



EarthComm: Chapter 2: Plate Tectonics and Your Community

Performance Task: The **Chapter Challenge** asks students to think about how they can use the theory of plate tectonics to help middle school students understand scientific theories. They might want to prepare a PowerPoint presentation, a web page, or a three-panel poster display. The project will need to address: (1) evidence for movement and changes in the geosphere, (2) the flow of matter and energy in the Earth, (3) the nature of the Earth’s interior, (4) how plate tectonics accounts for the features and processes that geoscientists observe in the Earth, and (5) how the theory of plate tectonics developed.

Activity	Description	Earth Science Principles	Durable Materials (class of 40 students)	Consumable Materials (class of 40 students)	Instructional Map
<p>Getting Started, Scenario, Chapter Challenge and Assessment Criteria</p>	<p>Students answer open-ended questions about the movement of the earth’s lithosphere. Students read a description of a teacher teaching plate tectonics. For the Chapter Challenge, students create a plan for helping this teacher. Students develop the criteria for assessing their Chapter Challenge projects.</p>		<p>None needed</p>		<ul style="list-style-type: none"> 1 class period
<p>Activity 1: Taking a Ride on a Lithospheric Plate</p>	<p>Students use data from Global Positioning System (GPS) satellites to determine the direction and speed of motion of the North American Plate. Based on their findings they then predict where their community will be</p>	<ul style="list-style-type: none"> Lithospheric plate movement Sea-floor spreading 	<ul style="list-style-type: none"> 5 USGS 7.5 minute topo maps. Animation of plate movement 10 calculators 10 1 ft-30cm rulers access to: www.agiweb.org/ear 	<ul style="list-style-type: none"> 10 plate motion calculator results 10 1ft-30cm rulers 40 copies of Blackline Master Plate Tectonics 1.1 World Map of Major Lithospheric Plates. 40 copies of Blackline Master Plate 	<ul style="list-style-type: none"> 2 Class Periods Think About It Investigate Part A, as teacher-lead discussion Investigate Part B – students do steps 1 to 3e. Digging Deeper – emphasize lines

Teacher Developed Scope and Sequence – Sample



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	located in the future.		thcomm	Tectonics 1.2 Measurement of Movements at GPS Stations in North America. <ul style="list-style-type: none"> • 40 copies of Blackline Master Plate Tectonics 1.3 The Location and Elevation of GPS Station WES2 over Time. (optional) 	of evidence for plate movement. <ul style="list-style-type: none"> • Preparing for Chapter Challenge
<p>Activity 2:</p> <p>Plate Boundaries and Plate Interactions</p>	Students build a model to simulate sea-floor spreading. Through a though experiment, students learn how crust is created and destroyed at divergent plate boundaries. Students look at a world plate tectonic map to explore the different types of plate boundaries. They then describe the plate tectonic setting of their own community.	<ul style="list-style-type: none"> • Divergent plate boundaries • Convergent plate boundaries • Transform plate boundaries 	<ul style="list-style-type: none"> • 10 1x2x6” Wood pieces • 10 sets of 3/4x8” dowels • 10 Measurement Paper with 1x2x6 stapled. • 10 1 ft-30cm rulers • 3 Maps, “This Dynamic Planet” 	<ul style="list-style-type: none"> • Transparent tape • Roll of fan-folded computer paper • 10 water soluble marker pens • staplers • 10 copies of Blackline Master Plate Tectonics 2.2 Cross Sections Through Subduction Zones. (optional) 	<ul style="list-style-type: none"> • 2 Class Periods • Think About It • Investigate Part A • Investigate Part B – do a teacher-lead discussion • Digging Deeper, questions 1, 2 a-g, and 3. • Preparing for the Chapter Challenge

Teacher Developed Scope and Sequence – Sample



Activity	Description	Earth Science Principles	Durable Materials (class of 40 students)	Consumable Materials (class of 40 students)	Instructional Map
<p>Activity 3: What Drives the Plates?</p>	<p>Students use a variety of liquids to investigate the effects of density on how a material moves and what effects temperature can have on the density of a material. Students then develop a method to determine the density of a variety of rocks. Students complete and experiment to determine the forces that cause the subduction of lithospheric plates</p>	<ul style="list-style-type: none"> • Earth’s layered structure • Thermal convection as the driving force of plate tectonics • Subduction of plates 	<ul style="list-style-type: none"> • 10 sets of Rock Samples - granite, basalt, sandstone • 1 hot plate • 10 – 100mL graduated cylinders • 3 double pan or single pan balances, to be read to +/- 0.1g (or 2 electronic balances) • 10 calculators 	<ul style="list-style-type: none"> • water for displacement • for demo: 30mL pancake syrup 30mL vegetable oil 30 mL Light Karo™ syrup 3 small pieces of balsa wood 	<ul style="list-style-type: none"> • 1-2 Class Periods • Think About It • Investigate Parts A-C as teacher lead discussion/demo • Digging Deeper – help students integrate concepts of flow of matter and energy in the Earth. - Discuss Newton’ Law of Gravity with formula (similar formula comes up in Physics as Columb’s Law) • Preparing for the Chapter Challenge
<p>Activity 4: Effects of Plate Tectonics</p>	<p>Students use maps to discover the relationship between plate tectonics and earthquakes and volcanoes. Students model the rise of magma through the Earth Using honey and</p>	<ul style="list-style-type: none"> • Oceanic trenches • Volcanism at plate boundaries • Hot-spot volcanism • Continental accretion 	<ul style="list-style-type: none"> • Video: “Making of the Himalayas,” NOVA • Demo 1 – 8oz clear glass jar with cap 	<ul style="list-style-type: none"> • 30 mL Honey • 30 mL Vegetable oil • 2 oz Cream Cheese • 2 oz Cheese Spread 	<ul style="list-style-type: none"> • 2 Class Periods • Think About It • Investigate Part A, step 2 as a demo • Students do steps 1 and 3 to 7. See

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	vegetable oil. Students then hypothesize about why volcanoes occur where they do. Students model subduction and accretion using cream cheese and cheese spread.	<ul style="list-style-type: none"> Earthquakes and plate tectonics 	1 – 1x2x8” piece of wood 1 – 2x6x8” piece of wood 1 – 8x16 piece of plastic <ul style="list-style-type: none"> Globes 1 Table knife 		relevant work in Chapter 1. <ul style="list-style-type: none"> Check your understanding # 2 and #3. Relate geographic features to types of plate boundaries. Preparing for the Chapter Challenge
<p>Activity 5:</p> <p>The Changing Geography of Your Community</p>	Students create a series of maps showing the position of the continents has changed over time and also how they may appear 250 million years into the future	<ul style="list-style-type: none"> Paleogeography Development of plate tectonic theory Paleomagnetism 	<ul style="list-style-type: none"> Animation of Continental Drift: http://www.ucmp.berkeley.edu/geology/tectonics.html 	<ul style="list-style-type: none"> 40 copies of Blackline Master Plate Tectonics 5.1 Outline of the Continents. 10 scissors roles of transparent tape 	<ul style="list-style-type: none"> 1-2 Class Periods Think About It Investigate Digging Deeper, #2 and 3, again relate geologic features with types of plate boundaries.
<p>Chapter Challenge</p>					<ul style="list-style-type: none"> 2 Class Periods Report Preparation Class Presentation