Earth An Introduction to Physical Geology 11th Edition Tarbuck Test Bank
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Earth: An Introduction to Physical Geology, 11e **(Tarbuck)**
Chapter 1 An Introduction to Geology

1.1 Multiple-Choice Questions

1) Which one of the following is a natural disaster?
A) A hurricane forming in the Atlantic Ocean
B) A landslide striking San Francisco
C) A volcano erupting in the Aleutian Islands
D) An earthquake occurring in the Mojave Desert
Answer: B
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 5 & 7
Section: 1.1 - Geology: The Science of the Earth
Focus/Concepts: 1.1
Earth Science LO: 8.1 - Natural hazards result from natural Earth processes.

2) Which culture recorded the earliest writings about topics such as fossils, earthquakes, and gemstones?
A) Roman Empire
B) Renaissance Europe
C) Ancient China
D) Ancient Greece
Answer: D
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.2 - The Development of Geology
Focus/Concepts: 1.2
Earth Science LO: 7.2 - Geology affects the distribution and development of human populations.

3) Which of the following is **not** a geologic hazard?
A) Poor construction materials resulting in a cracked foundation
B) Volcanic eruptions sending lava flows toward a city
C) Deforestation on a floodplain increasing the severity of river floods
D) Climate change leading to sea level rise
Answer: A
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 5 & 7
Section: 1.1 - Geology: The Science of the Earth
Focus/Concepts: 1.1
Earth Science LO: 8.1 - Natural hazards result from natural Earth processes.

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4) The Principle of _____ states that the physical, chemical, and biological processes at work shaping the Earth today have also operated in the geologic past.
A) Catastrophism
B) Plate Tectonics
C) Creationism
D) Uniformitarianism
Answer: D
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.2 - The Development of Geology
Focus/Concepts: 1.2
Earth Science LO: 1.5 - Earth scientists use their understanding of the past to forecast Earth's future.

5) What is the accepted age of the Earth?
A) 6,000 years
B) 1 million years
C) 4.6 million years
D) 4.6 billion years
Answer: D
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.2 - The Development of Geology
Focus/Concepts: 1.2
Earth Science LO: 2.2 - Our Solar System formed from a vast cloud of gas and dust 4.6 billion years ago.

6) _____ was in important 18^{th} century scientist who developed the idea of Uniformitarianism to explain the slow, steady changes responsible for shaping the Earth.
A) Charles Lyell
B) Isaac Newton
C) James Hutton
D) Charles Darwin
Answer: C
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.2 - The Development of Geology
Focus/Concepts: 1.2
Earth Science LO: 1.5 - Earth scientists use their understanding of the past to forecast Earth's future.

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7) What percentage of the Earth is covered by oceans?
A) 50%
B) 17%
C) 80%
D) 71%
Answer: D
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 5.1 - Water is found everywhere on Earth, from the heights of the atmosphere to the depths of the mantle.

8) Which of the following is **not** one of the jobs of the atmosphere?
A) Energy exchanges between the surface and outer space, creating weather and climate
B) Lessening the effects of weathering on the geosphere
C) Protection from ultraviolet radiation and the intensity of the Sun
D) Providing air for respiratory processes in the biosphere
Answer: B
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 2 & 7
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

9) Which of the four spheres of Earth is the most extensive?
A) Geosphere
B) Atmosphere
C) Hydrosphere
D) Biosphere
Answer: A
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 2
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

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10) What is the date of formation of the universe?
A) 4.6 billion years ago
B) 10 billion years ago
C) 13.7 billion years ago
D) 8.7 billion years ago
Answer: C
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.2 - Our Solar System formed from a vast cloud of gas and dust 4.6 billion years ago.

11) Which of the following materials can be used to make interpretations about the nature and composition of the interior of the Earth?
A) Meteorites
B) Diamond-bearing pipes
C) Slivers of crustal and mantle rocks exposed at the surface
D) All of the above
E) None of the above
Answer: D
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 2 & 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.3 - Earth formed from the accumulation of dust and gas, and multiple collisions of smaller planetary bodies.

