Foundations of Earth Science, 8e **(Lutgens/Tarbuck/Tasa)**
Chapter 3 Landscapes Fashioned by Water

3.1 Multiple-Choice Questions

1) The downslope movement of rock or soil due to the influence of gravity is _____.
A) weathering
B) erosion
C) mass wasting
D) exfoliation
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.2 Mass Wasting: The Work of Gravity
Focus/Concepts: 3.2
ESLI: 5.6 Water shapes landscapes.

2) Internal processes that occur at or near Earth's surface and are powered by _____.
A) radioactive elements in Earth's mantle
B) the sun
C) geothermal heat
D) cosmic rays
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.1 Earth's External Processes
Focus/Concepts: 3.1
ESLI: 5.6 Water shapes landscapes.

3) The tongue-like flow of water-saturated clay-rich soil on a hillside that breaks away and moves downslope is called _____.
A) debris flow
B) slump
C) rockslide
D) earthflow
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.2 Mass Wasting: The Work of Gravity
Focus/Concepts: 3.2
ESLI: 5.5 Earth's water cycles among the reservoirs of the atmosphere, streams, lakes, ocean, glaciers, groundwater, and deep interior of the planet.

4) Plants consume water during photosynthesis. They also release it to the atmosphere during _____.
A) evaporation
B) degassing
C) transpiration
D) infiltration
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.3 The Hydrologic Cycle
Focus/Concepts: 3.3
ESLI: 5.5 Earth's water cycles among the reservoirs of the atmosphere, streams, lakes, ocean, glaciers, groundwater, and deep interior of the planet.

5) _____ is the process by which liquid water changes into water vapor.
A) Infiltration
B) Evaporation
C) Runoff
D) Dissolution
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.3 The Hydrologic Cycle
Focus/Concepts: 3.3
ESLI: 5.5 Earth's water cycles among the reservoirs of the atmosphere, streams, lakes, ocean, glaciers, groundwater, and deep interior of the planet.

6) One drainage basin is separated from a neighboring drainage basin by a _____.
A) divide
B) slope
C) rill
D) zone of deposition
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.4 Running Water
Focus/Concepts: 3.4
ESLI: 5.6 Water shapes landscapes.

7) The Mississippi Delta is an example of which of the following?
A) zone of sediment production
B) zone of deposition
C) zone of transportation
D) angle of repose
Answer: B
Diff: 1
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.4 Running Water
Focus/Concepts: 3.4
ESLI: 5.6 Water shapes landscapes.

8) The Amazon River has _____ times as much discharge as the Mississippi River.
A) 4
B) 6
C) 8
D) 12
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.5 Streamflow Characteristics
Focus/Concepts: 3.5
ESLI: 5.6 Water shapes landscapes.

9) Pebbles caught in swirling eddies of water best describe _____.
A) cutbanks
B) potholes
C) point bars
D) meanders
Answer: B
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

10) Gravel would most likely exist in the _____ of a river.
A) dissolved load
B) suspended load
C) bed load
D) cutbank
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

11) _____ is the maximum load of solid particles a stream can transport in a unit of time.
A) Capacity
B) Competence
C) Alluvium
D) Bed load
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

12) If you were to examine the longitudinal profile of a typical river, you would probably find that the gradient is _____.
A) steepest near the mouth
B) steepest near the headwaters
C) roughly the same at the mouth and the headwaters
D) steepest in the zone of transport
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.5 Streamflow Characteristics
Focus/Concepts: 3.5
ESLI: 5.6 Water shapes landscapes.

13) Calcium and sodium ions make up much of the _____ of streams.
A) dissolved load
B) suspended load
C) bed load
D) sediment
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

14) The Mississippi River Delta system contains a series of _____ coalescing subdeltas.
A) 9
B) 7
C) 5
D) 3
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.9 Depositional Landforms
Focus/Concepts: 3.9
ESLI: 5.6 Water shapes landscapes.

15) Streams erode downward until they reach _____.
A) their base level
B) their profile
C) an oxbow
D) the floodplain
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.8 Shaping Stream Valleys
Focus/Concepts: 3.8
ESLI: 5.6 Water shapes landscapes.

16) V-shaped valleys would most likely contain _____.
A) waterfalls
B) floodplains
C) a braided stream
D) a delta
Answer: A
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.8 Shaping Stream Valleys
Focus/Concepts: 3.8
ESLI: 5.6 Water shapes landscapes.

