

Lesson: Building Contest for Shake Table			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4	The way to change how something is moving is by giving it a push or a pull, the size of the change is related to the strength of the push or pull. (2-1c)		<p>Make predictions based on observed patterns and not random guessing. (2-4a)</p> <p>Formulate and justify predictions based on cause-and-effect relationships (4-6c)</p>
Grades 5 – 8		Students know that the effects of an earthquake on a region vary, depending on the size of the earthquake, the distance of the region from the epicenter, local geology, and the type of construction in the region (6-1g)	<p>Identify a single independent variable in a scientific investigation and explain how this variable can be used to collect info to answer a question about the results of the experiment (5-6e)</p> <p>Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence. (7-7c)</p>
Grades 9 – 12			

<u>Lesson: Dynamic Plate Puzzle</u>			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4	Objects can be described in terms of the materials they are made of (e.g., clay, cloth, paper) and their physical properties (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, floating, sinking). (K-1a)	Characteristics of mountains, rivers, oceans, valleys, deserts, and local landforms. (K-3a) Students know some changes in the earth are due to slow processes, and some changes are due to rapid processes, such as landslides, volcanic eruptions and earthquakes (4-5A)	
Grades 5 – 8	The velocity of an object must be described by specifying both the direction and speed of the object (8-1d) The buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced (8-8c)	Evidence of plate tectonics is derived from the fit of the continents; the location of earthquakes, volcanoes, and mid-oceanic ridges (6-1a) Major geologic events, such as earthquakes, volcanic eruptions, and mountain building, result from plate motions. (6-1e) Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time. (7-4a)	Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (7-7d)
Grades 9 – 12		Students know the principal structures that form at the three different kinds of plate boundaries (9-12-3b) Features of the ocean floor (magnetic patterns, age, and sea-floor topography) provide evidence of plate tectonics. (9-12-3a) Students know the explanation for the location and properties of volcanoes that are due to hotspots and those that are due to subduction (9-12-3f)	Recognize the usefulness and limitations of models and theories as scientific representations of reality. (9-12-1q) Read and interpret topographic and geologic maps. (9-12-1h) Formulate explanations by using logic and evidence. (9-12-1d)

Lesson: Earth's Interior Structure			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			Use numerical data in describing and comparing objects, events, and measurements (3-4b)
Grades 5 – 8		Students know Earth is composed of several layers: a cold brittle lithosphere, hot convecting mantle, and dense metallic core (6-1b) Know the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system. (8-2g)	Measure and estimate the weight, length, or volume of objects (5-6B)
Grades 9 – 12			

Lesson: Earth Pizza			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			Students describe the relative position of objects by using one reference (e.g. above or below) (K-4c)
Grades 5 – 8			
Grades 9 – 12			

Lesson: Energy Transfer			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4	<p>Objects can be described in terms of the materials they are made of (e.g., clay, cloth, paper) and their physical properties (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, floating, sinking). (K-1a)</p> <p>Students know solids, liquids, and gases have different properties (1-1a)</p> <p>The way to change how something is moving is by giving it a push or a pull, the size of the change is related to the strength of the push or pull. (2-1c)</p>		<p>Students describe the relative position of objects by using one reference (eg above or below) (K-4c)</p> <p>Students describe the relative position of objects by using two references (1-4d)</p>
Grades 5 – 8		Students know Earth is composed of several layers: a cold brittle lithosphere, hot convecting mantle, and dense metallic core (6-1b)	
Grades 9 – 12			

Lesson: Foam Fault Models			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			
Grades 5 – 8		Students know that earthquakes are sudden breaks in the crust called faults (6-1d)	
Grades 9 – 12		Why and how earthquakes occur and the scales used to measure their intensity and magnitude (9-12-3d)	

Lesson: Graphs of Earth's Layers			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			Construct bar graphs to record data, using appropriately labeled axes. (2-4e)
Grades 5 – 8			
Grades 9 – 12			

Lesson: Human Primary and Secondary Waves			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4	Students know energy can be carried from one place to another by waves. (3-1d)		
Grades 5 – 8			
Grades 9 – 12	Students know how to identify transverse and longitudinal waves in mechanical media, such as springs and ropes, and on the earth (seismic waves) (9-12-4b)		

