

GEOLOGY

**Performance Indicators
Essential Questions
Suggested Activities
Suggested Resources**

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Facilitators:

**Niki Horner
Jane Skinner**

GEOLOGY
UNIT I
MAP SKILLS FOR GEOLOGY
(10%)

Performance Indicators

Geological and Topographic Map Interpretations:

- (E) (2.4) a. The student will be able to determine elevation from a topographic map.
- (E) (2.4) b. The student will be able to differentiate landscape features on a topographic map, using a key.
- (I) (2.4) c. The student will be able to identify direction of stream flow on a topographic map, using a key.
- (E) (2.4) d. The student will be able to identify faults on a geologic map.

Essential Questions

1. How can topographic and geologic maps be used?

GEOLOGY

UNIT II EARTH MATERIALS (10%)

Performance Indicators

1. Matter and Minerals:

- (E) (2.2) a. The student will be able to determine the hardness of a mineral using Moh's hardness scale and simple tools.
- (I) (2.4) b. Given a mineral in crystal form and a table of crystal forms, the student will be able to identify the crystal form of the given mineral.
- (E) (1.2) c. The student will be able to recall the parts, location, and charges of the atom.
- (E) (1.2) d. The student will be able to recognize the relationship between chemical bonds and the physical and chemical properties of minerals.
- (I) (1.2) e. The student will be able to calculate the atomic mass units using the formula for the specified mineral with a periodic table.
- (E) (2.2) f. The student will be able to distinguish between metallic and nonmetallic luster of minerals using colored pictures or hand samples.
- (E) (2.4) g. The student will be able to identify an unknown mineral using physical properties and a dichotomous key.
- (E) (2.4) h. The student will be able to recognize the characteristics of a mineral.
- (E) (2.4) i. The student will be able to recognize that rocks are composed of minerals.
- (I) (5.3) j. The student will be able to recognize the economic importance and uses of minerals and rocks.

2. Igneous Rocks and Their Processes of Formation:

- (I) (2.4) a. The student will be able to distinguish the various igneous rock textures: fine grained, coarse-grained, porphyritic, vesicular, glassy, and pegmatitic.
- (E) (2.4) b. The student will be able to determine how igneous rocks are classified using texture and mineral composition and mineral composition tables.
- (E) (2.4) c. The student will be able to determine the formation environment of an igneous rock by its texture.
- (E) (1.2) d. The student will be able to define igneous rock texture.
- (E) (2.4) e. The student will be able to determine the formation of a rock type by correlating temperature regimes to Bowen's reaction series, using Bowen's reactions series table.
- (E) (2.4) f. The student will be able to distinguish between intrusive and extrusive igneous rocks.
- (I) (1.2) g. The student will be able to recognize plutonic bodies: sill, dike, and batholith on a diagram.
- (I) (1.2) h. The student will be able to distinguish among the three types of volcanoes: stratovolcano/composite, shield, and cinder cone.
- (E) (2.4) i. The student will be able to identify the following igneous rocks, using properties and an igneous rock key: rhyolite, granite, obsidian, pumice, and basalt.

3. Sedimentary Rocks and Their Processes:

- (I) (1.2) a. The student will be able to differentiate between clastic/nonclastic sedimentary rocks.
- (I) (2.4) b. The student will be able to match the paleoenvironment to the sedimentary rock type (shale, sandstone, conglomerate, limestone coal, coquina).
- (E) (2.5) c. The student will be able to identify the following sedimentary rocks using physical properties and

sedimentary rock key: shale, sandstone, conglomerate, limestone, coal, and coquina.

- (E) (1.2) d. The student will be able to define the processes of sedimentary rock formation: weathering, transport, deposition, compaction, and lithification.
- (E) (2.4) e. The student will be able to recognize relationship between size and shape to settling rates: clay, silt, sand, pebble, and boulder sized particles.
- (I) (1.2) f. The student will be able to recognize sedimentary rock features: stratification, ripple marks, mudcracks, graded bedding, and fossils.
- (E) (1.2) g. The student will be able to diagram the rock cycle and include the rock types and processes.

4. Metamorphic Rocks and Their Processes:

- (E) (1.2) a. The student will be able to define the two main agents of metamorphism: heat and pressure.
- (E) (2.4) b. The student will be able to distinguish between foliated and non-foliated metamorphic rocks.
- (I) (2.4) c. The student will be able to distinguish between regional and contact metamorphism.

Essential Questions

1. What is an atom?
2. How can minerals be identified?
3. How can igneous rocks be identified?
4. What is the relationship of igneous rocks and their environment?
5. How can sedimentary rocks be identified?
6. What is the relationship to sedimentary rocks and their environment?
7. How can metamorphic rocks be identified?
8. What is the relationship to metamorphic rocks and their environment?

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UNIT III

Fresh Water Landscape

(20%)

Performance Indicators

Fresh Water Landscape Evolution:

- (E) (2.4) a. The student will be able to recognize and distinguish from a series of diagrams or photographs, the stages of stream evolution: youth, maturity, and old age.
- (E) (2.5) b. The student will be able to calculate stream gradient from a topographic map.
- (I) (2.2) c. The student will be able to sequence the processes of karst and cave formation.
- (E) (2.2) d. The student will be able to identify areas of stream deposition and erosion on a diagram.
- (E) (2.2) e. The student will be able to match the following terms to the diagram: oxbow lake, meander, delta, tributary, point bar, floodplain.
- (E) (1.2) f. The student will be able to define groundwater.

Essential Questions

1. What is stream evolution?
2. What are the components of a river?
3. What is groundwater?

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UNIT IV **Geologic Time** (10%)

Performance Indicators

Historical Geology:

- (E) (2.4) a. The student will be able to use the geologic time scale to determine age, durations, and chronological order of events throughout geologic time.
- (I) (1.2) b. The student will be able to define the Law of Faunal Succession.
- (E) (1.2) c. The student will be able to define the Law of Uniformitarianism.
- (E) (2.4) d. The student will be able to sequence a geologic block diagram using the Law of Horizontality, Law of Superpositions, Law of Cross-cutting Relationships, and index fossils.
- (E) (1.2) e. The student will be able describe types of fossilization: molds, casts, petrification, and trace fossils.
- (E) (1.4) f. The student will be able to distinguish between absolute and relative time.
- (I) (5.3) g. The student will be able to identify reasonable and plausible causes for mass extinctions.

Essential Questions

1. What are fossils?
2. What is the geologic time scale?

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UNIT V **Plate Tectonics** (20%)

Performance Indicators

Crustal Deformation Processes:

- (E) (1.3) a. Recognize, identify, and describe the three types of plate boundaries: divergent, convergent, and transform.
- (E) (1.3) b. Identify evidence for plate tectonics: paleomagnetism, fossil record, continental boundaries, and hot spots.
- (E) (1.3) c. Identify the driving mechanism for plate tectonics as convection currents in the mantle.
- (E) (1.2) d. Differentiate among the layers of the earth: crust (oceanic and continental), mantle, and core.
- (E) (2.4) e. Using a map of volcanoes and earthquakes, correlate the features to plate boundaries.
- (E) (1.2) f. Distinguish between anticline and syncline.
- (E) (1.2) g. Identify hanging and foot walls.
- (E) (1.2) h. Distinguish among reverse, normal, and strike-slip faults.
- (I) (1.2) i. Recognize the vertical movements of the earth's crust known as isostasy.

Essential Questions

1. What are plate tectonics?
2. What are the crustal deformation processes and landforms?