17) The flat area on either side of a stream's natural levee, where alluvium is deposited, is called the _____.
A) incised meander
B) delta
C) floodplain
D) headwaters
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.8 Shaping Stream Valleys
Focus/Concepts: 3.8
ESLI: 5.6 Water shapes landscapes.

18) Between a river and its floodplain, you might find _____.
A) natural levees
B) deltas
C) distributaries
D) meanders
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.9 Depositional Landforms
Focus/Concepts: 3.9
ESLI: 5.6 Water shapes landscapes.

19) A tributary stream that flows parallel to the main stream because a natural levee is present is called _____.
A) a yazoo tributary
B) flooding
C) approaching base level
D) eroding a pothole
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.9 Depositional Landforms
Focus/Concepts: 3.9
ESLI: 5.6 Water shapes landscapes.

20) Groundwater is the largest reservoir of _____.
A) water on Earth
B) seawater on Earth
C) glacial ice on Earth
D) freshwater that is readily available to humans
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

21) Impermeable layers such as clay that hinder or prevent water movement are called _____.
A) aquitards
B) aquifers
C) meanders
D) cutbanks
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

22) Groundwater tends to flow through bodies of rock or sediment that _____.
A) are composed of dark silicate minerals
B) have a high porosity
C) have a high permeability
D) are aquitards
Answer: C
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

23) Where the water table intersects Earth's surface, a(n) _____ results.
A) geyser
B) spring
C) artesian well
D) cone of depression
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.12 Springs, Wells, and Artesian Systems
Focus/Concepts: 3.12
ESLI: 5.6 Water shapes landscapes.

24) The San Joaquin Valley experienced a phenomenon called _____ due to excessive groundwater pumping.
A) acid mine drainage
B) evapotranspiration
C) water table rise
D) land subsidence
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.13 Environmental Problems of Groundwater
Focus/Concepts: 3.13
ESLI: 5.6 Water shapes landscapes.

25) The steepest angle at which unconsolidated granular material remains stable is _____.
A) oblique angles
B) the angle of momentum
C) the angle of repose
D) right angles
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.2 Mass Wasting: The Work of Gravity
Focus/Concepts: 3.2
ESLI: 5.6 Water shapes landscapes.

26) _____ is located in tiny pore spaces between grains of soil and sediment, underground.
A) Groundwater
B) Incised meander
C) Cutbank
D) Aquitard
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

27) _____ can form when the pressure surface is above the land surface.
A) Geysers
B) Flowing artesian wells
C) Springs
D) Cone of depression
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.12 Springs, Wells, and Artesian Systems
Focus/Concepts: 3.12
ESLI: 5.6 Water shapes landscapes.

28) Old Faithful, a _____ in Yellowstone National Park, erupts steam and hot water.
A) well
B) spring
C) geyser
D) cone of depression
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.12 Springs, Wells, and Artesian Systems
Focus/Concepts: 3.12
ESLI: 5.6 Water shapes landscapes.

29) Drawdown of groundwater due to heavy pumping from a well may result in a(n) _____, a "dimple" in the water table.
A) geyser
B) spring
C) artesian well
D) cone of depression
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.12 Springs, Wells, and Artesian Systems
Focus/Concepts: 3.12
ESLI: 5.6 Water shapes landscapes.

30) _____ are formed when groundwater dissolves cavities into limestone.
A) Point bars
B) Flowing artesian wells
C) Caverns
D) Incised meanders
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.14 The Geologic Work of Groundwater
Focus/Concepts: 3.14
ESLI: 5.6 Water shapes landscapes.

31) External processes include weathering, mass wasting, and _____.
A) partial melting
B) erosion
C) convection
D) subduction
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.1 Earth's External Processes
Focus/Concepts: 3.1
ESLI: 5.6 Water shapes landscapes.

32) _____ is a measure of the volume of open space in rocks and unconsolidated, geologic materials like alluvium and soils.
A) Porosity
B) Angularity
C) Permeability
D) Sphericity
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

33) Building a dam on a stream raises its _____, causing it to cease erosion and begin to deposit sediment.
A) angle of repose
B) aquitard
C) base level
D) headwaters
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.8 Shaping Stream Valleys
Focus/Concepts: 3.8
ESLI: 5.6 Water shapes landscapes.

