

Physical Geography

Unit 1 - Land and Water Forms

Unit 1 introduces students to the first of three components that make up the physical earth – land and water forms, climate, and ecosystems. The unit will help students to examine the constituent parts of the physical environment, forces that created them, patterns in their distribution, and how they influence, and are influenced by, selected human activities.

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Outcomes

SCO 1.1: The student will be expected to demonstrate an understanding that the earth's surface is shaped by building-up forces resulting from tectonic activity, including the following delineations:

- 1.1.1 Explain how compressional forces are caused. (k)
- 1.1.2 Explain how tensional forces are caused. (k)
- 1.1.3 Relate selected plate movements to compressional and tensional forces. (a)
- 1.1.4 Explain how compressional forces create fold mountains. (k)
- 1.1.5 **Differentiate between the terms anticline and syncline. (k)**
- 1.1.6 Explain how tensional forces create a normal fault. (k)
- 1.1.7 **Explain how compressional forces create reverse and overthrust faults. (k)**
- 1.1.8 Explain what causes a volcano to erupt. (k)
- 1.1.9 **Describe the characteristics of an ash-and-cinder cone, a shield cone, and a composite cone. (k)**
- 1.1.10 Conclude how the location of active volcanoes is related to places where plates meet. (a)
- 1.1.11 Describe global patterns in the location of landforms. (k)

Sample Learning/Teaching Strategies

Teachers can have students

- use block diagrams to illustrate how compressional forces cause folding to occur.
- use block diagrams to illustrate how tensional forces cause faulting to occur.
- provide students with a map showing world plates and their direction of movement. Ask them to identify areas where tensional forces exist and areas where compressional forces exist.
- use photos or diagrams to identify examples of an anticline and examples of a syncline.
- use diagrams to illustrate examples of a reverse fault and an overthrust fault.
- label a diagram to identify an ash-and-cinder cone, a shield cone, and a composite cone.
- use a landform map to compare the pattern of mountains and plains in North America with that in South America (see teacher note 1).

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Sample Assessment Strategies

Students could, for example:

- select a mountain system (e.g., the Himalayas) and use a world plates map to determine whether it resulted from tensional forces or from compressional forces.
- identify an anticline and a syncline on a cross-section illustrating a folded region.
- on a series of diagrams showing examples of reverse faults and overthrust faults, correctly label them (see teacher note 2).
- using a world relief map, describe the pattern of landforms.
- on an outline map of the world, indicate the approximate locations of volcanic eruptions for the past decade and describe their location relative to mountain ranges.
- select a flight path over a continent and briefly describe the landforms flown over.

Teacher Notes

- References are made to exercises in the student text (ST) and to the teacher's resource (TR).
- As an introduction to SCO 1.1, it may be helpful to review students' prior knowledge of simple terminology, such as topography, hill, plateau, and plain.
- Refer to "plate Tectonics and Continental Drift" (particularly the moving images of continental drift) in the Geography World website
<http://members.aol.com/bowermanb/101.html>
- "Earthquakes and Volcanoes" in Geography World website features such items as Earthquake of the Day, extensive pictures of Mount St. Helens, a map of the Pacific "ring of fire", and maps of plate tectonics
- The Internet Geography website (*<http://www.geography.learnontheinternet.co.uk>*) has an excellent illustrated section on volcanoes.
- Refer to ST, exercise 6, page 7. (1)
- Refer to ST, exercise 13, page 14. (2)

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Outcomes

SCO 1.2: The student will be expected to demonstrate an understanding of how the process of weathering helps wear down the land, including the following delineations:

- 1.2.1 Distinguish between the terms physical weathering and chemical weathering. (k)
- 1.2.2 Describe the mechanical processes by which physical weathering occurs. (k)
- 1.2.3 Describe the main interactions that result in chemical weathering. (k)
- 1.2.4 **Infer how the relationship between environmental conditions and the rate of physical and chemical weathering. (a)**

Sample Learning/Teaching Strategies

Teachers can have students

- use a series of photographs to illustrate examples of physical and chemical weathering.
- take photos of examples of physical and chemical weathering in the local area. Use a computer applications program (e.g., a photo scanner and PowerPoint) to develop a classroom presentation.
- use examples to explain that physical weathering is accelerated in moist regions with a wide temperature range.
- use examples to explain that chemical weathering is accelerated in hot, moist regions.

