limit at infinity and at points using algebraic techniques.		
Essential Questions:Why does this order make sense?	Learning Targets:Students will be able to approcimate area under a curve using trapezoids.		
Performance Tasks: Students will be able to write slope functions.	Notes:		
Topic 12:The definition of derivative	Length:1 day		
Lesson Frame:	We will define a derivative using the connection between functions and slope functions.		
	I will look for and express regularity in repeated reasoning by making connections between functions and slope functions.		
Performance Tasks: Students will be able to connect a function and its slope function.	Notes:		
Topic 13:Slope and area under a curve	Length:1 day		
Lesson Frame:	We will observe the connection between slope and area under a curve.		
	I will make sense of problems in order to make the connection between slope and area under a curve.		
Performance Tasks: Students will be able to see the connection between slope and area under a curve.	Notes:		