Science: Eighth Grade

The students will develop an understanding of the basic principles of an Integrated Science curriculum. Students will explore such topics as: The Nature of Science (scientific skill review), Astronomy, PA Ecology, Renewable/non-renewable energy resources, and an Introduction to Physical Science. Class structure includes lab/hands-on activities, lecture/notes, formal and informal assessments.

In the spring, all students will partake in the 8th Grade Science PSSA as required by the Federal Elementary /Secondary Education Act.

Course Information:

Frequency & Duration: 43 minutes; 5 periods per week; full year

Text: we have no formal textbook at this time

Note: The units of this curriculum can be presented in any order, since each one is a "self-contained" entity as part of the overall integrated course.

Content: The Nature of Science **Duration:** (4 weeks)

Essential Questions:	What process is used to design an experiment or test a question? What procedures do scientists use to find out more about our world and how it functions? How do scientists solve problems?
Skills:	• Know that indirect and direct observations are used by scientists to study the natural world. • Collect and analyze both qualitative and quantitative data. • Explain the importance of accuracy and precision in making valid measurements. • Know how to apply the scientific method to solve problems. • Be able design and perform experiments.
Instructional/Engagement Activities	
Assessments:	• Provided various lab scenarios, students will make indirect and direct observations to study the natural world. • Provided various lab activities, students will identify testable scientific questions. • Students will collect data/evidence and develop logical conclusions based on their analysis. • Provided lab experiences, students will explain the importance of making accurate and precise measurements.
Resources:	PSSA Science Coach Book Lesson 4 (pp. 50-53), Glossary (175-181) Observation / Inference Activity (ex: Specimen Jars) Scientific Method Lab Activities (ex: Paper Drop, Ball Bounce, Pendulum Lab) Design a controlled experiment activity (ex: Scientific Method Scenarios) Measurement Lab Activity (Finding Mass, Volume, and Density)
Standards:	3.1.8.A9 Science As Inquiry • Know that both direct and indirect observations are used by scientists to study the natural world and universe. • Identify questions and concepts that guide scientific investigations • Formulate and revise explanations and models using logic and evidence • Recognize and analyze alternative explanations and models • Explain the importance of accuracy and precision in making valid measurements

Vocabulary:	**Controlled experiment-** a test of a hypothesis under a set of conditions; **Dependent variable**- the variable that changes because of the manipulated variable; **Hypothesis-** possible explanation for a set of observations; **Independent variable-** the changed variable in an experiment; **Inferring-** Explaining or interpreting observations; **Observing-** Using one or more senses to gather information; **Predicting-** Forecasting what will happen in the future based on past experiences or evidence; **Science-** a way of learning about the natural world; **Scientific law-** what scientists expect to happen every time under a set of conditions; **Scientific theory-** well-tested concept that explains a set of observations; **Technology-** how people change the world around them to meet needs or to solve problems; **Variable-** one of the factors that change an experiment; **Qualitative**-an observation that includes physical characteristics without numbers or measurements; **Quantitative**-observation based on numerical data and/or measurements; **Experiment**-Scientific test; **Experimental Group**- group in an experiment that has the variable applied to it; **Control Group**- the group in an experiment used for comparison; **Data**- information obtained by experimentation

Comments: This unit is open to various lab activities dependent on supply availability, teacher preference, and student ability level.

Content: Energy Flow in an Ecosystem **Duration:** (4 weeks)

