Grade 6 Science: Year at a Glance

Unit 1, GROWTH AND DEVELOPMENT OF ORGANISMS						**Instructional days: 24**
Essential question:	How do organisms grow, develop, and reproduce?					
Unit abstract: By the end of this unit, students will understand how the environment and genetic factors determine the growth of an individual organism. They can connect this to the role of animal behaviors in animal reproduction and to the dependence of some plants on animal behaviors for their reproduction. Students will be able to provide evidence to support their understanding of the structures and behaviors that increase the likelihood of successful reproduction by organisms. Students will have opportunities to practice analyzing and interpreting data, using models, conducting investigations, and communicating information. Crosscutting concepts of cause and effect and structure and function support understanding across this topic.						
Performance Expectations Disciplinary Core Ideas		**Learning Goals (Foundation Box)**			**Connections to the CCSS – ELA**	**Connections to the CCSS – Mathematics**
		Disciplinary Core Ideas	**Science and Engineering Practices**	**Crosscutting Concepts**		
MS—LS1-4	Use argument 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.	LS1.B	Engaging in Argument from Evidence	Cause and Effect	RST.6-8.1 RI.6.8 WHST.6-8.1	6.SP.A.2 6.SP.8.4
MS—LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	LS1.B	Constructing Explanations and Designing Solutions	Cause and Effect	RST.6-8.1 RST.6-8.2 WHST.6-8.2	6.SP.A.2 6.SP.8.4
Notes:						

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Unit 2, ECOSYSTEMS						**Instructional days: 25**
Essential questions:	What are the interdependent relationships in ecosystems? How does matter cycle and energy flow in an ecosystem? How does an ecosystem maintain its necessary resources?					
Unit abstract: Upon completion of this unit of study, students will be able to analyze and interpret data, develop models, construct arguments, and demonstrate a deeper understanding of the cycling of matter, the flow of energy, and resources in ecosystems. They will also be able to study patterns of interactions among organisms within an ecosystem. They will consider biotic and abiotic factors in an ecosystem and the effects these factors have on populations. They will also understand that the limits of resources influence the growth of organisms and populations, which may result in competition for those limited resources. The crosscutting concepts of matter and energy, systems and system models, patterns, and cause and effect will be used to support understanding.						
Performance Expectations Disciplinary Core Ideas		**Learning Goals (Foundation Box)**			**Connections to the CCSS – ELA**	**Connections to the CCSS – Mathematics**
		Disciplinary Core Ideas	**Science and Engineering Practices**	**Crosscutting Concepts**		
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	LS2.A	Analyzing and Interpreting Data	Cause and Effect	RST.6-8.1 RST.6-8.7	
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	LS2.A	Constructing Explanations and Designing Solutions	Patterns	RST.6-8.1 WHST.6-8.2 WHST.6-8.9 SL.6.1 SL.6.4	WHST.6-8.5
MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	LS2.B	Developing and Using Models	Scale, Proportion, and Quantity	SL.6.5	6.EE.C.9
Notes:						

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Unit 3 – ECOSYSTEM DYNAMICS, FUNCTIONING AND RESILIENCE **Instructional days: 25**

Essential questions: How do ecosystems change and function over time?
How do humans affect the biodiversity of an ecosystem?
What are possible solutions to problems created by the natural world and the material world?

Unit abstract: In this unit of study, students study patterns of interactions among organisms within an ecosystem. They consider biotic and abiotic factors in an ecosystem and the effects these factors have on a population. They construct explanations for the interactions in ecosystems and the scientific, economic, political, and social justifications used in making decisions about maintaining biodiversity in ecosystems. The crosscutting concept of stability and change supports understanding across this topic. This topic also contains a science and engineering practice.
The focus in this unit is on a two-stage process of evaluating different ideas that have been proposed using a systematic method, such as a tradeoff matrix, to determine which solutions are most promising and testing different solutions, and then combining the best ideas into a new solution that may be better than any of the preliminary ideas.

