

# Sixth Grade Science

**Course Description: Semester 1:** Students will spend the first semester discovering that life science focuses on patterns, processes, and relationships of living organisms. Students will also learn about Force and Motion and how it relates and is applied in our society. This semester will focus on: **Molecules to Organisms: Structures and Processes:** This unit addresses how individual organisms are configured and how these structures function to support life, growth, behavior, and reproduction. **Motion and Stability: Forces and Interactions:** This unit will create an understanding that the forces between objects are important for describing how their motions change, as well as for predicting stability or instability in systems at any scale.

## Semester 1

Measurable Learner Objectives:

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
			<b>Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.</b>
			<b>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.</b>
			<b>Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.</b>
			<b>Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.</b>
			<b>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.</b>

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
			<b>Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and type of cells.</b>
			<b>Develop and use a model to describe the function of a cell as a whole and ways part of cells contribute to the function.</b>
			<b>Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.</b>
			<b>Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage memories.</b>
			<b>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 impact on people and the natural environment that may limit possible solutions.</b>
			<b>Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</b>
			<b>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.</b>

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
			<b>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.</b>

**Semester 2:** Students will spend the second semester discovering the energy flow in our world. Whether it is an ecosystem, a star, Earth’s atmosphere, a river, a bicycle, the human brain or a living cell, it has a cycle of energy that helps sustain it. This semester will focus on: **Ecosystems: Interactions, Energy, and Dynamics:** This unit explores organisms’ interactions with each other and their physical environment. This includes how organisms obtain resources, how they change their environment, how changing environmental factors affect organisms and ecosystems, how social interactions and group behavior play out within and among species, and how these factors all combine to determine ecosystem functioning. **Energy:** This unit explores the idea that interactions of objects can be explained and predicted using the concept of transfer of energy from one object or system of objects to another. The total energy within a defined system changes only by the transfer of energy into or out of the system. Students will experiment with kinetic energy, heat energy, electrical energy, and chemical energy in the context of physical and life science.

Measurable Learner Objectives:

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
			<b>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.</b>
			<b>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.</b>
			<b>Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</b>

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
			<b>Develop a model to describe the cycling of matter and flow of energy among living and non-living parts of an ecosystem.</b>
			<b>Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem impacts populations.</b>
			<b>Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.</b>
			<b>Evaluate competing design solutions for maintaining biodiversity and ecosystem services.</b>
			<b>Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.</b>
			<b>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.</b>
			<b>Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.</b>
			<b>Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.</b>

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
			<b>Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</b>
			<b>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.</b>