12) What is the definition of differentiation?
A) Separation of materials based on density
B) Categorization based on chemical formulas
C) Mixing of materials to produce a new compound
D) Divisions of planets based on constituent materials
Answer: A
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 4.2 - Earth, like other planets, is still cooling, though radioactive decay continuously generates heat.

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13) What is the age of the oldest rocks discovered on the planet?
A) 6,000 years old
B) 4.6 million years old
C) 4 billion years old
D) 4.6 billion years old
Answer: C
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

14) What property of the crust allowed it to form as the exterior of Earth?
A) Magma at the surface cooled and crystallized before anything in the interior
B) Materials that make up the crust are less dense and rose to the top
C) Churning and upheaval in the interior thrust crustal rocks toward the surface
D) Meteorites impacting Earth deposited this material at the surface
Answer: B
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 2
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

15) What provides us with the most information about the interior of the Earth?
A) Borehole data
B) Erupted materials
C) Satellite imagery
D) Seismic energy waves
Answer: D
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 1.4 - Earth scientists must use indirect methods to examine and understand the structure, composition, and dynamics of Earth's interior.

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16) A research team is studying the velocity of seismic waves in various types of rock. Using explosives, they create small explosions to study how fast the energy waves will travel. Using the data below, infer which rocks are higher in density and which are lower in density:

Rock A: 7 km/s
Rock B: 5.9 km/s
Rock C: 7.2 km/s
Rock D: 6.1 km/s
Rock E: 6.25 km/s

A) Rock C
B) Rocks B & D
C) Rocks B, D, & E
D) Rocks A & C
Answer: D
Diff: 2
Bloom's Taxonomy: Analysis
Global Sci Out: 2
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 1.4 - Earth scientists must use indirect methods to examine and understand the structure, composition, and dynamics of Earth's interior.

17) If the temperature in the Earth generally increases with depth, how is it possible that the Inner Core is a solid?
A) Temperatures increase to a certain point before leveling off below the melting point of the core
B) The pressures in the core are immense and keep it in a solid state in spite of the temperature
C) The material the Inner Core is composed of cannot melt at temperatures generated on Earth
D) The Inner Core is shedding the heat so quickly that melting does not have time to occur
Answer: B
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 2 & 7
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 4.2 - Earth, like other planets, is still cooling, though radioactive decay continuously generates heat.

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18) Which layer of the Earth is the thinnest?
A) Crust
B) Mantle
C) Outer Core
D) Inner Core
Answer: A
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

19) Which layer of the Earth is the thickest?
A) Crust
B) Mantle
C) Outer Core
D) Inner Core
Answer: B
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

20) What is the definition of the asthenosphere?
A) A portion of the atmosphere that blocks UV radiation
B) A soft, low-velocity layer in the Upper Mantle
C) The transition zone between the Mantle and the Outer Core
D) The portion of the Hydrologic Cycle that describes how plants contribute their respiration
Answer: B
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 4.4 - Earth's tectonic plates consist of the rock crust and uppermost mantle, and move slowly with respect to one another.

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21) The _____ is a layer of liquid nickel and iron believed to be responsible for generating the Earth's magnetic field.
A) Crust
B) Mantle
C) Outer Core
D) Inner Core
Answer: C
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 4.2 - Earth, like other planets, is still cooling, though radioactive decay continuously generates heat.

22) In what two areas are the youngest mountain ranges found today?
A) The Circum-Atlantic belt and Southern Europe/Asia
B) Western South America and the Appalachians of North America
C) The Circum-Pacific belt and Southern Europe/Asia
D) Scandinavia and Eastern Africa
Answer: C
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.9 - The Face of the Earth
Focus/Concepts: 1.9
Earth Science LO: 4.5 - Many active geologic processes occur at plate boundaries.

23) A _____ is a part of the craton that is covered by a thin veneer of sedimentary rocks.
A) Shield
B) Continental Shelf
C) Platform
D) Plateau
Answer: C
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.9 - The Face of the Earth
Focus/Concepts: 1.9
Earth Science LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

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1.2 True/False Questions

1) Historical geology describes geological processes that operate on the Earth.
Answer: FALSE
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.1 - Geology: The Science of the Earth
Focus/Concepts: 1.1
Earth Science LO: 1.5 - Earth scientists use their understanding of the past to forecast Earth's future.