Essential Questions:	What are some indigenous plants and animals in PA ecosystems? What are the characteristics of organisms in different trophic levels? How does energy flow support organisms in an ecosystem? How do limiting factors affect carrying capacity in ecosystems?
Skills:	• Identify and classify various examples of PA plants and animals. • Explain the flow of energy within an ecosystem. • Explain the concept of trophic levels. • Identify and explain natural and manmade limiting factors and their effects on PA ecosystems. • Determine the carrying capacities for organisms in an ecosystem.
Instructional/Engagement Activities	
Assessment:	• Students will identify PA plants and animals given a description and/or photograph using a PowerPoint exam. • Given a list of organisms that reside in a PA ecosystem, students will arrange them in the correct trophic levels using the energy flow template to create a poster. • From a list of limiting factors, students will determine whether they are natural or manmade and give evidence of their reasoning. • Given a sectional map of a typical PA ecosystem and a list of PA producers and consumers (with the energy requirements of each), students will determine the carrying capacities for each of the consumers for that ecosystem.
Resources:	PSSA Science Coach book glossary Wildlife Notes (provided by the PA Game Commission) Bill Nye video Biodiversity Teacher generated notes, class assignments, tests
Standards:	4.1.7 C. Explain the flow of energy within an ecosystem. 4.1.7C. Compare and contrast the flow of energy between organisms in different habitats. 4.1.7C. Explain the concept of trophic levels.
Vocabulary:	**Consumer-** an organism that obtains energy by feeding on other organisms; **Decomposer-** an organism that breaks down chemicals from wastes and dead organisms, and returns important materials to the soil and water; **Energy Pyramid-** a diagram that shows the amount of energy that moves from one feeding level to another in a food web; **Food Chain-** a series of events in which one organism eats another and obtains energy; **Food Web-** the pattern of overlapping food chains in an ecosystem; **Producer-** an organism that can make its own food; **Limiting Factor-** any factor in an ecosystem that determines population size; **Carrying Capacity-** the

maximum number of organisms that can live in an ecosystem;
Trophic Level – where an organism "fits" in an energy pyramid;
Carnivore- animals that only eat other animals; **Herbivore-** animals that only eat plants; **Omnivore –** animals that eat both plants and animals;
Ecosystem- the way living things interact with their environment;
Biodiversity- the variety of plants and animals existing in an ecosystem.

Comments: none at this time

Essential Questions:	What are the natural resources that we use to generate power (electricity, transportation, etc.)? Why are fossil fuels and other natural resources considered to be non-renewable? How does the dependency on fossil fuels create environmental problems on both global and local levels? How are PA's ecosystems affected by the harvest of its fossil fuels? What steps has PA made to regulate the harvest of fossil fuels? What evidence exists that supports the idea that burning fossil fuels contribute to global warming and climate change? What alternate sources of renewable energy are available in today's technology? How can using more renewables help to deter negative effects on environmental issues? What are the advantages and disadvantages of using nonrenewable vs. renewable resources in various contexts such as environmental factors, economic factors, political views and public opinion?
Skills:	• Identify, define, and give examples of all available renewable and nonrenewable resources. • List and describe the types of nonrenewable and renewable resources used in PA currently. • Cite evidence that supports the theory of global warming and climate change. • Devise a realistic plan of how to evenly distribute the use of natural resources and alternate forms of energy to make a smooth transition to help solve environmental issues without effecting local and national economic progression. • Compare and contrast alternative sources of energy based on cost and energy efficiency. • Participate in discussions concerning various conservation efforts that can be done as individuals as well as on a larger scale. • Explain how PA is considered a leader in regulating fossil fuel production and is also known as one of the states making great strides in the use of alternate energy resources.
Instructional/Engagement Activities	
Assessments:	• Provided various resources, students will identify various renewable and nonrenewable resources. • Students will list and identify the advantages and disadvantages of using either renewables or nonrenewables in certain circumstances based on the current available technologies. • Given research materials, students will be able to explain how each type of renewable energy resource is used in its proper application. • Students will be able to list and describe evidence for global warming and climate change.

