

Simple Solutions

NextGen Science 4

Alignment with DCIs

REVIEW STANDARDS

3-PS2.A: Forces and Motion

- ✦ Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object’s speed or direction of motion.
 - Lessons 6, 9
- ✦ Objects in contact exert forces on each other.
 - Lessons 7, 8

3-PS2.B: Types of Interactions

- ✦ Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart, and, for forces between two magnets, on their orientation relative to each other.
 - Lesson 7

2-PS1.A: Structure and Properties of Matter

- ✦ Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.
 - Lessons 11, 13

2-PS1.B: Chemical Reactions

- ✦ Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.
 - Lesson 12

K-LS1.C: Organization for Matter and Energy Flow in Organisms

- ✦ All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.
 - -Lesson 1, 3, 5, 10, 39

3-ESS2.D: Weather and Climate

- ✦ Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
 - -Lessons 1, 2, 5, 28, 30, 44

2-ESS2.C: The Role of Water in Earth’s Surface Processes

- ✦ Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form
 - -Lessons 15, 16, 29, 45

Science and Engineering Practices: Scientific Investigations Use a Variety of Methods (3-PS2)

- ✦ Science investigations use a variety of methods, tools, and techniques.
 - Lesson 4

4-PS3 ENERGY**PS3.A: Definitions of Energy**

- ✦ The faster a given object is moving, the more energy it possesses. (4-PS3-1)
 - Lesson 16
- ✦ Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)
 - Lessons 16, 17, 22

PS3.B: Conservation of Energy and Energy Transfer

- ✦ Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3)
 - Lessons 18, 21, 22
- ✦ Light also transfers energy from place to place. (4-PS3-2)
 - Lessons 16, 37
- ✦ Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)
 - Lessons 24, 33

PS3.C: Relationship Between Energy and Forces

- ✦ When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)
 - Lessons 18, 21

PS3.D: Energy in Chemical Processes and Everyday Life

- ✦ The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)
 - Lessons 19, 23, 24, 31, 33

ETS1.A: Defining Engineering Problems

- ✦ Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4)
 - Lessons 26, 27, 28

Science and Engineering Practices: Asking Questions and Defining Problems (4-PS3-3)

- ✦ Asking questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
 - Lessons 1, 2

4-PS4 WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER

PS4.A: Wave Properties

- ✦ Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (4-PS4-1)
 - Lessons 34, 36, 43
- ✦ Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)
 - Lesson 34

PS4.B: Electromagnetic Radiation

- ✦ An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)
 - Lessons 37, 38, 39

PS4.C: Information Technologies and Instrumentation

- ✦ Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)
 - Lesson 42

ETS1.C: Optimizing the Design Solution

- ✦ Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3)
 - Lessons 26, 27, 28

Crosscutting Concepts: Patterns (4-PS4-1)

- ✦ Similarities and differences in patterns can be used to sort and classify natural phenomena.
 - Lessons 14, 43

4-LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

LS1.A: Structure and Function

- ✦ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)
 - Lessons 46, 47, 48, 49, 51, 52, 53, 54, 61, 63

LS1.D: Information Processing

- ✦ Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)
 - Lessons 57, 58, 59, 62

4-ESS1 EARTH'S PLACE IN THE UNIVERSE

ESS1.C: The History of Planet Earth

- ✦ Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)
 - Lessons 66, 67, 68, 69, 70

4-ESS2 EARTH'S SYSTEMS

ESS2.A: Earth Materials and Systems

- ✦ Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)
 - Lessons 72, 73, 74, 76, 77

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- ✦ The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)
 - Lessons 82, 83, 84, 86

ESS2.E: Biogeology

- ✦ Living things affect the physical characteristics of their regions. (4-ESS2-1)
 - Lessons 78, 79, 81

4-ESS3 EARTH AND HUMAN ACTIVITY

ESS3.A: Natural Resources

- ✦ Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)
 - Lessons 32, 87, 88, 89, 91, 92, 93, 94

ESS3.B: Natural Hazards

- ✦ A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)
 - Lessons 96, 97, 98, 99, 101

ETS1.B: Designing Solutions to Engineering Problems

- ✦ Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)
 - Lessons 97, 98, 99, 101