The geographically informed person must understand that physical systems create, maintain, and modify the features that constitute Earth’s surface. The physical environment provides the essential background for all human activity on Earth.

Therefore, Standard 7 contains these themes: Components of Earth’s Physical Systems, Earth–Sun Relationships, and Physical Processes.

There are four physical systems: the atmosphere, the biosphere, the hydrosphere, and the lithosphere. These constitute the essential units of the planet’s physical systems. Recognizing the interactions within and among these four components offers insights on how Earth serves as the home of all living things—plants, animals, and humans.

Almost all of Earth’s energy comes from the Sun. The synchronized Earth–Sun relationships are essential for the planet to be habitable and capable of supporting life as we know it. Earth’s position relative to the Sun affects events and conditions in every part of the world. The amount of solar energy a place receives depends on the cyclically changing angles of the Sun’s rays. The seasons result from the tilt of Earth and its revolution around the Sun causing variable heating patterns, and thus significantly influences climate and weather as well as human activity.

The physical processes on Earth create constant change. These processes—including movement in the tectonic plates in the crust, wind and water erosion, and deposition—shape features on Earth’s surface.

Understanding how physical systems work can influence the choices people make about where they live, the types of buildings they construct, the travel networks they develop, and how they generally conduct their lives. Given the uncertain trajectory and effects of global climate change, knowledge about the factors that affect weather and climate is important for both personal and governmental decision-making. Global climate change is a public policy issue that must be addressed by governments, resulting in actions that determine the health, safety, and economic well-being of people across the world. Reasoned and responsible political decisions must derive from a clear understanding of the interactions among Earth’s physical systems, as well as the processes creating them.

Students must understand the effects of physical systems on Earth’s surface. Understanding these themes enables students to see how the changing physical environment is the stage for all human activity.
Components of Earth's Physical Systems

1. There are four components of Earth's physical systems (the atmosphere, biosphere, hydrosphere, and lithosphere)

Therefore, the student is able to:

A. Identify attributes of Earth's different physical systems, as exemplified by being able to
   ▶ Identify different attributes of physical systems in photographs (e.g., sky, clouds, plants, soil, oceans, lakes, mountains).
   ▶ Identify examples of water features on Earth's surface that comprise the hydrosphere (e.g., oceans, rivers, lakes, water vapor, ground water, different types of precipitation).
   ▶ Identify examples of landforms on Earth's surface (e.g., mountains, volcanoes, valleys, plains).

1. The four components of Earth's physical systems (the atmosphere, biosphere, hydrosphere, and lithosphere) are interdependent

Therefore, the student is able to:

A. Identify and describe patterns in the environment that result from the interaction of Earth's physical processes, as exemplified by being able to
   ▶ Identify and describe the connections between ocean circulation system and climate (e.g., North Atlantic Drift and the mild climate of Western Europe, the climatic effects of El Niño or La Niña).
   ▶ Identify and describe the patterns that result from the connections between climate and vegetation (e.g., examples of patterns of ecosystems and biomes).
   ▶ Identify and describe the patterns of physical features that result from erosion and deposition (e.g., estuaries and deltas, canyons, alluvial plains, sand dunes).

B. Analyze and explain patterns of physical features resulting from the interactions of Earth's physical processes, as exemplified by being able to
   ▶ Analyze maps of tectonic plates to predict the location of physical features (e.g., mountain ranges, volcanoes, rift valleys).
   ▶ Analyze the pattern of glacial features as a result of glacial retreat (e.g., moraines, kettle lakes, cirques).
   ▶ Analyze and explain factors influencing precipitation patterns and predict where the patterns will occur (e.g., convectional, orographic, frontal).

