SUBJECT: Science	**GRADE: 7th**
Unit Title: Structure and Properties of Matter	**Time Frame:** 6 Weeks

UNIT OVERVIEW
In this unit, we will investigate evidence of a chemical reaction and analyze how atomic and molecular interactions explain the properties of matter that we see and feel.

LRG SKILLS AND DISPOSITIONS	**STEELS/NGSS STANDARDS**
• Collaboration and Teamwork	STEELS: 3.2.6-8.A, 3.2.6-8.B. 3.2.6-8.C, 3.2.6-8.E, 3.2.6-8.F NGSS: MS-PS1-1, MS-PS1-2, MS-PS1-3, MS-PS1-4, MS-PS1-5

COMPETENCIES	**LEARNING TARGETS**
• I can distinguish between all forms of matter that exist as a result of combination or rearrangement of atoms.	• I can develop models to describe the atomic composition of simple molecules and extended structures.(A) • I can develop a model that predicts and describes changes in particle motion, temperature and state of a pure substance when thermal energy is added or removed. (B) • I can gather and make sense of information to describe that synthetic materials come from natural resources and impact society. (C) • I can analyze and interpret data on the properties of the substances before and after the substances interact to determine if a chemical reaction has occurred. (D)
• I can synthesize information to construe how atoms of some substances combine or rearrange to form new substances that have different properties.	• I can develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. (E) • I can undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. (F)

SUBJECT: Science	**GRADE: 7th**
Unit Title: Motion, Forces, and Energy	**Time Frame:** 6 Weeks

UNIT OVERVIEW

In this unit, students will describe physical interactions between objects and within systems of objects and how energy can be transferred from one object or system to another.

LRG SKILLS AND DISPOSITIONS	**STEELS/NGSS STANDARDS**
• Collaboration and Teamwork	STEELS: 3.2.6-8.G, 3.2.6-8.H, 3.2.6-8.I 3.2.6-8.J NGSS: MS-PS2-1, MS-PS2-2, MS-PS2-4

COMPETENCIES	**LEARNING TARGETS**
• I can construct an explanation and use examples that a change in motion of interacting objects can be explained and predicted by forces. • I can construct an explanation using examples showing all forces between objects, regardless of size or direction, arise from only a few types of interactions. • I can construct an explanation on how energy can be modeled as either motions of particles or as being stored in force fields. • I can create a model that shows the total energy in any system is always equal to the total energy transferred into or out of the system.	• I can apply Newton's Laws of Motion to design a solution to a problem involving the motion of two colliding objects. (G) • I can plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. (H) • I can ask questions about data to determine the factors that affect the strength of electric and magnetic forces. (I)

• I can develop a model demonstrating that forces between objects can result in transfer of energy between these objects. • *" I can proficiently utilize fundamental principles of physics, such as Newton's Laws of Motion and the concepts of force, mass, and energy, to analyze and solve complex problems involving motion, interactions, and energy transformations." (G-S)* • *"I can use Newton's Laws to solve problems with objects colliding, plan tests to show how force and mass impact motion, and ask questions about data to understand electric and magnetic force strength." (G-I)*	
• *"I can explain why objects are attracted to each other due to gravity, based on their masses. I can also investigate and judge experiments that show fields exist between objects exerting forces, read graphs to understand how an object's mass and speed affect its kinetic energy, and create models to show how potential energy changes when objects interact from a distance." (J-S)*	• I can construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. (J) • I can conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. (K) • I can construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass and speed of an object. (L) • I can apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (M) • I can plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in average kinetic energy of particles as measured by the temperature of his sample. (N) • I can construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from an object. (O) • I can develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. (P) • I can use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in the wave. (Q)

	• I can develop and use a model to describe how waves are reflected, absorbed, or transmitted through various materials. (R) • I can integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. (S)

SUBJECT: Science	**GRADE: 7th**
Unit Title: Cells and Heredity	**Time Frame:** 4 Weeks
UNIT OVERVIEW	
In this unit, students will explain the ways cells contribute to the function of living organisms and how living organisms pass traits from one generation to the next.	
LRG SKILLS AND DISPOSITIONS	**STEELS/NGSS STANDARDS**
• Collaboration and Teamwork	STEELS: 3.1.6-8.A, 3.1.6-8.B, 3.1.6-8.C, 3.1.6-8.F, 3.1.6-8.G, 3.1.6-8.M, 3.1.6-8.N NGSS: MS-LS1-1, MS-LS1-2, MS-LS1-3, MS-LS1-6, MS-LS1-7, MS-LS3-1, MS-LS3-2
COMPETENCIES	**LEARNING TARGETS**

• I can analyze and synthesize how organisms have characteristic structures that enable functions and behaviors that allow them to grow, reproduce, and die. • I can develop to represent how offspring resemble, but are not identical to, their parents due to traits being passed from one generation to the next via genes. • I can use models to show how variations among individuals of the same species can be explained by both genetic and environmental factors. • *"I can study how organisms' structures drive functions for growth, reproduction, and mortality, depict offspring's traits inherited from parents via genes, and use models to explain variations within species influenced by genetics and environment."*	• I can conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells. (A) • I can develop and use a model to describe the function of a cell as a whole and the ways the parts of cells contribute to the function. (B) • I can use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. (C) • I can use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively. (D) • I can construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. (E) • I can construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and the flow of energy into and out of organisms. (F) • I can develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism (G) • I can develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. (M) • I can develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. (N)

