



CURRICULUM GRID

NGSS NATIONAL CURRICULUM

Next Generation Science Standards (NGSS)
Year 5 - 5th Grade

Primary goal: content is didactic Content/features are instructional and didactic: Learning of these skills is constantly present in the core usage.	Secondary goal: content is facilitative Content/features are partly instructional, partly facilitative: Learning of these skills is present in the core usage, but require help from teacher or use of lesson plan.	Requires external hardware
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Fifth Grade - Next Generation Science Standards - 5.Structure and Properties of Matter			
5-PS1-3. Make observations and measurements to identify materials based on their properties.		■	
5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.			■
Fifth Grade - Next Generation Science Standards - 3-5.Engineering Design			
3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.		■	
3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.		■	
Fifth Grade - Next Generation Science Standards - 5.Space Systems: Stars and the Solar System			
5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.		■	
5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.		■	
5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.		■	

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Next Generation Science Standards (NGSS)
Year 5 - Middle School

Primary goal: content is didactic Content/features are instructional and didactic: Learning of these skills is constantly present in the core usage.	Secondary goal: content is facilitative Content/features are partly instructional, partly facilitative: Learning of these skills is present in the core usage, but require help from teacher or use of lesson plan.	Requires external hardware
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Middle School Physical Science - Next Generation Science Standards - MS.Waves and Electro-magnetic Radiation			
MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	■		
MS-PS4-3. 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.	■		
MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.		■	
Middle School Earth and Space Sciences - Next Generation Science Standards - MS.Weather and Climate			
MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.		■	
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.		■	
MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.		■	
Middle School Physical Science - Next Generation Science Standards - MS.Chemical Reactions			
MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.		■	
MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.			■
Middle School Life Sciences - Next Generation Science Standards - MS.Matter and Energy in Organisms and Ecosystems			
MS-LS1-6. 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.		■	
Middle School Physical Science - Next Generation Science Standards - MS.Energy			
MS-PS3-1. 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.		■	
MS-PS3-2. 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.		■	
MS-PS3-5. 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.		■	
MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.			■

Middle School Earth and Space Sciences - Next Generation Science Standards - MS.Earth's Systems			
MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.		■	
Middle School Engineering Design - Next Generation Science Standards - MS.Engineering Design			
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.		■	
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		■	
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.		■	
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.			
Middle School Physical Science - Next Generation Science Standards - MS.Forces and Interactions			
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.	■		
MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	■		
MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.		■	
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.		■	
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.		■	

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Next Generation Science Standards (NGSS)
Year 5 - High School

Primary goal: content is didactic Content/features are instructional and didactic: Learning of these skills is constantly present in the core usage.	Secondary goal: content is facilitative Content/features are partly instructional, partly facilitative: Learning of these skills is present in the core usage, but require help from teacher or use of lesson plan.	Requires external hardware
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High School Physical Sciences - Next Generation Science Standards - HS.Structure and Properties of Matter			
HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.		■	
High School Physical Sciences - Next Generation Science Standards - HS.Waves and Electromagnetic Radiation			
HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.		■	
HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy		■	
High School Physical Sciences - Next Generation Science Standards - HS.Energy			
HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.		■	
HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).		■	
HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.		■	
HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.		■	
HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).			■
High School Physical Sciences - Next Generation Science Standards - HS.Forces and Interactions			
HS-PS2-1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration		■	
HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.		■	
HS-PS2-3. Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.		■	
HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.		■	
HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.		■	

High School Life Sciences - Next Generation Science Standards - HS.Matter and Energy in Organisms and Ecosystems			
HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.		■	
High School Engineering Design - Next Generation Science Standards - HS.Engineering Design			
HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.		■	
HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.		■	
HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.		■	