2) Geologic hazards are natural processes.
Answer: TRUE
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.1 - Geology: The Science of the Earth
Focus/Concepts: 1.1
Earth Science LO: 8.1 - Natural hazards result from natural Earth processes.

3) Archbishop James Ussher used the Bible to construct a chronology to date the creation of the Earth to 46,000 B.C.
Answer: FALSE
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.2 - The Development of Geology
Focus/Concepts: 1.2
Earth Science LO: 1.5 - Earth scientists use their understanding of the past to forecast Earth's future.

4) Before a hypothesis can become an accepted part of scientific knowledge, it must pass objective testing and analysis.
Answer: TRUE
Diff: 2
Bloom's Taxonomy: Knowledge
Global Sci Out: 1
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

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5) A hypothesis can never be changed or modified.
Answer: FALSE
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

6) The majority of the hydrosphere is found in the atmosphere in the form of water vapor.
Answer: FALSE
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 2
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 5.5 - Earth's water cycles among the reservoirs of the atmosphere, streams, lakes, ocean, glaciers, groundwater, and deep interior of the planet.

7) The four spheres on Earth operate independently from each other.
Answer: FALSE
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 2
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

8) Both energy and matter will flow in and out of an open system.
Answer: TRUE
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 2
Section: 1.5 - Earth as a System
Focus/Concepts: 1.5
Earth Science LO: 3.2 - All Earth processes are the result of energy flowing and mass cycling within and between Earth's systems.

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9) The interior of the Earth is divided into roughly spherical layers separated by density.
Answer: TRUE
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.3 - Earth formed from the accumulation of dust and gas, and multiple collisions of smaller planetary bodies.

10) The lithosphere is the layer in the interior of the Earth that is just below the crust.
Answer: FALSE
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 2
Section: 1.7 - Earth's Internal Structure
Focus/Concepts: 1.7
Earth Science LO: 4.5 - Many active geologic processes occur at plate boundaries.

11) Crystallization can produce metamorphic rocks.
Answer: FALSE
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

12) External processes driven by solar energy can create the materials necessary for sedimentary rocks.
Answer: TRUE
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 3.3 - Earth exchanges mass and energy with the rest of the Solar System.

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13) A craton is the interior of a continental mass that has been undisturbed for the last 1 billion years.
Answer: FALSE
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.9 - The Face of the Earth
Focus/Concepts: 1.9
Earth Science LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

1.3 Short Answer Questions

1) Which three sciences contribute knowledge and principles that geologists use to understand the natural world?
Answer: Biology, Physics and Chemistry
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7 & 8
Section: 1.1 - Geology: The Science of the Earth
Focus/Concepts: 1.1
Earth Science LO: 1.2 - Earth scientists use a large variety of scientific principles to understand how our planet works.

2) _____ is the doctrine that describes how the Earth was shaped by a series of great catastrophes over a short period of time.
Answer: Catastrophism
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.2 - The Development of Geology
Focus/Concepts: 1.2
Earth Science LO: 1.5 - Earth scientists use their understanding of the past to forecast Earth's future.

3) Illustrate how can soil be considered a part of all four atmospheres.
Answer: Soil is made of both geologic and biologic materials. It also supports the growth of plants in the biosphere. Pore spaces in the soil are occupied by both air and water. Air and water are also required to weather debris necessary for soil development.
Diff: 2
Bloom's Taxonomy: Application
Global Sci Out: 2 & 8
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

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4) Express the definition of the Earth System in your own words.
Answer: Answers will vary, but should include that the four spheres of the Earth are not separate, but interact with each other.
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 2 & 8
Section: 1.5 - Earth as a System
Focus/Concepts: 1.5
Earth Science LO: 3.6 - Earth's systems are dynamic; they continually react to changing influences.