	• Students (in small groups) write talking points to be used in a classroom debate concerning the use of non-renewables vs. renewables. • Students will explain how PA sets regulations to manage the use of fossil fuels in an effort to conserve PA ecosystems.
Resources:	PSSA Science Coach Book Glossary *The Inconvenient Truth (video)* *History Channel: Renewable Energy Resources (video)* *What Are Fossil Fuels? (video)* Teacher generated notes, assignments, tests, etc.
Standards:	3.3.8.A2. Describe renewable and nonrenewable energy resources. 4.3.7 A. Explain how products are derived from natural resources. • Describe the process of converting raw materials to consumer goods. • Differentiate between renewable and nonrenewable resources. 4.3.8. A. Compare and contrast alternative sources of energy.
Vocabulary:	**Biomass Fuels**- produced from living things (leaves, food wastes, manure); **Fuel-** substance that produces energy; **Geothermal Energy**- tapping the heat from Earth's interior to produce electricity; **Hydroelectric Power**- produced from moving water; **Meltdown**- releasing large amounts of radiation into the environment; **Nonrenewable Resources-** fuels that take millions of years to form; **Nuclear Fission**- splitting an atom creates a large amount of energy; **Renewable Resources** fuels that take a relatively short time to replenish; **Solar Energy**- energy produced from the sun **Tidal Power-**using the ocean waves to generate electricity; **Generator**- a device that when spinning a high rates of speed can create an electrical current; **Petroleum (oil)-** a liquid fossil fuel used mainly in transportation; **Coal**-a solid fossil fuel used mainly in manufacturing and power generation; **Natural Gas/Propane**-a gaseous fossil fuel used to generate electricity and in manufacturing; **Wind Power**-using the wind to naturally turn a turbine to generate electricity; **Uranium**- an ore used to make electricity in nuclear power plants; **Photovoltaic-**using the sun's light to make electrons; **wind farm-** a place that has more than one wind turbine generating electricity; **Solar Thermal**-using the heat from the sun to generate power; **Global Warming-** the idea that the Earth's atmosphere is getting thicker from greenhouse gasses causing the overall average temperature of the earth to increase

Content: Energy Resources **Duration:** (3 weeks)

Essential Questions:	What are the natural resources that we use to generate power (electricity, transportation, etc.)? Why are fossil fuels and other natural resources considered to be non-renewable? How does the dependency on fossil fuels create environmental problems on both global and local levels? How are PA's ecosystems affected by the harvest of its fossil fuels? What steps has PA made to regulate the harvest of fossil fuels? What evidence exists that supports the idea that burning fossil fuels contribute to global warming and climate change? What alternate sources of renewable energy are available in today's technology? How can using more renewables help to deter negative effects on environmental issues? What are the advantages and disadvantages of using nonrenewable vs. renewable resources in various contexts such as environmental factors, economic factors, political views and public opinion?
Skills:	• Identify, define, and give examples of all available renewable and nonrenewable resources. • List and describe the types of nonrenewable and renewable resources used in PA currently. • Cite evidence that supports the theory of global warming and climate change. • Devise a realistic plan of how to evenly distribute the use of natural resources and alternate forms of energy to make a smooth transition to help solve environmental issues without effecting local and national economic progression. • Compare and contrast alternative sources of energy based on cost and energy efficiency. • Participate in discussions concerning various conservation efforts that can be done as individuals as well as on a larger scale. • Explain how PA is considered a leader in regulating fossil fuel production and is also known as one of the states making great strides in the use of alternate energy resources.
Instructional/Engagement Activities	
Assessments:	• Provided various resources, students will identify various renewable and nonrenewable resources. • Students will list and identify the advantages and disadvantages of using either renewables or nonrenewables in certain circumstances based on the current available technologies. • Given research materials, students will be able to explain how each type of renewable energy resource is used in its proper application.