34) Most karst topography forms in _____.
A) limestone
B) granite
C) basalt
D) sandstone
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.14 The Geologic Work of Groundwater
Focus/Concepts: 3.14
ESLI: 5.6 Water shapes landscapes.

35) Which of the following drainage patterns forms on highly fractured bedrock?
A) rectangular
B) dendritic
C) radial
D) trellis
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.4 Running Water
Focus/Concepts: 3.4
ESLI: 5.6 Water shapes landscapes.

36) _____ hang from the ceiling in caves.
A) Stalactites
B) Stalagmites
C) Karst topography
D) Incised meanders
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.14 The Geologic Work of Groundwater
Focus/Concepts: 3.14
ESLI: 5.6 Water shapes landscapes.

37) Which of the following rivers flows inside the Grand Canyon?
A) Nile River
B) Colorado River
C) Mississippi River
D) Amazon River
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.4 Running Water
Focus/Concepts: 3.4
ESLI: 5.6 Water shapes landscapes.

38) One potential source of groundwater contamination would be _____.
A) partial melting
B) evapotranspiration
C) lithification
D) leaking septic tank
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.13 Environmental Problems of Groundwater
Focus/Concepts: 3.13
ESLI: 5.6 Water shapes landscapes.

39) A cross-sectional view of a stream from its headwaters to its mouth is called a(n) _____.
A) longitudinal profile
B) transverse profile
C) oblique profile
D) subterranean profile
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.5 Streamflow Characteristics
Focus/Concepts: 3.5
ESLI: 5.6 Water shapes landscapes.

40) Streams that exhibit flow only during wet periods are called _____.
A) intermittent streams
B) braided streams
C) ephemeral streams
D) meandering streams
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.5 Streamflow Characteristics
Focus/Concepts: 3.5
ESLI: 5.6 Water shapes landscapes.

41) Ephemeral streams typically flow after heavy rainstorms in _____ climates.
A) humid
B) arid
C) tropical
D) arctic
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.5 Streamflow Characteristics
Focus/Concepts: 3.5
ESLI: 5.6 Water shapes landscapes.

42) The average number of storm-related deaths attributed to flooding from 1985 to 2014 was _____.
A) 66
B) 73
C) 83
D) 94
Answer: C
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.10 Floods and Flood Control
Focus/Concepts: 3.10
ESLI: 5.6 Water shapes landscapes.

43) _____ are earthen mounds built on the banks of rivers to increase the volume of water the channel can hold.
A) Natural levees
B) Channels
C) Flood-control dams
D) Artificial levees
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.10 Floods and Flood Control
Focus/Concepts: 3.10
ESLI: 5.6 Water shapes landscapes.

44) Blocks of bedrock that break loose and slide downslope are often called a(n) _____.
A) slump
B) rockslide
C) mudflow
D) earthflow
Answer: B
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.2 Mass Wasting: The Work of Gravity
Focus/Concepts: 3.2
ESLI: 5.6 Water shapes landscapes.

45) Dredging a stream or river is an example of _____.
A) channelization
B) meandering
C) lithification
D) downcutting
Answer: A
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.10 Floods and Flood Control
Focus/Concepts: 3.10
ESLI: 5.6 Water shapes landscapes.

3.2 Matching Questions

Match the following items with the correct descriptions.

A) the process by which solid particles of various sizes are separated and deposited in different locations
B) meander that has been separated from main part of river
C) interwoven stream channels
D) area of deposition along a river
E) area above water table where openings between sediment, soil, and rock are filled with air
F) uppermost layer of the saturated zone
G) the volume of water flowing past a certain point in a given unit of time
H) the transfer of rock and soil downslope, under the influence of gravity
I) impermeable bed that hinders or prevents groundwater movement
J) curvy bends in a river
K) volume of open spaces in rock or soil
L) area of active erosion in a river
M) rock, sediment, or soil through which groundwater moves easily
N) areas within sediment where all open spaces are completely filled with water
O) new channel segment occurring between meanders due to erosion
P) the slope of a stream channel expressed as the vertical drop of a stream over a specified distance
Q) a complex network of converging and diverging channels that thread their way among numerous islands or gravel bars
R) water in the saturated zone
S) measure of a material's ability to transmit water
T) the physical removal of material by a mobile agent such as flowing water, waves, wind, or ice
U) sand, gravel, and large boulders that are too large to be carried in suspension and, instead, move along the bottom of a stream channel
V) the physical breakdown (disintegration) and chemical alteration (decomposition) of rock at or near Earth's surface