5) List three examples of subsystems or cycles of the Earth System.
Answer: Answers will vary, but three examples listed in the text include the Carbon Cycle, Hydrologic Cycle, and Rock Cycle.
Diff: 2
Bloom's Taxonomy: Knowledge
Global Sci Out: 2 & 8
Section: 1.5 - Earth as a System
Focus/Concepts: 1.5
Earth Science LO: 3.4 - Earth's systems interact over a wide range of temporal and spatial scales.

6) Are humans part of the Earth System? List your evidence.
Answer: Yes. As discussion about anthropogenic climate change will attest, our actions will affect the other spheres on the Earth.
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 2 & 8
Section: 1.5 - Earth as a System
Focus/Concepts: 1.5
Earth Science LO: 3.8 - Earth's climate is an example of how complex interactions among systems can result in relatively sudden and significant changes.

7) What were the three basic divisions of the interior of the early Earth?
Answer: Iron-rich core, primitive crust, and mantle
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7 & 8
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.3 - Earth formed from the accumulation of dust and gas, and multiple collisions of smaller planetary bodies.

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8) What was the source for the early atmosphere? Explain the process by which it developed.
Answer: Differentiation of materials in the early Earth and the process of degassing led to the early atmosphere.
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 2 & 8
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 4.2 - Earth, like other planets, is still cooling, though radioactive decay continuously generates heat.

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1.4 Matching Questions

Put the steps of the Scientific Method in order from first to last.

A) Observations and experiments are developed to test the hypothesis
B) Data is collected that relates to the question
C) A question is proposed about the natural world
D) Hypotheses are rejected, modified, or accepted
E) Questions are posed and a hypothesis is developed
F) Results are shared with the scientific community

1) First
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

2) Second
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

3) Third
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

4) Fourth
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

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5) Fifth
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

6) Sixth
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

Answers: 1) C 2) B 3) E 4) A 5) D 6) F

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Match the sphere of the Earth with the correct definition.

A) All life on the planet
The solid Earth
B) Gaseous envelope around the planet
The solid Earth
C) Water portion of the planet
The solid Earth
D) The solid Earth

7) Hydrosphere
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

8) Biosphere
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

9) Atmosphere
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

10) Geosphere
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

Answers: 7) C 8) A 9) B 10) D

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Put the events leading up to the formation of the early Earth in order.

A) Rapid expansion of stellar matter
B) Formation of solar nebula
C) Nuclear fission lights up Sun
D) Formation of proto-planets

11) First
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.2 - Our Solar System formed from a vast cloud of gas and dust 4.6 billion years ago.

12) Second
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.2 - Our Solar System formed from a vast cloud of gas and dust 4.6 billion years ago.

13) Third
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.2 - Our Solar System formed from a vast cloud of gas and dust 4.6 billion years ago.

14) Fourth
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.2 - Our Solar System formed from a vast cloud of gas and dust 4.6 billion years ago.

Answers: 11) A 12) B 13) C 14) D

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Sort the collection of rocks below into the three categories of rocks.

A) Slate, Schist, Quartzite, Phyllite
B) Granite, Gabbro, Rhyolite, Basalt
C) Limestone, Conglomerate, Arkose, Dolomite

15) Igneous Rocks
Diff: 2
Bloom's Taxonomy: Analysis
Global Sci Out: 2
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

16) Sedimentary Rocks
Diff: 2
Bloom's Taxonomy: Analysis
Global Sci Out: 2
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

17) Metamorphic Rocks
Diff: 2
Bloom's Taxonomy: Analysis
Global Sci Out: 2
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

Answers: 15) B 16) C 17) A

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Match the rock type with the correct definition.

A) Rocks that form when a pre-existing rock is altered due to heat and pressure
B) Rocks that form from pre-existing materials going through lithification
C) Rocks that form from the crystallization of molten material

18) Igneous
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

19) Sedimentary
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

20) Metamorphic
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 7
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

Answers: 18) C 19) B 20) A

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1.5 Essay Questions

1) Explain how increased urbanization makes people more vulnerable to natural disasters?
Answer: Answers will vary, but those listed in Section 1.1 of the text include: Coastal wetlands and dunes are destroyed, which protect coastal cities from storms. Sea level rise will inundate coastal areas. Urban areas in seismic and/or volcanic areas will concentrate a large number of people in the path of these hazards. As construction commences, there may be poor construction practices or inappropriate land use that concentrate people in vulnerable sites. Urbanization can change the magnitude and frequency of flooding on rivers.
Diff: 3
Bloom's Taxonomy: Comprehension
Global Sci Out: 5, 7, & 8
Section: 1.1 - Geology: The Science of the Earth
Focus/Concepts: 1.1
Earth Science LO: 9.5 - Human activities alter the natural land surface.