	• Students will be able to list and describe evidence for global warming and climate change. • Students (in small groups) write talking points to be used in a classroom debate concerning the use of non-renewables vs. renewables. • Students will explain how PA sets regulations to manage the use of fossil fuels in an effort to conserve PA ecosystems.
Resources:	PSSA Science Coach Book Glossary *The Inconvenient Truth (video)* *History Channel: Renewable Energy Resources (video)* *What Are Fossil Fuels? (video)* Teacher generated notes, assignments, tests, etc.
Standards:	3.3.8. A2. Describe renewable and nonrenewable energy resources. 4.3.7. A. Explain how products are derived from natural resources. • Describe the process of converting raw materials to consumer goods. • Differentiate between renewable and nonrenewable resources. 4.3.8. A. Compare and contrast alternative sources of energy.
Vocabulary:	**Biomass Fuels**- produced from living things (leaves, food wastes, manure); **Fuel-** substance that produces energy; **Geothermal Energy**- tapping the heat from Earth's interior to produce electricity; **Hydroelectric Power**- produced from moving water; **Meltdown**- releasing large amounts of radiation into the environment; **Nonrenewable Resources-** fuels that take millions of years to form; **Nuclear Fission**- splitting an atom creates a large amount of energy; **Renewable Resources** fuels that take a relatively short time to replenish; **Solar Energy**- energy produced from the sun

Content: Intro to Astronomy (The Universe and Stars) **Duration:** (3 weeks)

Essential Question:	Why are models a vital part of understanding the solar system? What is the force of gravity's role in the formation of our universe and objects in space? How and when did the universe form? What are the Goldilocks Conditions? What are galaxies? How does a star form, evolve, and die? How are stars classified?
Skill:	• Recognize and explain the role of gravity as an essential factor in the formation of objects and their positioning after the Big Bang. • Explain the origin and composition of the universe. • Describe the Big Bang. • Determine the likelihood of life existing on a planet/moon/etc. based on its conditions. • Compare/contrast major types of galaxies and define the Milky Way as one of these. • Describe the life cycle of a star. • Describe how nuclear fusion occurs in a star providing it with energy. • Describe how temperature and color of stars are directly related. • Interpret data from an HR diagram comparing absolute brightness and temperature. • Given data, plot stars on an HR Diagram. • Explain measurements and instruments indicating the age of the universe.
Instructional/Engagement Activities	
Assessment:	• Explain the role of gravity as a major factor in the formation of objects in the universe. • Explain how gravity can cause a singularity to form essentially ending the universe as we know it. • Given data, students will compare and classify stars in the universe based on astronomical spectroscopy. • Appropriate utilize an HR diagram to graph and interpret data. • Constellation/Mythology Project • Describe the stages of star cycles. • Compare/contrast the cycle of a large star v. small star. • Describe the different ways in which we can classify a star • Contrast apparent v. absolute brightness
Resources:	Bill Nye *Gravity* video Constellation/Mythology Activity

Standards:	3.3.6. B1. Compare and contrast the size, composition, and surface features of the planets that comprise the solar system as well as the objects orbiting them. Recognize the role of gravity as a force that pulls all things on or near the earth toward the center of the earth and in the formation of the solar system and the motions of objects in the solar system. S8.A.1.1 distinguish between a scientific theory and opinion, explaining how a theory is supported with evidence, or how new data may change existing theories and practices. 3.3.7. B1. Explain how gravity is the major force in the formation of the planets, stars, and the solar system. Describe gravity as a major force in determining the motions of planets, stars, and the solar system. Compare and contrast properties and conditions of objects in the solar system. 3.3.8. B1. Explain how light, measured remotely, can be used to classify objects in the universe 3.3.8. B2. SCALE AND MEASUREMENT Explain measurements and evidence indicating the age of the universe.
Vocabulary:	**Astronomy**- study of the moon, stars, and other objects in space; **Universe**- all of space and everything in it; **Big Bang Theory-** Theory describing how the universe formed 13.8 billion years ago with the explosion of the singularity. **Gravity**- force that pulls objects toward each other; **Extraterrestrial life**- life from beyond Earth; **Friction**- a contact force that opposes the motion of an object; **Light year**- the distance that light travels in one year; **Galaxy**- huge group of single stars, star systems, star clusters, dust and gas bound by gravity; **Constellation**- imaginary patterns of stars; **Black Hole**- an object with gravity so strong that nothing, not even light, can escape it; **Nebula**- a large cloud of gas and dust spread out in immense volume; **White Dwarf**- blue-white core of the star that is left behind and cools **Neutron Star**- remains of high-mass stars; **Protostar**- a contracting cloud of gas and dust with enough mass to form a star; **Supernova**- when a supergiant runs out of fuel and suddenly explodes; **Telescope**- instrument built to observe distant objects by making them appear closer; **Apparent Brightness**- how bright a star appears to us from Earth. **Absolute Brightness**-the true brightness of a star; **Goldilocks Conditions-** the conditions required for life to exist as we know it.