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Sample Assessment Strategies

Students can, for example:

- given a list of weathering events, classify each one as either physical weathering or as chemical weathering.
- given a graph showing moisture and temperature conditions, identify a point where physical weathering would be most pronounced.
- given a graph showing moisture and temperature conditions, identify a point where chemical weathering would be most pronounced.

Teacher Notes

- Explain to students that physical weathering is sometimes referred to as mechanical weathering.
- The University of Guelph has an excellent site that provides diagrams to depict processes of physical and chemical weathering; refer to <http://www.uoguelph.ca/~sadura/wearef/wea0.html>

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Outcomes

SCO 1.3: The student will be expected to demonstrate an understanding of how running water acts as an agent of erosion and deposition, including the following delineations:

- 1.3.1 Describe the three stages in the life cycle of a river. (k)
- 1.3.2 State two ways in which water erosion occurs. (k)
- 1.3.3 Examine evidence to determine the life cycle stage of a river. (a)
- 1.3.4 Explain how deltas are formed. (k)
- 1.3.5 **Contrast the terms arcuate delta, digitate delta, and estuarine delta. (k)**

Sample Learning/Teaching Strategies

Teachers can have students

- use photographs to identify characteristics of each stage in the life cycle of a river.
- given an air photograph or topographic map, identify a point where lateral erosion would be pronounced; a point where vertical erosion would be pronounced.
- describe the life cycle stage of a local river.
- draw a diagram to illustrate the features of an arcuate delta, digitate delta, or an estuarine delta.

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Sample Assessment Strategies

Students could, for example:

- given a photograph and/or a topographic map, have students identify the life cycle stage of a river and explain their decision.
- given a contour map of a river, describe a river in terms of its slope, width, straightness of channel, and life cycle stage (see teacher note 1).
- identify an arcuate delta, digitate delta, or an estuarine delta on a topographic map.

Teacher Notes

- A contour map is available in ST, Figure 2.6, page 27. (1)
- The Internet Geography website has a short section on rivers.
- Explain to students that a digitate delta is sometimes referred to as a birds-foot delta.

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Outcomes

SCO 1.4: The student will be expected to demonstrate an understanding of how moving ice acts as an agent of erosion and deposition, including the following delineations:

- 1.4.1 Define the terms outwash plain, terminal moraine, erratic, drumlin, and esker. (k)
- 1.4.2 **Examine evidence for the direction of movement of a continental glacier. (a)**
- 1.4.3 Define the terms cirque, arête, hanging valley, lateral moraine, and terminal moraine. (k)
- 1.4.4 Define the term fiord. (k)

Sample Learning/Teaching Strategies

Teachers can have students

- use a block diagram to describe the features of continental glaciation.
- use a block diagram to describe the features of alpine glaciation.

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Sample Assessment Strategies

Students could, for example.

- identify lateral and terminal moraines from air photos of an alpine region.
- read a literary piece about a hiker or mountain climber and identify features of alpine or continental glaciation.

Teacher Notes

- SCO 1.4 assumes student prior knowledge of glaciers and their movement (e.g., advancing, retreating, remaining stationary).
- Refer to “The Earth’s Land, Water, and Erosion” in the Geography World website.

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Outcomes

SCO 1.5: The student will be expected to demonstrate an understanding that ocean waves and currents change coastlines, including the following delineations:

- 1.5.1 Define the term spit. (k)
- 1.5.2 Define the terms sea cave, sea arch, and stack. (k)
- 1.5.3 Explain how sea caves, sea arches and stacks are formed. (a)
- 1.5.4 **Analyze the processes that result in the “straightening out” of an irregular coastline. (a)**

Sample Learning/Teaching Strategies

Teachers can have students

- use an air photo and sketch a spit and indicate the direction of the dominant and secondary waves.
- sketch examples of coastal features and describe how they were formed.

