

Alignment to the Next Generation Science Standards Performance Expectations

The Next Generation Science Standards (NGSS) were developed through a collaborative state-led process. These K-12 science standards are rich in content and practice, and arranged in a coherent manner across disciplines and grades to provide all students an internationally benchmarked science education. The NGSS is based on the Framework for K-12 Science Education developed by the National Research Council. For More information about NGSS and to explore all the standards, go to: <http://www.nextgenscience.org/>. For More information about, and to read the Framework for K-12 Science Education, go to: http://www.nap.edu/catalog.php?record_id=13165#

These alignments are not intended to imply that activities include all content needed to satisfy the specified NGSS performance expectations. Rather, they are intended to provide guidance for how the activities may supplement other materials for fully addressing these performance expectations.

Next Generation Science Standards Performance Expectation	Activity Number									
	1	2	3	4	5	6	7	8	9	10
MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.		.								
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.				.						
MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth 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-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.			.							
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.	.									
MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.										.
MS-ESS2-5. 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-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.							.			

Connections to Climate Literacy: The Essential Principles of Climate Science

Climate Literacy: The Essential Principles of Climate Science presents information that is deemed important for individuals and communities to know and understand about Earth's climate, impacts of climate change, and approaches to adaptation or mitigation. It can serve as discussion starters, launching points for scientific inquiry and promote greater climate science literacy by providing an educational framework of principles and concepts. The Essential Principles can also serve educators who teach climate science as a way to meet content standards in their science curricula.

These connections are not intended to imply that activities include all content needed to fully address the specified Principles. Rather, they are intended to provide guidance for how the activities may supplement other materials for climate science education. For more information and to download a copy of *Climate Literacy: The Essential Principles of Climate Science*, go to: <http://www.globalchange.gov/resources/educators/climate-literacy>

Climate Literacy Essential Principles	Activity Number									
	1	2	3	4	5	6	7	8	9	10
1. The Sun is the primary source of energy for Earth's climate system.	•									
2. Climate is regulated by complex interactions among components of the Earth system.		•	•			•		•	•	•
3. Life on Earth depends on, is shaped by, and affects climate.		•	•			•			•	•
4. Climate varies over space and time through both natural and man-made processes.		•	•			•		•	•	
5. Our understanding of the climate system is improved through observations, theoretical studies, and modeling.				•	•					
6. Human activities are impacting the climate system.			•		•	•	•	•	•	•
7. Climate change will have consequences for the Earth system and human lives.						•	•	•	•	

Connections to Energy Literacy: Essential Principles & Fundamental Concepts for Energy Education

Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education does not seek to identify all areas of energy understanding, but rather to focus on those that are essential for all citizens. Energy concepts are presented that, if understood and applied, will help individuals and communities make informed energy decisions. The Energy Literacy Principles are intended for anyone involved in energy education, and used in formal educational environments, provides direction without adding new concepts to the educator’s curriculum.

These connections are not intended to imply that activities include all content needed to fully address the specified Principles and Concepts. Rather, they are intended to provide guidance for how the activities may supplement other materials for energy education. For more information and to download a copy of Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education, go to: <http://library.globalchange.gov/products/other/energy-literacy-essential-principles-fundamental-concepts-for-energy-education-high-resolution-booklet>

Energy Literacy Essential Principles and Fundamental Concepts	Activity Number									
	1	2	3	4	5	6	7	8	9	10
2. Physical processes on Earth are the result of energy flow through the Earth system.										
2.3 Earth’s weather and climate are mostly driven by energy from the Sun.	•									
2.4 Water plays a major role in the storage and transfer of energy in the Earth system.		•								
2.6 Greenhouse gases affect energy flow through the Earth system.						•		•	•	
2.7 The effects of changes in Earth’s energy system are often not immediately apparent.				•						
3. Biological processes depend on energy flow through the Earth system.										
3.1 The Sun is the major source of energy for organisms and the ecosystems of which they are a part.			•							
3.6 Humans are part of Earth’s ecosystems and influence energy flow through these systems.			•							
4. Various sources of energy can be used to power human activities, and often this energy must be transferred from source to destination.										
4.1 Humans transfer and transform energy from the environment into forms useful for human endeavors.		•								
4.3 Fossil and biofuels are organic matter that contain energy captured from sunlight.						•				
6. The amount of energy used by human society depends on many factors.										
6.2 One way to manage energy resources is through conservation.									•	
7. The quality of life of individuals and societies is affected by energy choices.										
7.3 Environmental quality is impacted by energy choices.						•	•	•	•	