Content: The Sun and Heat Transfer **Duration:** (3 weeks)

Essential Question:	How do we get energy from the Sun? What are the characteristics of a star such as the Sun? How can energy be transferred from one object or system to another? How does energy interact with matter to cause change?
Skill:	• Distinguish the differences in properties of a solid, liquid, and gasses. • Identify the difference of volume and mass of different substances. • Identify how energy is transferred (conduction, convection, radiation) • Explain the effects on the physical and chemical properties of matter during energy transfer • Explain how a change in energy, changes matter. • Demonstrate that heat moves in predictable ways from warmer objects to cooler ones. • Describe and identify the layers and surface features of the Sun. Describe how the features of the Sun can affect Earth.
Instructional/Engagement Activities	
Assessment:	• Given various hands on demonstrations, students will discover how heat/energy is transferred from one object to another. • Students will create a poster to show and describe (in depth at the molecular level) how heat is transferred in an example that they devise on their own. Students can expand on the project with a class demonstration, diorama, or video. • Students will explain how the properties of matter changed during energy transfer. • Written quiz on the layers and features of the Sun that includes a diagram. Written test on the Sun, energy from the Sun, and energy/heat transfer.
Resources:	Student notebook Video on the sun Video on heat transfer
Standards:	3.2.7.A3. 3.2.7B5 3.2.7B6 3.2.7.B3 3.2.8.B3 3.2.6.B4 3.2.8.A4. 3.2.6B6.

Vocabulary:

Helium Core- the center of the Sun where nuclear fusion occurs **Conduction-** the transfer of heat by direct contact **Convection**- the transfer of heat due to density differences in liquid or gas Corona- the largest and outermost layer of the Sun **Density**- the amount of matter in a given volume Nuclear fusion- the process of atoms fusing together creating another element **Photosphere**- the layer of the Sun's atmosphere that gives off visible light **Radiation**- the transfer of heat by electromagnetic waves **Solar Wind**- electrified particles emitted from the Sun at high speed and massive quantities **Sunspots**- dark, cooler areas of the Sun **Temperature**- the degree of hotness or coldness of an object or the environment corresponding to its molecular activity; **Thermometer**- an instrument used for measuring temperature **vacuum-** space empty of all matter

Content: The Moon Duration: (3 weeks)

Essential Question:	What is the Moon and how does it affect life on Earth?
Skills:	• Define what our Moon is and how it came to be our natural satellite. • Describe the surface features and physical characteristics of the Moon. • List the phases of the lunar month and explain the reason for the various phases. • Explain how ocean tides are controlled by the Moon. • Identify key people and events that resulted in exploration of the Moon. • Explain how current technology may be useful in revisiting the Moon in the near future. Describe ways the Moon may be useful to society in the future.
Instructional/Engagement Activities	
Assessments:	• Students will be able to identify and describe various physical structures found on the Moon on a written exam. • Students will demonstrate their knowledge of Moon phases by participating in the "Moon Phase Lab" and will draw each phase as it appears in key points of the lunar month. • Students in small groups will design and plan a 3 month mission to the Moon which includes such topics as transportation, living quarters, necessary equipment, provisions, and power resources. Each group will have the option to present their project ideas via Power Point, poster and model, or any other way they seem fit to support their plan to the student audience.
Resources:	Teacher generates class notes, homework assignments and tests Moon phase lab kit (Moon and Earth models, light bulbs) Clips from Nation Geographic's *Living on the Moon* video Bill Nye, *The Moon* video Research Project Rubric
Standards:	3.3.6.B1. Compare and contrast the size, composition, and surface features of the planets that comprise the solar system as well as the objects orbiting them. Recognize the role of gravity as a force that pulls all things on or near the earth toward the center of the earth and in the formation of the solar system and the motions of objects in the solar system. 43.3.8.A6 MODELS Explain how satellite images, models, and maps are used to identify Earth's resources. S8.A.1.1 distinguish between a scientific theory and opinion, explaining how a theory is supported with evidence, or how new data may change existing theories and practices.
Vocabulary:	**Moon-**any natural satellite that orbits a planet; **maria-** darker areas on the moon's surface that consist of basalt formed from asteroid impacts billions