1) Weathering
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

2) Discharge
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

3) Bed load
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

4) Mass wasting
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

5) Erosion
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

6) Sorting
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

7) Gradient
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

8) Braided channels
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

9) Cut bank
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

10) Cutoff
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

11) Point bar
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

12) Oxbow lake
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

13) Braided channel
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

14) Meander
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

15) Water table
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

16) Aquifer
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

17) Groundwater
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

18) Permeability
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

19) Aquitard
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

20) Zone of saturation
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

21) Porosity
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

22) Unsaturated zone
Diff: 2
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.11 Groundwater: Water beneath the Surface
Focus/Concepts: 3.11
ESLI: 5.6 Water shapes landscapes.

Answers: 1) V 2) G 3) U 4) H 5) T 6) A 7) P 8) Q 9) L 10) O 11) D 12) B 13) C 14) J 15) F 16) M 17) R 18) S 19) I 20) N 21) K 22) E

3.3 Essay Questions

1) Describe three factors that can act as triggers for mass wasting events.
Answer: Answers will vary, but a correct answer will include three of the following: (a) addition of water, perhaps by heavy rains, which reduces particle-to-particle cohesion, lubricates, and adds weight to the slope, (b) oversteepening of a slope, (c) removal of vegetation by forest fires or intentional human clearing, which reduces or eliminates the "net-like" effect of roots holding soils in place, or (d) the land may be shaken by an earthquake. There are also landslides without triggers.
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.2 Mass Wasting: The Work of Gravity
Focus/Concepts: 3.2
ESLI: 5.6 Water shapes landscapes.

2) Imagine that you land a new job as a consultant to a county where floods have recently damaged many houses along a river. Describe some of the structural methods that are available to you as options to control flooding.
Answer: There are three structural approaches to flood control. Flood-control dams may be built, so that the water from large rainfall events may be captured, stored, and gradually released to the river system. Another option is to artificially add bulk to natural levees, making them into artificial levees that work to keep the river in its channel. Channelizing the river speeds up the flow of water so that it doesn't "pile up" to flood height. River managers may also take a nonstructural approach, identifying high-risk areas and implementing appropriate zoning regulations to keep people and property far from harm's way when the river floods.
Diff: 3
Bloom's Taxonomy: Evaluating/Creating
Global Sci Out: G2
Section: 3.10 Floods and Flood Control
Focus/Concepts: 3.10
ESLI: 5.6 Water shapes landscapes.

3) In Pearson County, residents are concerned because the water table has been dropping for more than two years. What might be some of the reasons that the amount of groundwater in Pearson County is decreasing?
Answer: The decrease could be due to a lack of replenishment to a temporary change in the weather, such as a drought. It could also be a longer-term lack of replenishment, where a viable recharge mechanism is missing, such as in much of the High Plains Aquifer, where we are essentially mining "fossil" water. Another possibility is that residents of the county (or some other county "upstream") are extracting water in greater volume, or more rapidly, than previously, thus diminishing the groundwater "budget."
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.13 Environmental Problems of Groundwater
Focus/Concepts: 3.13
ESLI: 5.6 Water shapes landscapes.

4) Imagine you are an astronaut, landing on an alien world. Looking out your spacecraft window, you see a world that looks very much like Earth. You notice a disappearing stream and two sinkholes. Based on your training in Earth science, make a prediction about the rock type you would find in the area where you have landed, and justify your prediction. Make a second prediction about the composition of the atmosphere on the new planet.
Answer: Disappearing streams and potholes are typical landscape features in karst topography on Earth, and karst topography forms on Earth where groundwater dissolves limestone. Groundwater can accomplish this task because of carbonic acid, which can result from the interaction of rain with carbon dioxide in the air. So the air of the new planet may contain carbon dioxide or a similar acid (once dissolved in water) as well as water vapor. The rock type may be limestone, or a similarly soluble rock type–like rock salt or rock gypsum, perhaps.
Diff: 3
Bloom's Taxonomy: Evaluating/Creating
Global Sci Out: G2
Section: 3.14 The Geologic Work of Groundwater
Focus/Concepts: 3.14
ESLI: 5.6 Water shapes landscapes.