2) In the 16th and 17th centuries, the doctrine of Catastrophism was used to describe how the Earth had been shaped quickly by fast, violent catastrophes and was therefore very young. In the 18th century, James Hutton developed the Principle of Uniformitarianism, which stated that the Earth was shaped by small, gradual changes occurring over a long period of time, making the Earth much older. Which side (if any) is correct and why?
Answer: The Earth is shaped by catastrophic events such as earthquakes and floods, which will cause major changes in a short period of time. However, the Earth is also shaped by small, gradual changes such as stream deposition and weathering, which may only show measurable change after several decades or centuries. In reality, both sides are correct.
Diff: 3
Bloom's Taxonomy: Synthesis
Global Sci Out: 1, 2, 7, & 8
Section: 1.2 - The Development of Geology
Focus/Concepts: 1.2
Earth Science LO: 1.5 - Earth scientists use their understanding of the past to forecast Earth's future.

3) Explain how a scientific theory differs from the way most non-scientists use the word theory in everyday language.
Answer: A scientific theory is a well-tested and widely accepted view the scientific community agrees on that best explains observable facts. The more familiar usage of theory in everyday language usually refers to an educated guess.
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1 & 8
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

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4) Explain the difference between a scientific hypothesis and a scientific theory.
Answer: A scientific hypothesis is an untested explanation developed to try to explain a set of observations. A scientific theory is a well-tested and widely accepted view that best explains the observable facts.
Diff: 2
Bloom's Taxonomy: Comprehension
Global Sci Out: 1 & 8
Section: 1.3 - The Nature of Scientific Inquiry
Focus/Concepts: 1.3
Earth Science LO: 1.3 - Earth science investigations take many different forms.

5) Changes in one part of the Earth System can influence processes in other parts of the system. Sometimes these changes can be minor, but sometimes they can be severe. Which part of the Earth System do you think exerts the most power over the other three? Why do you believe this is the case? Support your position with evidence.
Answer: Answers will vary.
Diff: 3
Bloom's Taxonomy: Evaluation
Global Sci Out: 2, 7, & 8
Section: 1.5 - Earth as a System
Focus/Concepts: 1.5
Earth Science LO: 3.7 - Changes in part of one system can cause new changes to that system or to other systems, often in surprising and complex ways.

6) On May 18, 1980, the volcano Mt. St. Helens in Washington State erupted, devastating life and landscape for over 200 mi^2 through ash falls, lahars, and other pyroclastic deposits. A few days later, President Jimmy Carter flew surveyed the devastated area and stated it looked more desolate than a moonscape. How did the volcanic eruption affect the hydrologic, biologic, and atmospheric parts of the Earth System? And, after the eruption, how did those same parts of the Earth System affect the volcanic deposits?
Answer: Answers will vary but can include landslide deposits creating a lahar when entering Spirit Lake, burrowing animals that had survived the eruption digging to the surface and bringing soil up from below, lupines re-establishing themselves in the pumice fields, etc.
Diff: 3
Bloom's Taxonomy: Application
Global Sci Out: 2 & 8
Section: 1.5 - Earth as a System
Focus/Concepts: 1.5
Earth Science LO: 3.7 - Changes in part of one system can cause new changes to that system or to other systems, often in surprising and complex ways.

