

# 8<sup>th</sup> Grade



## Energy Transfer

**How can energy be transferred from one object or system to another?**

**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.

## Waves & Electromagnetic Radiation

**What are the characteristic properties of waves that enable them to transfer energy?**

**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 PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

**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. (not being tested)

## Matter and Energy in Organisms and Ecosystems

**How do organisms obtain and use matter and energy?**

**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.

**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.

**MS LS2-2** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**MS LS2-4** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**MS LS2-5** Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

**How do matter and energy move through an ecosystem?**

**MS LS1-7** 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.

**MS LS2-3** Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

## Energy Transfer

**How can energy be transferred from one object or system to another?**

**MS PS3-3** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. ( apply to weather and ecosystems unit)

**MS PS3-4** Plan an investigation to determine the relations 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. (apply to weather and ecosystems unit)

# 8<sup>th</sup> Grade



## **Weather & Climate**

### **What factors interact and influence weather and climate?**

**MS ESS2-5** Collect data to provide evidence for how the motions and complex interactions of air masses results 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.

**MS ESS2-1** Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

**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.

## **Human Impact**

### **How can natural hazards be predicted?**

**MS ESS3-2** Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. (related to severe weather events)

### **How do human activities affect Earth systems?**

**MS ESS3-3** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

**MS ESS3-4** Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

## **Engineering Design-Bundled as Appropriate**

**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.

**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.