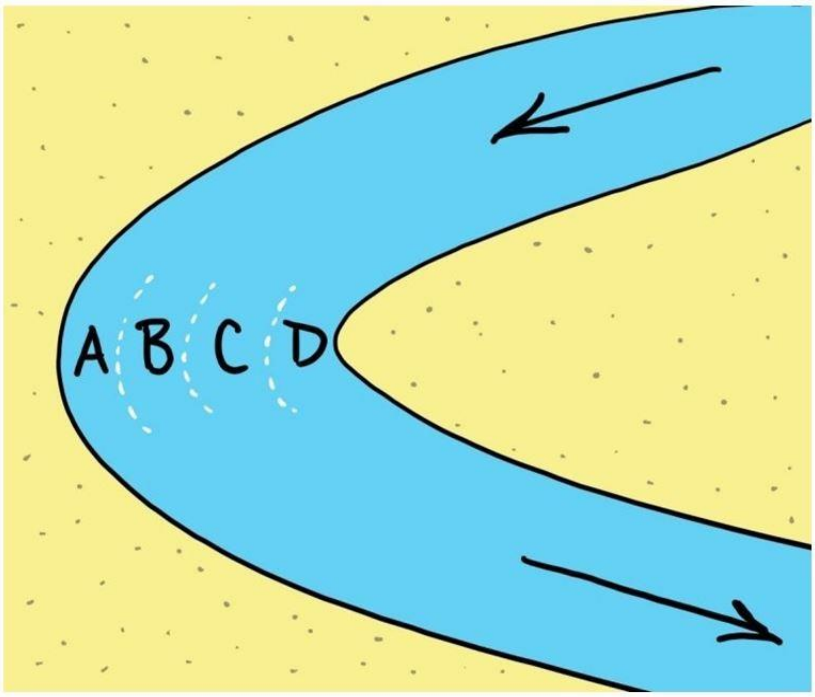
5) Discuss the difference between laminar flow and turbulent flow. Provide an example of each type and how stream velocity may influence flow.
Answer: Laminar flow occurs when water flows in a roughly straight-line path that parallels the stream channel. By comparison, turbulent flow is erratic and often appears as a swirling motion. An example of laminar flow is a slowly moving stream, whereas an example of turbulent flow is mountain rapids. As the velocity of the stream increases, the flow becomes more turbulent.
Diff: 3
Bloom's Taxonomy: Evaluating/Creating
Global Sci Out: G2
Section: 3.5 Streamflow Characteristics
Focus/Concepts: 3.5
ESLI: 5.6 Water shapes landscapes.

6) Explain how the gradient, discharge, channel size, and channel roughness typically change as you migrate downstream.
Answer: Refer to Smartfigure 3.13. Discharge, channel size, and flow velocity all increase as you move downstream. Channel roughness and gradient decrease as you move toward the mouth.
Diff: 3
Bloom's Taxonomy: Evaluating/Creating
Global Sci Out: G2
Section: 3.5 Streamflow Characteristics
Focus/Concepts: 3.5
ESLI: 5.6 Water shapes landscapes.

7) Compare and contrast the concepts of capacity and competence. How would periods of flooding affect the capacity and competency of a river?
Answer: Capacity refers to the maximum load of solid particles a stream can transport per unit of time. Competence is a measure of a stream's ability to transport particles based on size rather than quality. During periods of flooding the increase in discharge results in higher degrees of capacity and competence.
Diff: 3
Bloom's Taxonomy: Evaluating/Creating
Global Sci Out: G2
Section: 3.6 The Work of Running Water
Focus/Concepts: 3.6
ESLI: 5.6 Water shapes landscapes.