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Sample Assessment Strategies

Students could, for example.

- analyze photographs or diagrams of a coastline to identify a spit, sea cave, sea arch, and stack.
- given four depictions of the same stretch of coastline, arrange them in their correct order to reflect the correct sequence in the development of selected coastal features (see teacher note 1).

Teacher Notes

- Briefly overview the three processes by which wave action erodes coastlines.
- Refer to the “Waves” section of the Internet Geography website for some basic explanations and animations of coastal erosion.
- Refer to ST, Figure 3.11, pages 48-49. (1)

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Outcomes

SCO 1.6: The student will be expected to demonstrate an understanding of how landforms and water forms influence human activity, including the following delineations:

- 1.6.1 Examine how human activity adapts to landforms and water forms. (a)
- 1.6.2 Examine how humans respond to hazards posed by selected landforms and water forms. (a)
- 1.6.3 Develop a proposal for the economic use of selected landforms or water forms. (i)
- 1.6.4 **Justify a preference for the aesthetic appeal of selected landforms and water forms. (i)**
- 1.6.5 Propose a solution to a threat posed by selected landforms and water forms. (i)

Sample Learning/Teaching Strategies

Teachers can have students

- given a topographic map with two points identified, determine the best route for a highway to link the two locations. Identify building-up and wearing down processes that helped to create this route..
- develop a research project to assess the importance of land and water forms and related processes to economic activity. For example, farming became established in certain areas due to the presence of volcanic soils; tourism resulted from distinctive features created by moving ice; the life cycle of a given river led to the establishment of hydroelectric generation. The project should be supported by related statistical and illustrative material.
- assume the role of a regional planner and examine information (e.g., maps, photos, written descriptions, statistics) for an area. Suggest strategies to develop economic activity that would take advantage of the land and water forms.
- reflect upon their preferences in terms of land and water forms. Assuming that they were to relocate to another area, determine which type of land and water forms would influence their decision. Defend the position.
- analyze a case study about a natural disaster to decide whether a given event may be categorized as a cause, effect, or a human response. The analysis may be charted:

Disaster-Related Event	Cause	Effect	Human Response

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Sample Assessment Strategies

Students can, for example:

- analyze a series of photos depicting different types of land use in a variety of physical settings. The photos used could relate to the use of terraces for farming in mountains; grain farming on a prairie ecosystem; a hydro-electric generating station on a river site; sports fishing on a river; a beach scene showing sunbathers and swimmers; tourists at a site such as the Grand Canyon. Complete the following chart to show that primary activity is shaped to a large extent by the nature of the physical environment.

Photo	Landscape Feature	Land Use	How Landscape Affected Human Activity

- select a poem in which the poet treats some aspect of the natural environment. Write a short paragraph to describe the feelings that the poem evokes and the techniques (e.g., imagery, figurative language, and sound devices) used.
- analyze a case study to examine a threat that the environment is posing; e.g., a possible mass movement of the earth, earthquake, flooding, or coastal erosion. Describe the nature and cause of the threat and develop a plan outlining actions that may be taken to eliminate or reduce the threat.
- develop a web page containing text and photos of landforms and water forms to attract visitors to your local area.

Teacher Notes

- The delineations for SCO 1.7 focus on the upper levels of Bloom's taxonomy of thinking skills. More specifically, the student is expected to engage in analysis, synthesis, and evaluation as they express preferences, develop positions, take a stand for the strategy/activity given.
- SCO 1.7 requires the student to work at the upper levels of Bloom's taxonomy, but also moves students into the affective domain as they make personal judgements or express personal preferences; the shift toward the affective domain can be quite motivating for many students.
- The World Geography website has excellent material on natural disasters, e.g., volcanoes, tsunamis, and earthquakes.
- Refer to the "Fund Raiser" suggestion, TR, page 12.

