

GRADE 7

UNIT 1

GEOLOGY

UNIT 1 – GEOLOGY (SEPUP *Rocks & Minerals* and *Plate Tectonics* Modules)

Time needed: 8-9 weeks

ESSENTIAL QUESTION: What evidence do scientists use to determine the structure of the Earth?

Why do scientists describe Earth as a dynamic system?

How does our knowledge of rocks and minerals provide an understanding of Earth's structure and processes?

Scientists have now modified Wegener's *Continental Drift* ideas into *Plate Tectonics*. What is different?

Key Idea 2:

Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Major Understandings:

PS 2.2a The interior of Earth is hot. Heat flow and movement of material within Earth cause sections of Earth's crust to move. This may result in earthquakes, volcanic eruption, and the creation of mountains and ocean basins.

PS 2.2b Analysis of earthquake wave data (vibrational disturbances) leads to the conclusion that there are layers within Earth. These layers in the crust, mantle, outer core, and inner core have distinct properties.

PS 2.2c Folded, tilted, faulted, and displaced rock layers suggest past crustal movement.

PS 2.2d Continents fitting together like puzzle parts and fossil correlations provided initial evidence that continents were once together.

PS 2.2e The Theory of Plate Tectonics explains how the "solid" lithosphere consists of a series of plates that "float" on the partially molten section of the mantle. Convection cells within the mantle may be the driving force for the movement of the plates.

PS 2.2f Plates may collide, move apart, or slide past one another. Most volcanic activity and mountain building occur at the boundaries of these plates, often resulting in earthquakes.

PS 2.2g Rocks are classified according to their method of formation. The three classes of rocks are sedimentary, metamorphic, and igneous. Most rocks show characteristics that give clues to their formation conditions.

PS 2.2h The rock cycle model shows how types of rock or rock material may be transformed from one type of rock to another.

PS 2.2i Weather describes the conditions of the atmosphere at a given location for a short period of time.

PS 2.2j Climate is the characteristic weather that prevails from season to season and year to year.

PS 2.2k The uneven heating of Earth's surface is the cause of weather.

PS 2.2l Air masses form when air remains nearly stationary over a large section of Earth's surface and takes on the conditions of temperature and humidity from that location. Weather conditions at a location are determined primarily by temperature, humidity, and pressure of air masses over that location.

PS 2.2m Most local weather condition changes are caused by movement of air masses.

PS 2.2n The movement of air masses is determined by prevailing winds and upper air currents.

PS 2.2o Fronts are boundaries between air masses. Precipitation is likely to occur at these boundaries.

PS 2.2p High-pressure systems generally bring fair weather. Low-pressure systems usually bring cloudy, unstable conditions. The general movement of highs and lows is from west to east across the United States.

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General Skills (from NYS Core Curriculum)

- GS 1. follow safety procedures in the classroom and laboratory
- GS 2. safely and accurately use the following measurement tools: metric ruler, balance, stopwatch, graduated cylinder, thermometers, spring scale, voltmeter
- GS 3. use appropriate units for measured or calculated values
- GS 4. recognize and analyze patterns and trends
- GS 5. classify objects according to an established scheme and a student-generated scheme
- GS 6. develop and use a dichotomous key
- GS 7. sequence events
- GS 8. identify cause-and-effect relationships
- GS 9. use indicators and interpret results

Physical Setting Skills (from NYS Core Curriculum)

- PSS1. given the latitude and longitude of a location, indicate its position on a map and determine the latitude and longitude of a given location on a map
- PSS 2. using identification tests and a flow chart, identify mineral samples
- PSS 3. use a diagram of the rock cycle to determine geological processes that led to the formation of a specific rock type
- PSS 4. plot the location of recent earthquake and volcanic activity on a map and identify patterns of distribution
- PSS 5. use a magnetic compass to find cardinal directions
- PSS 6. measure the angular elevation of an object, using appropriate instruments
- PSS 7. generate and interpret field maps including topographic and weather maps
- PSS 8. predict the characteristics of an air mass based on the origin of the air mass
- PSS 9. measure weather variables such as wind speed and direction, relative humidity, barometric pressure, etc.
- PSS 10. determine the density of liquids, and regular- and irregular-shaped solids
- PSS 11. determine the volume of a regular- and an irregular-shaped solid, using water displacement
- PSS 12. using the periodic table, identify an element as a metal, nonmetal, or noble gas
- PSS 13. determine the identity of an unknown element, using physical and chemical properties
- PSS 14. using appropriate resources, separate the parts of a mixture
- PSS 15. determine the electrical conductivity of a material, using a simple circuit
- PSS 16. determine the speed and acceleration of a moving object