Wind, water, and freeze-thaw erosion has resulted in unusual rock formations including the spires or "hoodoos" in Utah's Bryce Canyon National Park.
Essential Element: Physical Systems

GEOGRAPHY STANDARD 7: The physical processes that shape the patterns of Earth’s surface

4th GRADE
the student knows and understands:

Earth – Sun Relationships

2. Earth–Sun relationships affect conditions on Earth

Therefore, the student is able to:

A. Describe how Earth’s position relative to the Sun affects conditions on Earth, as exemplified by being able to

» Describe the relationship between the cycle of seasons and months in the Northern and Southern hemispheres.
» Describe the differences in seasons based on latitude (e.g., first and last frost in different locations, length of growing season, bird migrations).
» Describe the changes in daily sunrise and sunset and length of daylight hours by recording the change in times over the span of the school year.

Physical Processes

3. Physical processes shape features on Earth’s surface

Therefore, the student is able to:

A. Identify examples of physical processes, as exemplified by being able to

» Identify different cycles in Earth’s systems (e.g., water cycle, carbon cycle, wind or water erosion, weathering, deposition, mass wasting).
» Identify the components and relationships in the water cycle.
» Identify the components and relationships in the erosion cycle (e.g., water carving canyons, wind sculpting mesas, landslides, avalanches).

B. Describe how physical processes shape features on Earth’s surface, as exemplified by being able to

» Describe landforms by constructing 3-D physical models and organize the models into groups formed by similar processes.
» Describe the physical processes that shaped particular landform features using pictures of landforms such as canyons, mesas, and deltas.
» Describe how freeze–thaw processes erode rock (e.g., potholes on local streets, rock slides in mountain regions).

8th GRADE
the student knows and understands:

Earth – Sun Relationships

2. Earth–Sun relationships drives physical processes that follow an annual cycle and create patterns on Earth

Therefore, the student is able to:

A. Explain how Earth–Sun relationships drive Earth’s physical processes and create annual patterns, as exemplified by being able to

» Explain the occurrences of weather phenomena in different locations due to annual changes in the Earth–Sun relationship (e.g., hurricanes in the fall in subtropical areas, monsoon rainfall, tornadoes in the mid-latitudes during the spring and summer).
» Explain why the hours of visible sunlight change with seasons (e.g., the equatorial region experiences approximately 12 hours of sunlight year round while places in the Arctic and Antarctic circles vary from 0 to 24 hours of visible sunlight).
» Describe how the angle of the Sun’s rays changes at different latitudes by shining a light directly on the equator of a globe and noting the change in the location (on the tropic lines) and angle of the direct rays as the tilted globe is moved to represent the different seasons.

12th GRADE
the student knows and understands:

Earth – Sun Relationships

2. Earth–Sun relationships are variable over long periods of time resulting in changes in physical processes and patterns on Earth

Therefore, the student is able to:

A. Explain how variability in Earth–Sun relationships affect Earth’s physical processes over time, as exemplified by being able to

» Explain how cyclic changes (e.g., precession or Milankovitch cycle) in Earth’s orbit are responsible for changes in heating that result in climatic changes such as an ice age and glaciation of Earth’s surface.
» Describe the variability in climate over historical periods of time (e.g., over the last 1,500 years or during epochs such as the Pleistocene).
» Explain how changes in sea coral (including current observations and fossil records) are due to sea level rise or fall as a result of climate variability.

Physical Processes

3. Physical processes interact over time to shape particular places on Earth’s surface

Therefore, the student is able to:

A. Analyze and explain the results of interactions of physical processes over time, as exemplified by being able to

» Identify the landforms that comprise much of Bangladesh and explain the physical processes that make the country susceptible to river flooding, monsoon flooding, and cyclonic storms.
» Analyze and explain the landscape of Iceland in terms of physical processes (e.g., volcanism, glaciation, plate tectonics of the mid-Atlantic ridge).
» Compare and contrast the Great Lakes of East Africa and the Great Lakes of North America and describe physical processes that created each of these lake systems.

National Geography Standards, Second Edition
Essential Element: Physical Systems

GEOGRAPHY STANDARD 7: The physical processes that shape the patterns of Earth’s surface

Glaciers, such as the Monacobreen Glacier in Spitzbergen, Svalbard, move and sculpt the land surface resulting in landforms including lakes, valleys, cirques, and moraines.