of years ago; **craters-**large depressions on the moon's surface made from impacts of various object from space: **regolith-**Moon's soil; **moon phase-**part of the moon we see from our perspective from Earth depending on what day of the month it is; **lunar eclipse-**the shadow of Earth on the Moon; **solar eclipse-**the Moon casting a shadow on Earth; **tide-**the ebb and flow of ocean water due to Moon's gravitational pull; **penumbra-**the darkest part of Earth's shadow on the moon; **umbra-**the lighter part of Earth's shadow on the moon during a lunar eclipse; **lunar month-** the amount of time it takes for the Moon to make one complete revolution around Earth; **waxing phase-**the phase of the visible moon when it appears to be growing; **waning phase-**the phase of the visible moon when it appears to be shrinking

Content: Forms of Energy **Duration:** (3 weeks)

Essential Questions:	What are the different forms of energy? How is energy changed from one form to another? (transformed) How does energy affect the motion of an object? How does energy get transferred from one object to another? How do you calculate the amount of energy an object has?
Skills:	• Describe the effect mass, movement, and speed, on kinetic/potential energy. • Calculate the energy an object has or needs to accomplish a task. • Compare kinetic/potential energy. • Identify the three types of potential energy. • Describe energy sources, transfer of, and conversion of energy.
Instructional/Engagement Activities	
Assessments:	• Students will calculate for kinetic energy using $1/2mv^2$ • Students will calculate for potential energy using $m(9.8m/s^2)h$ or weight(h) • Students will describe an object as having kinetic, potential, or both. • Students will explain how an object has elastic, gravitational, or chemical potential energy. • Students will identify energy as being nuclear, electromagnetic (light), mechanical, sound (acoustic), electrical, thermal, or chemical. Students will correctly identify and describe energy transformations in given scenarios .
Resources:	Focus Science packet (Forms of Energy) Video on forms of energy
Standards:	3.2.7.A3. 3.2.8.B3. 3.2.6.B2 3.2.7.B2 3.2.8 B2
Vocabulary:	**Kinetic energy-** energy of motion **Potential energy-** stored energy **Conservation of Energy**- a principle stating that energy cannot be created or destroyed, but can be altered from one form to another; **Energy Transfer**- the conversion of one form of energy into another, or the movement of energy from one place to another; **Mechanical energy-** energy due to an objects movement **Thermal energy (Heat)-** the vibration and movement or

atoms/molecules **Chemical energy**- energy stored in the bonds between atoms/molecules **Nuclear energy**- energy stored in the nucleus of an atom **Acoustic energy**- energy produced by sound waves **Radiant energy**- energy that travels in electromagnetic waves **Electrical energy**- movement of electrons

Content: Objects in the Solar System **Duration:** (3 weeks)