This information is provided to help you in your unit planning. The time needed is an average, based on 45-50 minute class periods. Those activities that can be skipped without undue impact on the conceptual flow or skills foundation are marked with an asterisk (*) and were not included in the weekly time blocks.

GRADE 7 **UNIT 1** **GEOLOGY**

		<i>Title/Description</i>	<i>Key Concepts & Processes</i>	<i>Advance Prep Notes to teachers</i>	<i>Teaching periods</i>	<i>Assessment</i>	<i>Alignment to NYS Core Curriculum</i>
SEPUP ROCKS AND MINERALS MODULE							
	12*	Observing Natural Resources Students examine and rank four natural resources from most to least valuable.	Observational skills, natural resources, renewable and nonrenewable resources, using literacy		1-2		GS 4, GS 5 <i>Homework:</i> Research important natural resources in New York state.
WEEK 1	13	Diamond Dilemma Students gather data on an unidentified mineral that appears to be a diamond.	Scientific inquiry, data collection, physical properties, using mathematics	Copy student sheets	1-2		GS 1, GS 4, PSS 2
	14	Analyzing Diamond Data Students compare data on the unidentified mineral to that of four known materials and then identify the sample as fluorite.	Scientific inquiry, physical properties, data analysis	Copy student sheets	1	AQ 5: RE (p. TR-166)	GS 4, PSS 2
	15	Mineral Properties A reading on minerals and their properties introduces the idea that rocks are made of minerals.	Natural resources, minerals, rocks, properties Using literacy	Get index cards, overhead projector; copy student sheets	1-2	Quick Check	PSS 2, GS 4 <i>Homework:</i> What important minerals are found in New York State?
WEEK 2	16	Mineral Identification Students design an investigation to identify an unknown mineral.	Scientific inquiry, minerals, properties, data analysis <i>Extension:</i> Web site, additional mineral tests	Need safety goggles, paper towels, water, overhead projector	2-3	Quick Check Proc: DI (p. TR-162) AQ 3: RE (p. TR-166)	GS1, GS 3, PSS 2
	17*	The Minerals in Rocks Students select and test a single property to determine whether the mineral found in two different rock samples is calcite or quartz.	Scientific inquiry, minerals, rocks, properties, data analysis, use literacy skills	Need safety goggles, paper towels, water; copy student sheets	1-3		GS1, GS 4, PSS 2

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	18* Every Rock Tells a Story Students analyze the content of a fictional newspaper story that describes the alleged discovery of diamonds in a national forest.	Minerals, rocks, relationship between them, use literacy skills <i>Homework:</i> *Can assign for homework if desired.	Copy student sheets	1-2	Quick Check	GS 4, PSS 2
	19 Rock Formation The formation of sedimentary, igneous, and metamorphic rocks is explained in the context of coal, kimberlite, and marble formation.	Igneous rock, sedimentary rock, metamorphic rock, magma, use literacy skills <i>Homework:</i> Prepare for the lab in activity 20	Copy student sheets	1-2	Quick Check	PS2.2g
WEEK 3	20 Identifying Rock Types Students observe and identify rocks as either igneous, sedimentary, or metamorphic.	Igneous rock, sedimentary rock, metamorphic rock,	Copy student sheets	2-3	Procedure: GI (p. TR-170)	PS2.2g
	21* Modeling Rock Layers Students model the formation of sedimentary rock layers.	Sedimentary rocks, modeling, variable, range, using mathematics	Get watches or clocks, overhead projector	1-2		PS2.2g
	22 The Rock Cycle Game Students play a game that models the rock cycle.	Rock cycle, igneous rock, sedimentary rock, metamorphic rock, magma	Get overhead projector; copy student sheets	1-2	AQ 7: UC (p. TR-165)	PS2.2g, PS2.2h Homework: Make up 3 new “earth event” cards for the Rock Cycle Game
	23* Making Minerals Students evaluate data on mined vs. manufactured diamonds and discuss their relative value.	Natural resources, minerals, properties, using literacy skills	Get overhead projector; copy student sheets	1-2	AQ 3: ET (p. TR-167)	PSS 2