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7) Compare and contrast ocean basins and continents.
Answer: One significant difference between these is their respective elevations. Ocean basins are lower in elevation whereas continents are higher in elevation. However, his elevation difference is the result of different material densities and thicknesses. Continental material is thicker (up to 70 km), but in spite of that sits higher on the mantle because it is less dense (2.7 g/cm^3). Oceanic material is thinner (averaging at 7 km), but denser (3.0 g/cm^3).
Diff: 3
Bloom's Taxonomy: Analysis
Global Sci Out: 2 & 8
Section: 1.9 - The Face of the Earth
Focus/Concepts: 1.9
Earth Science LO: 2.4 - Earth's crust has two distinct types: continental and oceanic.

8) In the 17^{th} century, Archbishop James Ussher of Ireland used the Bible to calculate that the Earth was created in 4004 B.C. Imagine you could take Archbishop Ussher to Niagara Falls. Although Niagara Falls is located on the border between the United States and Canada today, it was located several km to the north at the Niagara Escarpment and is eroding southward. Let's assume the rate of erosion is 50 cm/yr. Assuming the distance from the Niagara Escarpment to Niagara Falls is 11 km, calculate how long, calculate how long it would have taken to erode from the Escarpment to the current location of the Falls. How would this affect Archbishop Ussher's assessment of the age of the Earth?
Answer: Rewriting the Rate Equation so that Time = Distance/Rate:
11 km = 1,100,000 cm
Time = 1,100,000 cm/50 cm per year = 22,000 years
It took 22,000 years to erode the material, not to mention the fact that it would take time to deposit the rock before the river could erode it. These numbers, supported by geologic evidence, proves Ussher's age of the Earth is too young.
Diff: 2
Bloom's Taxonomy: Application
Global Sci Out: 2 & 4
Section: 1.2 - The Development of Geology
Focus/Concepts: 1.2
Earth Science LO: 1.3 - Earth science investigations take many different forms.

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1.6 Visual

1) Draw the hydrologic cycle to illustrate the processes of the hydrologic sphere.
Answer: Answers will vary, but should include evaporation, condensation, precipitation, infiltration, evapotranspiration, and run-off.
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 3
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 5.5 - Earth's water cycles among the reservoirs of the atmosphere, streams, lakes, ocean, glaciers, groundwater, and deep interior of the planet.

2) Using the illustration you made of the hydrologic cycle, identify three locations where the hydrologic sphere is interacting with one of the other three spheres. Make sure to list the names of the spheres interacting at those locations.
Answer: Answers identified can include evaporation (hydrologic and atmospheric spheres), evapotranspiration (hydrologic and biologic spheres), and infiltration (hydrologic and geologic spheres).
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 2 & 3
Section: 1.4 - Earth's Spheres
Focus/Concepts: 1.4
Earth Science LO: 4.1 - Earth's geosphere changes through geological, hydrological, physical, chemical, and biological processes that are explained by universal laws.

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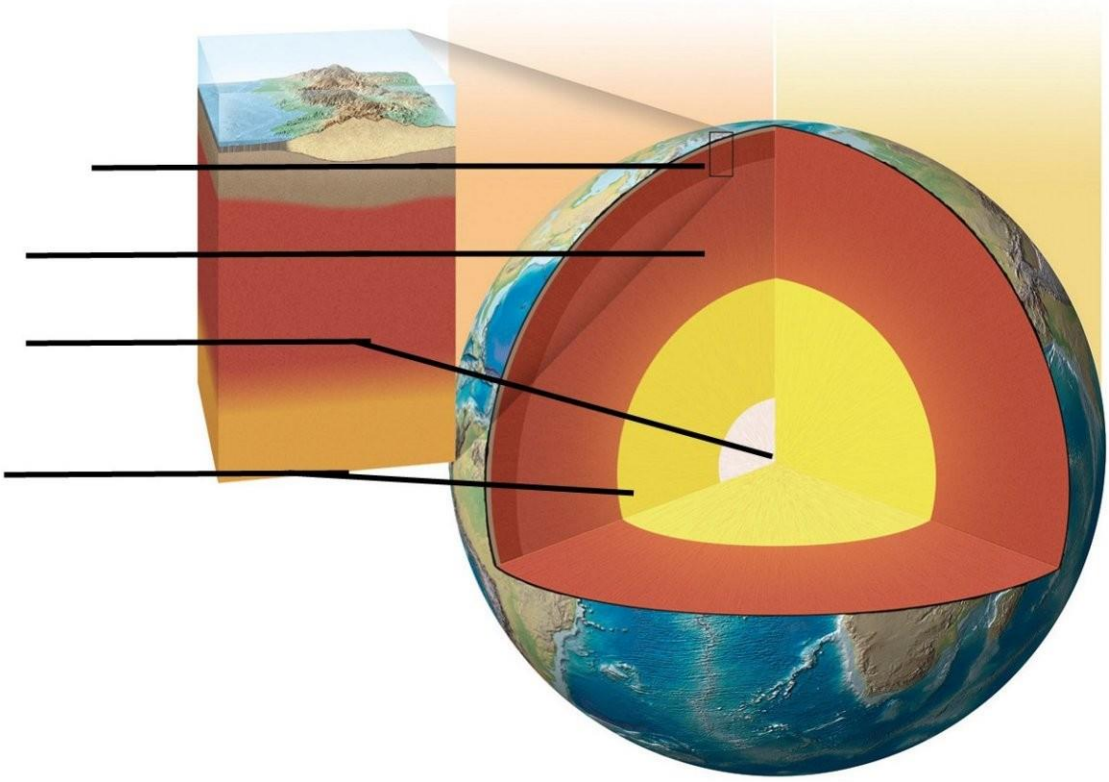
3)