Essential Questions:	What are comets? What is the difference between an asteroid and a meteoroid? What is the difference between a meteor and a meteorite? What was the effect of the Alvarez Asteroid striking the Earth 65mya? Why is it important to study space? What is the Asteroid belt?
Skill:	• Compare/contrast meteoroids, meteors, and meteorites. • Describe how an asteroid could affect geologic processes, weather, and life on Earth. • Describe the characteristics of a comet. • Using knowledge of the inner and outer planets, reason how the asteroid belt formed. • Describe why rocks burn in our atmosphere • Using scientific thought, differentiate between fact/fiction and possible/not possible when watching a "science film" • Describe how objects in space can affect our lives here on Earth.
Instructional/Engagement Activities	
Assessment:	• Written test • Class discussion and write up on Real v. Hollywood Science • Back in Time Activity Part1(Solo) Part2 (collaborate with group) Part 3 (extra credit) • Discussion of Space Adventures (an actual travel agency that specializes in trips to space) • Discussion of NASA's NEO Program
Resources:	Film Armageddon Science text book Student notebook Websites for NASA and Space Adventures
Standards:	S8. D.3.1.2 S8.D.2.1.3
Vocabulary:	**Asteroid belt-** an orbit of rocks found between Mars and Jupiter **Comet-**an object in our solar system with a regular orbit and is made of dust, gas**,** and ice. **crater-** a hole left by the impact of a rock on Earth. **Extinction-** end of life **Friction-** the rubbing of an object against another that produces heat. **Meteor-** a rock from space that burns up completely in Earth's atmosphere **Meteorite**- a rock from space that is too large to burn completely in our atmosphere and strikes the Earth. Nucleus- the solid, center portion of a comet

Content: Force and Newton's Laws **Duration:** (3 weeks)

Essential Questions:	What is force? What is the difference between balanced and unbalanced force? How do you calculate force? What are Newton's Laws? What is gravity? What affects gravity? How/why do objects orbit others in space? How are Newton's Laws applicable to everyday occurrences?
Skill:	• Define force • Calculate net force. • Describe what happens when forces are unbalanced. • Describe Newton's Laws • Calculate force given mass and acceleration. • Describe the law of universal gravitation and how mass and distance have an affect on gravitational pull. • Describe orbital motion as a balance of gravity and inertia and what would happen if one changes. • Given various examples, students will determine which of Newton's laws explains what is happening or what will be happening next.
Instructional/Engagement Activities	
Assessment:	• Hot Wheel Lab (determine how slope affects velocity) • Newton's Cradle lab (discovering Newton's 3rd law of motion) • Calculating net force • Use of demonstrations to prove Newton's Laws of Motion • Calculating force using Newton's 2nd Law of motion. • Describe 2 reasons why a rocket needs less force to leave Earth the further it gets from Earth. • Written exam
Resources:	Student notebook
Standards:	3.2.7.B1. 3.2.8.B1.

Vocabulary:	**Acceleration-** a change in speed and/or direction; **force**- a push or pull **friction**- a contact force that resists the motion of an object; **gravity**- an attractive force between objects **Inertia-** continuous motion of an object keeping the same speed and direction; **mass**- the amount of matter in an object **velocity**-speed and direction of an object; **weight**- a measure of the pull of gravity on an object

Content: Solar System **Duration:** (4 weeks)

Essential Question:	What is a planet? How did the solar system form? What are the characteristics of the planets in our solar system? Do other planets have conditions for life to exist?
Skill:	• Compare/contrast the terrestrial v. the gas giants • Describe the general characteristics and special features associated with each planet and describe why/how these features exist. • Describe the conditions that inhibit mankind from surviving an each other planet. • Given an organism, describe the adaptations it would need to survive on a different planet. • Define day/year and explain why they differ for each planet. • Describe how we came to understand and accept heliocentric over geocentric theory
Instructional/Engagement Activities	
Assessment:	• Adapt an Alien Project • Take home test (given an imaginary planet with a specific location, determine what the likely characteristics of that planet would be including, size, mass, atmosphere, surface, temperature, rings, day, year, moons) • Written exam • Presentation on each planet
Resources:	Student notebook Video on planets Adapt an Alien paper work
Standards:	S8.B.2.1.1 S8.B.2.1.2 S8.D.3.1.3
Vocabulary:	**Day-** the time it takes a planet to spin once on its axis; **greenhouse effect**- the trapping of heat by gases in the atmosphere; geocentric theory- the theory that the Earth is the center of the solar system and the entire universe; **heliocentric theory**- the idea that the Sun is the center of the solar system; **revolution**- the orbiting of one object around another **rotation**- an object spinning on its axis **Year**- the time it takes a planet to orbit its star one time.