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SEPUP PLATE TECTONICS MODULE							
WEEK 4	36	Storing Waste Earthquakes and volcanoes are introduced as students analyze evidence related to the storing of nuclear waste at Yucca Mountain, Nevada.	Observational skills, natural resources, renewable/nonrenewable, Using literacy skills <i>Homework:</i> Do other countries depend on nuclear power? Research this question.	Copy student sheets	2	AQ 2 ET (p. TR-167)	GS 7, GS 8
	37	Volcanic Landforms Students consider the constructive nature of volcanoes as they model the effects of two different kinds of volcanic eruptions.	Scientific inquiry, data collection, physical properties, using literacy skills	Need class set of paper towels, safety goggles, meter sticks (optional); prep the vinegar/baking soda mixtures, and volcano molds	1		PS2.2a, PS2.2g, GS 1, GS 2
	38	Beneath the Earth's Surface Students construct diagrams describing earth's interior before and after they read about volcanoes and earth layers	Volcano, magma, landform, model, using literacy and mathematics	Copy student sheets; need overhead projector, calculators, apple, knife, compasses (optional)	1-2	Quick Check AQ 5 UC (p. TR-165)	PS2.2a, PS2.2b,
WEEK 5	39	Earth Time Students are introduced to the age of the earth as they place important events in earth's history into one of four time periods.	Geological time, paleontologist <i>Extension:</i> Visit the American Museum of Natural History web site (www.amnh.org) to learn more about earth's past.	Copy student sheets; need overhead projector, get self-stick notes (optional)	1-2		GS 7

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	40* The Continent Puzzle Students use puzzle pieces representing the earth's continents to begin to investigate continental drift.	Introduction to continental drift, fossil evidence, geological time, Pangea	Copy student sheet; need overhead projector	1		PS2.2d,GS 4
	41 Continental Drift Students consider the historical development of the idea of continental drift as they evaluate related evidence.	Continental drift, evidence Using literacy. <i>Homework:</i> Can be assigned as homework.	Copy student sheet; need overhead projector	1	Quick Check AQ 3: UC (p. TR-165) AQ 3: SI (p. TR-169)	PS2.2c, PS2.2d,
WEEK 6	42 The Theory of Plate Tectonics Students watch a short video on the history of the theory of plate tectonics, beginning with Wegener's theory of continental drift.	Continental drift, plate tectonics and its relationship to earthquakes, volcanoes, mountains, Using literacy.	Need VCR and TV monitor; copy student sheets	1-2		PS2.2c, PS2.2d, PS2.2e, PS2.2f
	43* Measuring Earthquakes Students model how a seismograph records earthquakes as they explore the relationship between earthquakes and plate boundaries.	Earthquakes, plates, seismogram, seismograph, fault (optional)	Need plain white paper, overhead projector	2-3	Procedure: GI (p. TR-170)	PS2.2a, PS2.2f