Using the blanks provided, label the layers in the interior of the Earth.
Answer: See Fig. 1.18
Diff: 1
Bloom's Taxonomy: Knowledge
Global Sci Out: 3
Section: 1.6 - Early Evolution of Earth
Focus/Concepts: 1.6
Earth Science LO: 2.3 - Earth formed from the accumulation of dust and gas, and multiple collisions of smaller planetary bodies.

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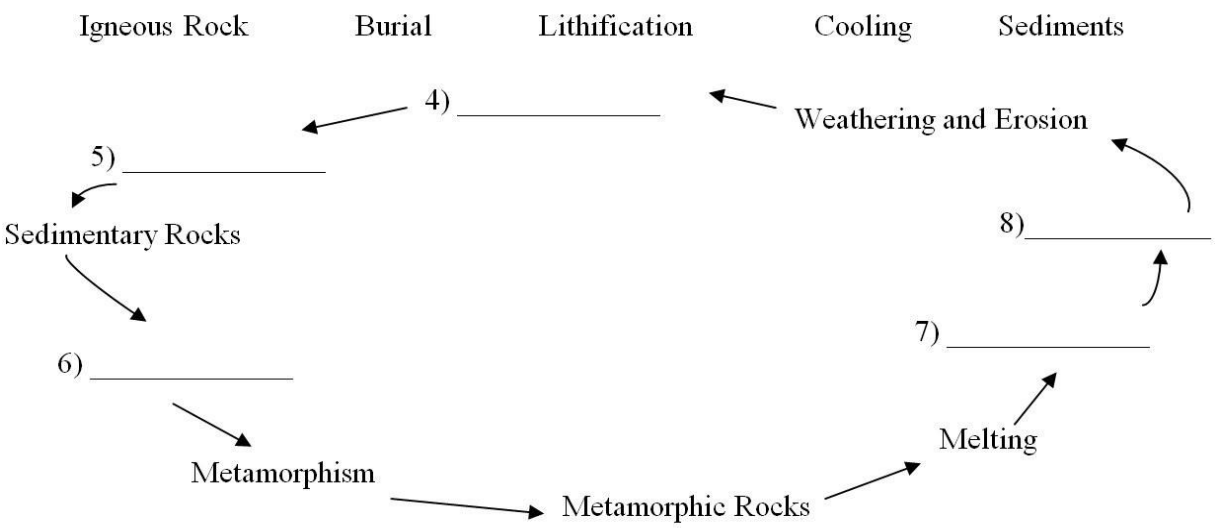
4) **Geologic Rock Cycle**
Below is a partially completed geologic rock cycle. Using the choices provided, match the correct word with the correct blank in the rock cycle.