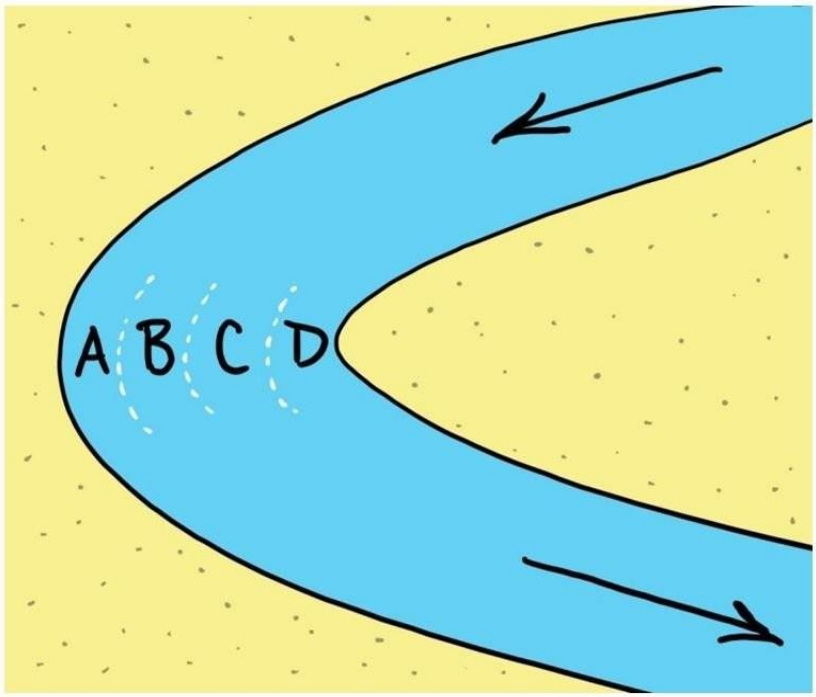
3.4 Visual Questions

1) Examine the sketch of a bend in a river. The arrows show the water flow direction. In which of the four lettered locations will the water be moving at the highest velocity?



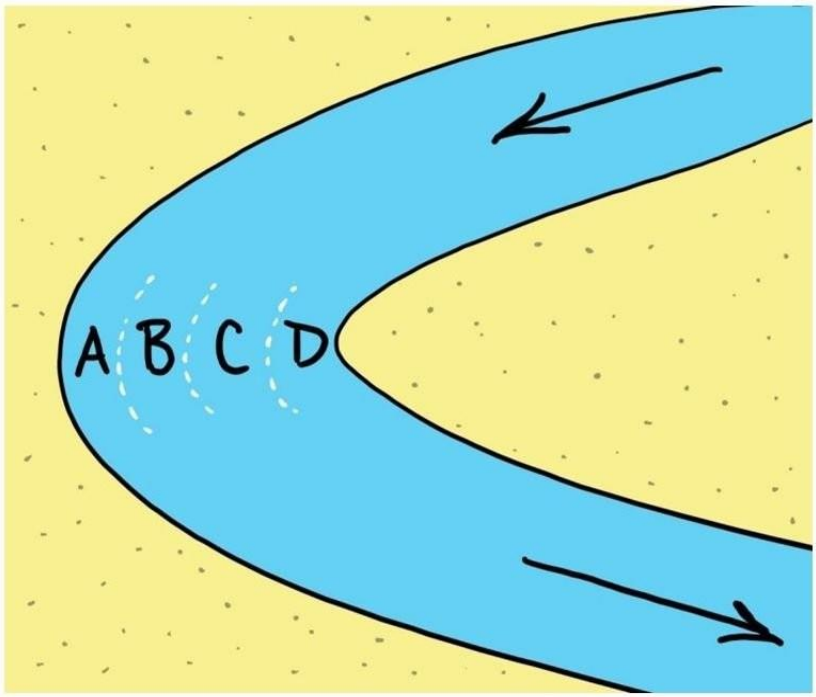
A) A
B) B
C) C
D) D
Answer: A
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

2) Examine the sketch of a bend in a river. The arrows show the water flow direction. In which of the four lettered locations will erosion take place?



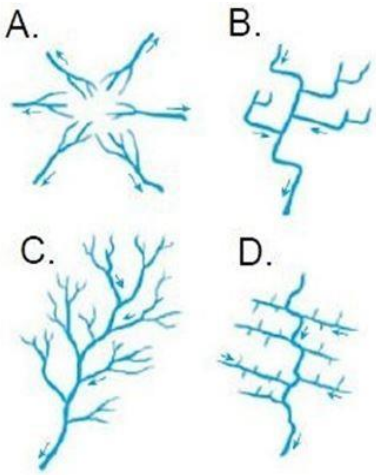
A) A
B) B
C) C
D) D
Answer: A
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

3) Examine the sketch of a bend in a river. The arrows show the water flow direction. In which of the four lettered locations is deposition most likely to occur?



