

Grade Four

In the primary grades, students developed some simple models that identified the existence of cause and effect relationships for landscape changes, motion, and vision. What mechanisms drive these cause and effect relationships? Grade four students focus on both tangible processes like the erosion of soil and, for the first time, develop abstract concepts like energy. They also seek to explain some processes that are not directly observable such as internal body systems. Table 4.2 shows a sequence of five possible phenomenon-based instructional segments in grade four.

The tool chest of science and engineering practices (SEPs) expands in grade four. Students are able to use more sophisticated measurements and representations of data and then analyze it more thoughtfully. They are also able to construct more complicated pictorial models such as tracing the path of light rays as they reflect off objects. In grade four, students have the geometric reasoning skills to describe and measure angles.

Despite all their growing skills and knowledge, grade four students are still elementary children passionate about discovery and adventure. Teachers should capitalize on this energy by providing opportunities to play with cars or marbles crashing together, build towers, make up secret codes, go outside so that they can collect and observe insects, and play in the sand with stream tables. These concrete experiences allow students to connect their everyday experience to the abstract ideas that they are beginning to master.

Table 4.2. Overview of Instructional Segments for Grade Four



1 Car Crashes

Students investigate the energy of motion and how it transfers during collisions. They ask questions about the factors that affect energy changes during collisions.



2 Renewable Energy

Students investigate different devices that convert energy from one form to another and then design their own device. They obtain information about how we convert natural resources into usable energy and the environmental impacts of doing so.



3 Sculpting Landscapes

Students develop models of how sedimentary rocks form and use them to interpret the history of changes in the physical landscape. They perform investigations of the agents that erode and change landscapes.



4 Earthquake Engineering

Students explore earthquakes from three different perspectives: They use maps to identify patterns about where earthquakes occur on Earth, they develop models that describe waves and apply them to understanding earthquake shaking, and they design earthquake-resistant structures to withstand that shaking.



5 Animal Senses

Students develop a model of how animals see that includes their external body structures, internal body systems, and light, and information processing.

Sources: Duran Ortiz 2011; Leaflet 2004; M. d'Alessio; Figure 1 at <https://www.cde.ca.gov/ci/sc/cf/ch4.asp#link7>. © 2004 Jessica Todd, University of Colorado Boulder, TeachEngineering.org. All rights reserved. Used with permission; Montani 2015