Lesson: Illustration of Energy Carried by Waves			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4	The way to change how something is moving is by giving it a push or a pull, the size of the change is related to the strength of the push or pull. (2-1c) Students know energy can be carried from one place to another by waves. (3-1d)		
Grades 5 – 8	Students know that energy can be carried from one place to another by waves (6-3a) Know how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction. (8-2d)		
Grades 9 – 12	Students know waves carry energy from one place to another (9-12-4a)		

Lesson: It's Your Fault			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4	Students know machines (and faults!) convert stored energy to motion and heat. (3-1c)		
Grades 5 – 8			
Grades 9 – 12			

Lesson: Magnitude versus Intensity			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			
Grades 5 – 8	Students know a force has both direction and magnitude (8-2a)	Students know that the effects of an earthquake on a region vary, depending on the size of the earthquake, the distance of the region from the epicenter, local geology, and the type of construction in the region (6-1g)	
Grades 9 – 12	Wave speed depends on the properties of the medium in which it propagates (9-12-4d)	Why and how earthquakes occur and the scales used to measure their intensity and magnitude (9-12-3d)	Analyze situations and solve problems that require combining and applying concepts from more than one area of science (9-12-1f)

Lesson: Moving With Magnitude			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4	An object's motion can be described by recording the change in position of the object over time. (2-1b)		
Grades 5 – 8			
Grades 9 – 12			

Lesson: Peanut Butter Sandwich Fault			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			Describe the properties of common objects (K-4b)
Grades 5 – 8			
Grades 9 – 12			

Lesson: Plate Tectonics			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			
Grades 5 – 8			
Grades 9 – 12		Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors, such as solar radiation and plate movement. (9-12-6c)	

Lesson: Plate Tectonic Flip Book			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4		Fossils provide evidence about the plants and animals that lived long ago and that scientists learn about the past history of Earth by studying fossils. (2-3d) Students know some changes in the earth are due to slow processes, and some changes are due to rapid processes, such as landslides, volcanic eruptions and earthquakes (4-5A)	
Grades 5 – 8			
Grades 9 – 12			Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena (9-12-1i)

Lesson: Plotting Earthquake Epicenters			
Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			
Grades 5 – 8			Use a variety of print and electronic resources (including WWW) to collect information and evidence as a part of a research project (7-7b)
Grades 9 – 12			

Lesson: San Francisco Bay Area Earthquakes

Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			
Grades 5 – 8		Students know that the effects of an earthquake on a region vary, depending on the size of the earthquake, the distance of the region from the epicenter, local geology, and the type of construction in the region (6-1g)	
Grades 9 – 12		Students know how to analyze published geologic hazard maps of California and know how to use the map's info to identify evidence of geologic events of the past and predict geologic changes in the future (9-12-9d)	

Lesson: Seismic Waves

Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			
Grades 5 – 8			
Grades 9 – 12			Use the appropriate tools and technology to collect and display data (9-12-1a)

Lesson: Slinky™ Demonstration of Primary and Secondary Waves

Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4	Students know energy can be carried from one place to another by waves. (3-1d) Students know machines (and faults!) convert stored energy to motion and heat. (3-1c)		
Grades 5 – 8	Students know that energy can be carried from one place to another by waves (6-3a)		
Grades 9 – 12	Students know how to identify transverse and longitudinal waves in mechanical media, such as springs and ropes, and on the earth (seismic waves) (9-12-4b)		

Lesson: 3-D Earth Structure Model

Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			
Grades 5 – 8			Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (7-7d)
Grades 9 – 12			

Lesson: Tremors and Turtles

Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			Make new observations when discrepancies exist between two descriptions of the same object or phenomenon. (1-4e) Draw pictures that portray some features of the thing being described. (1-4a)
Grades 5 – 8			
Grades 9 – 12			

Lesson: Walk/Run Primary and Secondary Wave Travel Time

Content Area:	Physical Science	Earth Science	Investigation and Experimentation
Grades K – 4			Construct and interpret graphs from measurements. (4-6E) Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results (4-6D)
Grades 5 – 8			
Grades 9 – 12			