Performance Expectations Disciplinary Core Ideas		Learning Goals (Foundation Box)			Connections to the CCSS – ELA	Connections to the CCSS – Mathematics
		Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts		
MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	LS2.C	Engaging in Argument from Evidence	Stability and Change	RST.6-8.1 RI.8.8 WHST.6-8.1 WHST.6-8.9	
MS-LS2-5*	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*	LS2.C LS4.D ETS1.B	Engaging in Argument from Evidence	Stability and Change	RST.6-8.8 RI.8.8	MP.4 6.RP.A.3
MS-ETS1.1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	ETS1.A	Asking Questions and Defining Problems		RST.6-8.1 WHST.6-8.8	MP.2 6.EE.A.2
MS-ETS1.3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	ETS1.B ETS1.C	Analyzing and Interpreting Data		SL.6.5	MP.2 6.SP

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Unit 4, FORCES AND MOTION							**Instructional days: 19**
Essential questions:	How can one describe physical interactions between objects and within systems of objects? What is the effect of force on any pair of interacting objects? How is the motion of an object determined?						
Unit abstract: Forces and Motion focuses on helping students understand ideas related to why some objects will keep moving and why objects fall to the ground. Students will be able to apply Newton's third law of motion to related forces to explain the motion of objects. Students are also able to apply an engineering practice and concept to solve a problem caused when objects collide. The crosscutting concepts of system and system models and stability and change serve as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in asking questions, planning and carrying out investigations, designing solutions, engaging in argument from evidence, developing and using models, and constructing explanations and designing solutions, and they are expected to use these practices to demonstrate understanding of the core ideas.							
Performance Expectations Disciplinary Core Ideas		**Learning Goals (Foundation Box)**			**Connections to the CCSS – ELA**	**Connections to the CCSS – Mathematics**
		Disciplinary Core Ideas	**Science and Engineering Practices**	**Crosscutting Concepts**		
MS-PS2-1*	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. *	PS2.A	Constructing Explanations and Designing Solutions	Systems and System Models	RST.6-8.1 RST.6-8.3 WHST.6-8.7	MP.2 6.NS.C.5 6.EE.A.2 7.EE.B.3 7.EE.B.4
MS – PS2-2	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.	PS2.A	Planning and Carrying Out Investigations	Stability and Change	RST.6-8.3 WHST.6-7.7	MP.2 6.EE.A.2 7.EE.B.3 7.EE.B.4
MS-ETS1.1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	ETS1.A	Asking Questions and Defining Problems		RST.6-8.1 WHST.6-8.8	MP.2 7.EE.3
MS-ETS1.2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	ETS1.B	Engaging in Argument from Evidence		RST.6-8.1 RST.6-8.9 WHST.6-8.7 WHST.6-8.9	MP.2 7.EE.3
MS-ETS1.3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	ETS1.B ETS1.C	Analyzing and Interpreting Data		RST.6-8.1 RST.6-8.7 RST.6-8.9	MP.2 7.EE.3
MS-ETS1.4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	ETS1.B ETS1.C	Developing and Using Models		SL.8.5	MP.2 7.SP

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Unit 5, TYPES OF INTERACTIONS **Instructional days: 19**

Essential questions: How can one describe physical interactions between objects and within systems of objects?
What type of interactions occurs between forces?

Unit abstract: In this unit of study, students understand ideas related to why some objects will keep moving, why objects fall to the ground, and why some materials are attracted to each other while others are not. Students apply ideas about gravitational, electrical, and magnetic forces to explain a variety of phenomena including beginning ideas about why some materials attract each other while others repel. In particular, students will develop understanding that gravitational interactions are always attractive but that electrical and magnetic forces can be both attractive and negative. Students also develop ideas that objects can exert forces on each other even though the objects are not in contact, through fields. The crosscutting concepts of cause and effect, system and system models, and stability and change serve as organizing concepts for these disciplinary core ideas. In these performance expectations, students are expected to consider the influence of science, engineering, and technology on society and the natural world. They will demonstrate proficiency in asking questions, planning and carrying out investigations, designing solutions, and engaging in argument.