SUBJECT: Science	**GRADE: 7th**
Unit Title: Species Diversity	**Time Frame:** 4 weeks

UNIT OVERVIEW	
In this unit, students will construct explanations for how organisms change over time, in response to the environment, that contribute to the overall biodiversity of living things on Earth.	
LRG SKILLS AND DISPOSITIONS	**STEELS/NGSS STANDARDS**
• Collaboration and Teamwork	STEELS: 3.1.6-8.D, 3.1.6-8.E, 3.1.6-8.F, 3.1.6-8.G, 3.1.6-8.H, 3.1.6-8.I, 3.1.6-8.J 3.1.6-8.K, 3.1.6-8.L,3.1.6-8.M, 3.1.6-8.N, 3.1.6-8.O, 3.1.6-8.P, 3.1.6-8.Q, 3.1.6-8.R, 3.1.6-8.S, 3.1.6-8.T, 3.1.6-8.U NGSS: MS-LS2-4, MS-LS2-5, MS-LS2-6, MS-LS2-7, MS-LS2-8
COMPETENCIES	**LEARNING TARGETS**
• I can provide evidence that characteristic structures, functions, and behaviors of organisms change in predictable ways as they progress from birth to old age (the life cycle). • I can construct meaning of how structures, functions, and behaviors of organisms allow them to obtain, use, transport, and remove the matter and energy needed to live. • I can gather and synthesize how animals have external and internal sensory receptors that detect different kinds of information that then gets processed by the brain. • I can analyze and interpret how ecosystems are complex systems that include both living (biotic) and non-living (abiotic) components that interact with each other. • I can develop a model that shows how matter and the flow of energy within ecosystems occur through interactions among different organisms and between organisms and the physical environment. • *"I can use evidence and reasoning to explain how behaviors and structures impact reproduction and growth, describe photosynthesis, model food transformation, analyze sensory responses, interpret resource effects, predict organism interactions, and explain genetic changes and variations."* • *"I can interpret fossil records and infer evolutionary relationships, analyze technological impacts on traits, use*	• I can use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively. (D) • I can construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. (E) • I can construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (F) • I can develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. (G) • I can gather and synthesize information about how sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. (H) • I can analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (I) • I can construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (J) • I can develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (K)

math to explain natural selection, and evaluate biodiversity solutions."	● I can construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (L) ● I can develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. (M) ● I can develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. (N) ● I can analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. (O) ● I can apply scientific ideas to construct an explanation for anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. (P) ● I can analyze displays of pictorial data to compare patterns of similarities in anatomical structures across multiple species to identify relationships not evident in the fully formed anatomy. (Q) ● I can gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (R) ● I can construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. (S) ● I can use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (T) ● I can evaluate competing design solutions for maintaining biodiversity and ecosystem services. (U)

SUBJECT: Science	**GRADE: 7th**
Unit Title: Earth Science (Fossils and Geology)	**Time Frame:** 3 weeks

UNIT OVERVIEW
In this unit, students will analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

LRG SKILLS AND DISPOSITIONS	**STEELS/NGSS STANDARDS**
• Collaboration and Teamwork	STEELS: 3.3.6-8.B, 3.3.6-8.E NGSS: MS-ESS1-4, MS-ESS2-2
COMPETENCIES	**LEARNING TARGETS**
• I can describe the processes that form rocks and fossils and use them as evidence to infer about life long ago *(time periods and environments)*.	*Formation + Characteristics* • I can describe the properties and formation of igneous, sedimentary, and metamorphic rocks. *Use fossils to infer* • I can explain and apply the Law of Superposition. • I can use index fossils to determine the relative ages of rock layers. • I can use fossils to infer about past environments *(Pennsylvania)*.
• I can analyze the impact of human activity *(choices and actions)* on the environment.	• I can distinguish between material and energy resources based on their uses. • I can classify materials as renewable and nonrenewable resources. • I can apply scientific principles to design a method for monitoring and minimizing human impact on the environment.

SUBJECT: Science	**GRADE: 7th**
Unit Title: Nature of Science	**Time Frame:** 4 Weeks and all year (in all units)

UNIT OVERVIEW
Throughout each unit, students will conduct investigations, construct explanations and design solutions, develop models, interpret data, analyze and communicate information, and engage in argument with evidence.

LRG SKILLS AND DISPOSITIONS	**STEELS/NGSS STANDARDS**
● Collaboration and Teamwork	3.1.7.A 3.1.7.B 3.1.7.C 3.1.7.D , 3.1.7.E, 3.2.7.A 3.2.7.B, 3.2.7.C, 3.7.7.A 3.7.7.B) S8.A.1.1 S8.A.1.1.1, S8.A.1.2, S8.A.2.1.3, S.8.A.2.1.5, S8.A.2.2, S8.A.3 S8A.3.2 S8.A.3.3, S8.B.3.3.1
COMPETENCIES	**LEARNING TARGETS**
● I can think, reason, and explain the way a scientist does.	● I can ask questions and define a problem. ● I can develop and use a model. ● I can plan and carry out an investigation. ● I can analyze and interpret data. ● I can use mathematical and computational thinking. ● I can construct explanations and design solutions. ● I can engage in an argument with evidence. ● I can obtain, evaluate, and communicate information.