Answer: 4-Sediments, 5-Lithification, 6-Burial, 7-Cooling, 8-Igneous Rock
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

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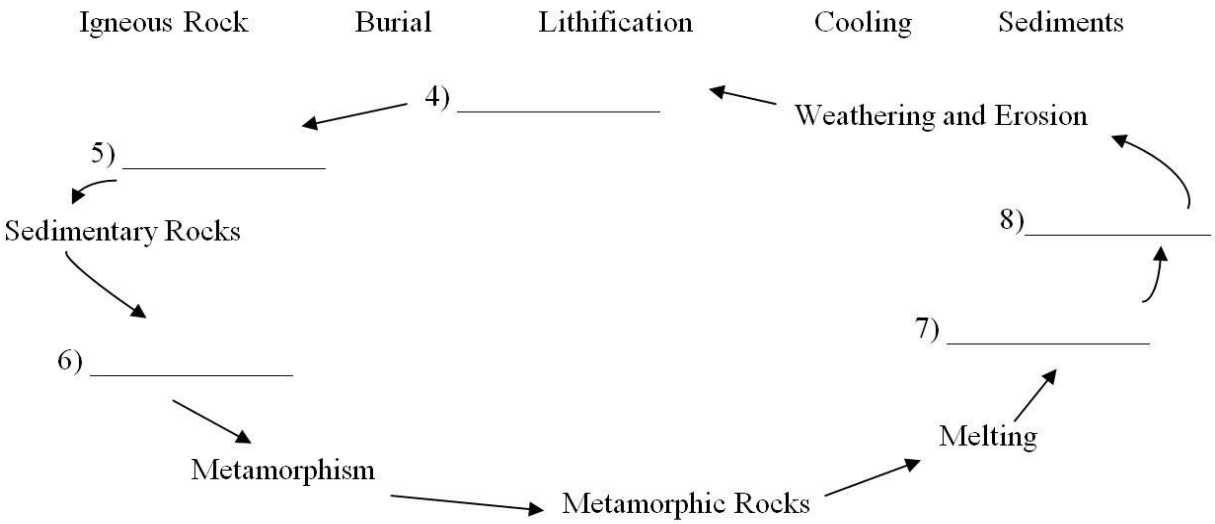
5) Using the Rock Cycle, draw alternate paths between the rock types.



Answer: Answers will vary, but can include igneous rocks going through metamorphism to become metamorphic rocks, etc.
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 7
Section: 1.8 - Rocks and the Rock Cycle
Focus/Concepts: 1.8
Earth Science LO: 4.6 - Earth materials take many different forms as they cycle through the geosphere.

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6)

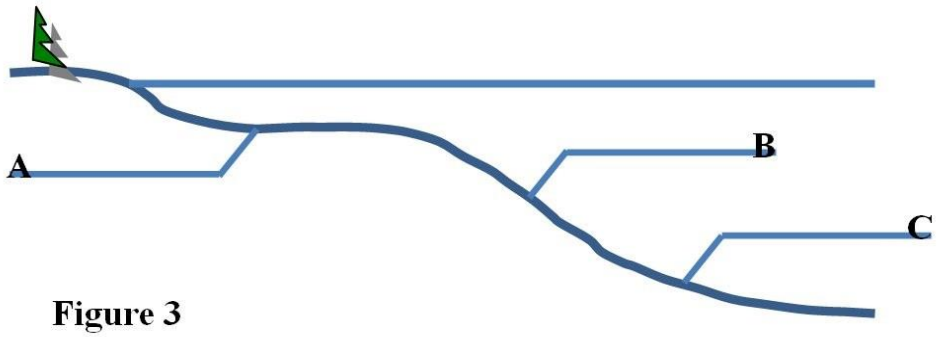

Figure 3

Label the correct feature for each blank on the seafloor profile in the image above.
Answer: A-Continental Shelf, B-Continental Slope, C-Continental Rise
Diff: 1
Bloom's Taxonomy: Comprehension
Global Sci Out: 3 & 7
Section: 1.9 - The Face of the Earth
Focus/Concepts: 1.9
Earth Science LO: 3.1 - The four major systems of Earth are the geosphere, hydrosphere, atmosphere, and biosphere.

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