Performance Expectations Disciplinary Core Ideas		Learning Goals (Foundation Box)			Connections to the CCSS – ELA	Connections to the CCSS – Mathematics
		Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts		
MS-PS2-3	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	PS2.B	Asking Questions and Defining Problems	Cause and Effect	RST.6-8.1	MP.2
MS-PS2-4	Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	PS2.B	Engaging in Argument from Evidence	Systems and System Models	WHST.6-8.1	
MS-PS2-5	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.	PS2.B	Planning and Carrying out Investigations	Energy and Matter	RST.6-8.3 WHST.6-8.7	

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Unit 6, EARTH AND SPACE **Instructional days: 19**

Essential questions: What are patterns in the apparent motion between celestial bodies?
What are the components of the universe?

Unit abstract: In this unit, students formulate an answer to questions such as: "What is Earth's place in the universe? What makes up our solar system and how can the motion of Earth explain seasons and eclipses? How do people figure out that the Earth and life on Earth have changed through time?"
This unit is broken down into three sub-ideas: the universe and its stars, Earth and the solar system, and the history of planet Earth. Students examine the Earth's place in relation to the solar system, the Milky Way Galaxy, and the universe. There is a strong emphasis on a systems approach, using models of the solar system to explain astronomical and other observations of the cyclical patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain the data that support the theories explaining the formation and evolution of the universe. Students examine geosciences data in order to understand the processes and events in Earth's history. The crosscutting concepts of patterns, scale, proportion, and quantity and systems and systems modeling are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models, analyzing data, and constructing explanations and designing solutions, and to use these practices to demonstrate understanding of the core ideas.

Performance Expectations Disciplinary Core Ideas		Learning Goals (Foundation Box)			Connections to the CCSS – ELA	Connections to the CCSS – Mathematics
		Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts		
MS-ESS1-1	Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.	ESS1.A ESS1.B	Developing and Using Models	Patterns	SL.8.5	MP.4 6.RP.A.1
MS-ESS1-2	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	ESS1.A ESS1.B	Developing and Using Models	Systems and Systems Models	SL.8.5	MP.4 6.RP.A.1 6.EE.B.6
MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.	ESS1.B	Analyzing and Interpreting Data	Scale, Proportion, and Quantity	RST.6-8.1 RST.6-8.7	MP.2 6.RP.A.1

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Unit 7, WEATHER AND CLIMATE						**Instructional days: 19**
Essential questions:	How does water cycle through Earth's systems? How do the motions and interactions of air masses affect changes in weather conditions? How do the unequal heating and rotation of the Earth determine regional climates?					
Unit abstract: In this unit, students formulate an answer to questions such as: "How does water influence weather, circulate in the oceans, and shape Earth's surface, and what factors interact and influence weather?" This unit is broken down into three sub-ideas: Earth's large-scale systems interactions, the roles of water in Earth's surface processes, and weather and climate. Students understand how Earth's geosystems operate by modeling the flow of energy and cycling of matter within and among different systems. A systems approach is also important here, examining the feedbacks between systems as energy from the sun is transferred between systems and circulates though the ocean and atmosphere. The crosscutting concepts of cause and effect, systems and system models, and energy and matter are called out as organizing concepts for these disciplinary core ideas. In this unit, students are expected to demonstrate proficiency in developing and using models and planning and carrying out investigations, and they are expected to use these practices to demonstrate understanding of the core ideas.						
Performance Expectations **Disciplinary Core Ideas**		**Learning Goals (Foundation Box)**			**Connections to the CCSS – ELA**	**Connections to the CCSS – Mathematics**
		Disciplinary Core Ideas	**Science and Engineering Practices**	**Crosscutting Concepts**		
MS-ESS2-4	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	ESS2.C	Developing and Using Models	Energy and Matter		
MS-ESS2-5	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.	ESS2.C ESS2.D	Planning and Carrying Out Investigations	Cause and Effect	RST.6-8.1 RST.6-8.9 WHST.6-8.8	MP.2 6.NS.C.5
MS-ESS2-6	Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	ESS2.C ESS2.D	Developing and Using Models	Systems and System Models	SL.8.5	
Notes:						