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WEEK 7	44	Mapping Plates Students compare the nature and shape of continents vs. plates as they label major plates and use earthquake and volcano data to plot and draw missing plate boundaries.	Continents, plates, lithosphere, risk Using literacy <i>Extension:</i> Visit the SEPUP website (www.sepupplhs.org) to find out more about plate movement.	Need dark-colored markers and light-colored pencils, overhead projector; copy student sheets	1		PS2.2f, PSS 4
	45	Understanding Plate Boundaries Students read about how plate tectonics helps explain earthquakes, volcanoes, and mountain ranges.	Convergent, divergent, transform, subduction, hot spot (optional) Using literacy <i>Homework:</i> Research mountain ranges in New York state.	Copy student sheet	1-2	Quick Check	PS2.2e, PS2.2f
	46*	Convection Currents Students explore the mechanism behind plate motion in convection currents.	Convection current, magma, mantle	Need warm and cold water, paper towels/sponge, overhead projector	1-2		PS2.2b, PS2.2e
WEEK 8	47	Spreading Plates Students use a computer simulation to investigate what happens when earth's plates move apart.	Divergent boundary, plates, lithosphere, mantle, geologic time	Need computers with Internet access, overhead projector; copy student sheet	1	Quick Check	PS2.2a, PS2.2f, GS 8
	48	Other Types of Plate Motion Students use a computer simulation to investigate what happens when earth's plates collide as well as slide past each other.	Convergent, transform, subduction, lithosphere, mantle, geological time	Need computers with Internet access; copy student sheet	1-2	AQ 4: UC (p. TR-165)	PS2.2a, PS2.2f, GS 8

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49	Comparing Site Risk Students draw on their knowledge of the risk of earthquakes and volcanoes to compare storing nuclear waste at three different sites, including Yucca Mountain.	Nuclear waste, earthquakes, volcanoes, risk, evidence, trade-offs Using literacy	Copy student sheets	1-2	AQ 2: ET (p. TR-167)	PS2.2a, PS2.2f
THE FOLLOWING ACTIVITIES ARE OPTIONAL AND INCLUDED IN THE TEACHER'S GUIDE ONLY						
29*	Weathering, erosion and deposition Students read about weathering, erosion and deposition and about the impact of human activity on these processes.	Constructive and destructive processes, weathering, erosion, deposition, human activity and earth processes	Copy student sheets	1-2	AQ2: UC	
58*	The Causes of Climate Students read about more factors affective climate, including the sun's energy.	Climate, sun's energy, oceans, landforms	Get heat lamp (ptional)	1		PS 2.2j
60*	The Changing States of Water Students are introduced to the different forms of water and how they change from one to another.	States of water (solid, liquid, gas), water vapor, clouds, condensation, evaporation, water cycle	Safety goggles, hot plate, plastic bootle, glass beaker, matches, incense, tongs, ice, access to freezer, sheet of black paper; copy student sheets	1-2		PS 2.2o

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62*	Traveling on the Water Cycle Students simulate traveling with water molecules through the water cycle. After completing the simulation, students write a story that describes traveling with their water.	Models, states of water, water vapor, clouds, condensation, evaporation, water cycle, literacy	Get picture of water cycle, one liter container, m9 mL graduated tube: copy student sheets	1-2	AQ 4: SI	PS 2.2o
64*	Earth's Atmosphere Students use a computer simulation to sample air composition, temperature, and pressure at different altitudes above earth's surface.	Layers of atmosphere, atmospheric composition, air pressure, water vapor	Internet access needed, gather calculators, prepare student sheets	1-2		PS 2.2j, 2.2m, 2.2n
66*	Atmosphere and Climate A reading about the relationship between atmosphere and climate.	Atmosphere, wind, atmospheric layers and composition		1	AQ2: UC	PS 2.2j, 2.2m, 2.2n, 2.2o, 2.2p, PSS 8, 9
8*	Measuring Volume Students use two methods – measurement and calculation and water displacement – to determine volume.	Linear measurement, volume, measurement, calculation of volume	Copy student shets, collect calculators, tape markers, various objects to determine volume	1-2	AQ6: UC	PSS 10, 11

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9*	Measuring Mass, Calculating Density Students measure mass and calculate density in order to identify six metal objects.	Density, mass measurement, use of equations	Copy student sheets, collect balances calculators,	1-2	AQ 3e: UC	PSS 10, 11
10*	Density of Unknown Solids Students calculate density in order to identify unknown solids	Writing procedures, determining density, identifying unknowns, using mathematics	Collect at least 16 product labels, calculators, index cards, balances; cop student sheets	2	AQ 1: AD Proc: DI	PSS 10, 11