

MOTION AND STABILITY: FORCES AND INTERACTIONS

Performance Expectation	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
Clarification Statement	Examples of practical problems could include reducing the effects of impact of two objects such as two cars hitting each other, an object hitting a stationary object, or a meteor hitting a spacecraft.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<ol style="list-style-type: none"> 1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions: Constructing explanations (science) and designing solutions (engineering) in 6–8 builds on K–5 experiences and progresses to include designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. <ul style="list-style-type: none"> • Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system. 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information 	<p>FORCES AND MOTION For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). (MS.PS2A.2)</p> <p>DEVELOPING POSSIBLE SOLUTIONS A solution needs to be tested, to prove the validity of the design and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. Models of all kinds are important for testing solutions (MS.ETS1B.2)</p>	<p>SYSTEMS AND SYSTEM MODELS Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems.</p>

EARTH'S SYSTEMS

Performance Expectation	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
Clarification Statement	Emphasis is on the ways water changes its state and location as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<ol style="list-style-type: none"> Asking questions and defining problems Developing and using models: Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. <ul style="list-style-type: none"> Develop a model to describe unobservable mechanisms. Planning and carrying out investigations Analyzing and interpreting data Using mathematics and computational thinking Constructing explanations and designing solutions Engaging in argument from evidence Obtaining, evaluating, and communicating information 	<p>THE ROLES OF WATER IN EARTH'S SURFACE PROCESSES: Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS.ESS2C.a)</p> <p>Global movements of water and its changes in form are propelled by sunlight and gravity. (MS.ESS2C.c)</p> <p>LOUISIANA'S NATURAL RESOURCES Replenishable resources such as groundwater and oxygen are purified by the movement through Earth's cycles. (MS.EVS1A.c)</p>	<p>ENERGY AND MATTER Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter.</p>

FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

Performance Expectation	Construct and use argument(s) based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of survival and successful reproduction of animals and plants respectively.
Clarification Statement	Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, or vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds or creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, or hard shells on nuts that squirrels bury.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<ol style="list-style-type: none"> Asking questions and defining problems Developing and using models Planning and carrying out investigations Analyzing and interpreting data Using mathematics and computational thinking Constructing explanations and designing solutions Engaging in argument from evidence: Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s). <ul style="list-style-type: none"> Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. Obtaining, evaluating, and communicating information 	<p>GROWTH AND DEVELOPMENT OF ORGANISMS Animals engage in characteristic behaviors that increase the odds of reproduction. (MS.LS1B.c) Plants (flowering and non-flowering) reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS.LS1B.d) Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. (MS.LS2D.a)</p>	<p>CAUSE AND EFFECT Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.</p>