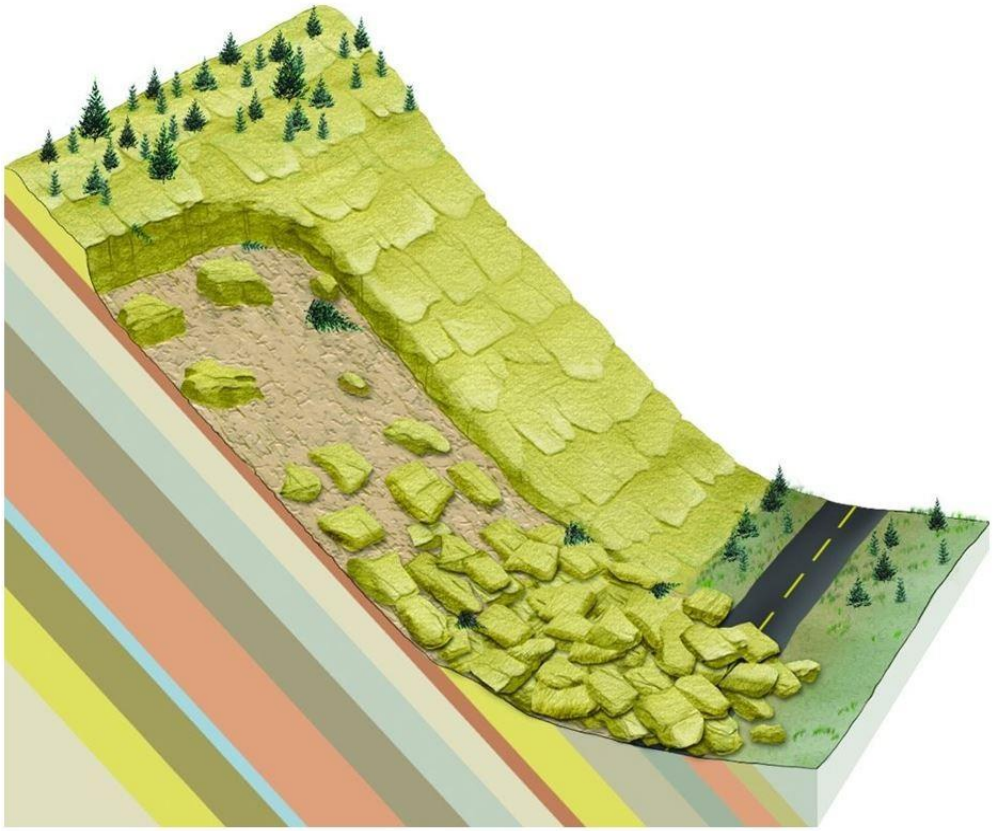
A) A
B) B
C) C
D) D
Answer: D
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

4) Which of the drainage patterns shown here might develop on relatively uniform surface materials?



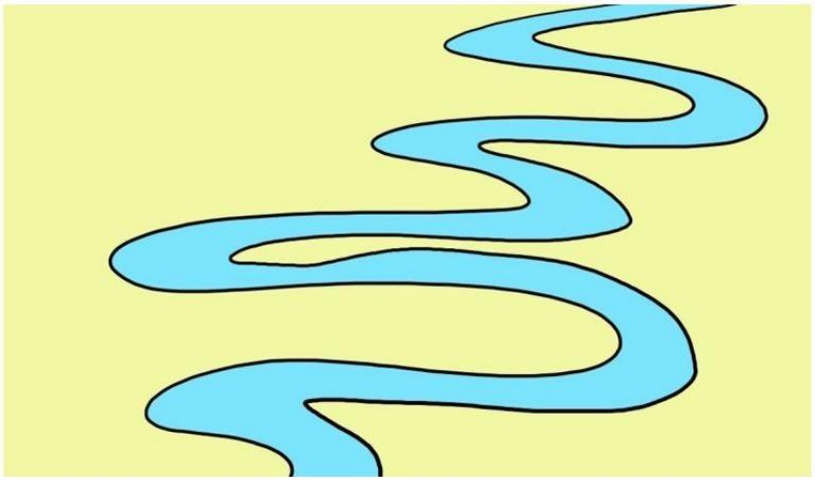
A) A
B) B
C) C
D) D
Answer: C
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.4 Running Water
Focus/Concepts: 3.4
ESLI: 5.6 Water shapes landscapes.

5) What is the specific form of mass wasting illustrated here?



A) point bar
B) rockslide
C) avalanche
D) cutbank
Answer: B
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.2 Mass Wasting: The Work of Gravity
Focus/Concepts: 3.2
ESLI: 5.6 Water shapes landscapes.

6) The river depicted in this drawing shows prominent _____.

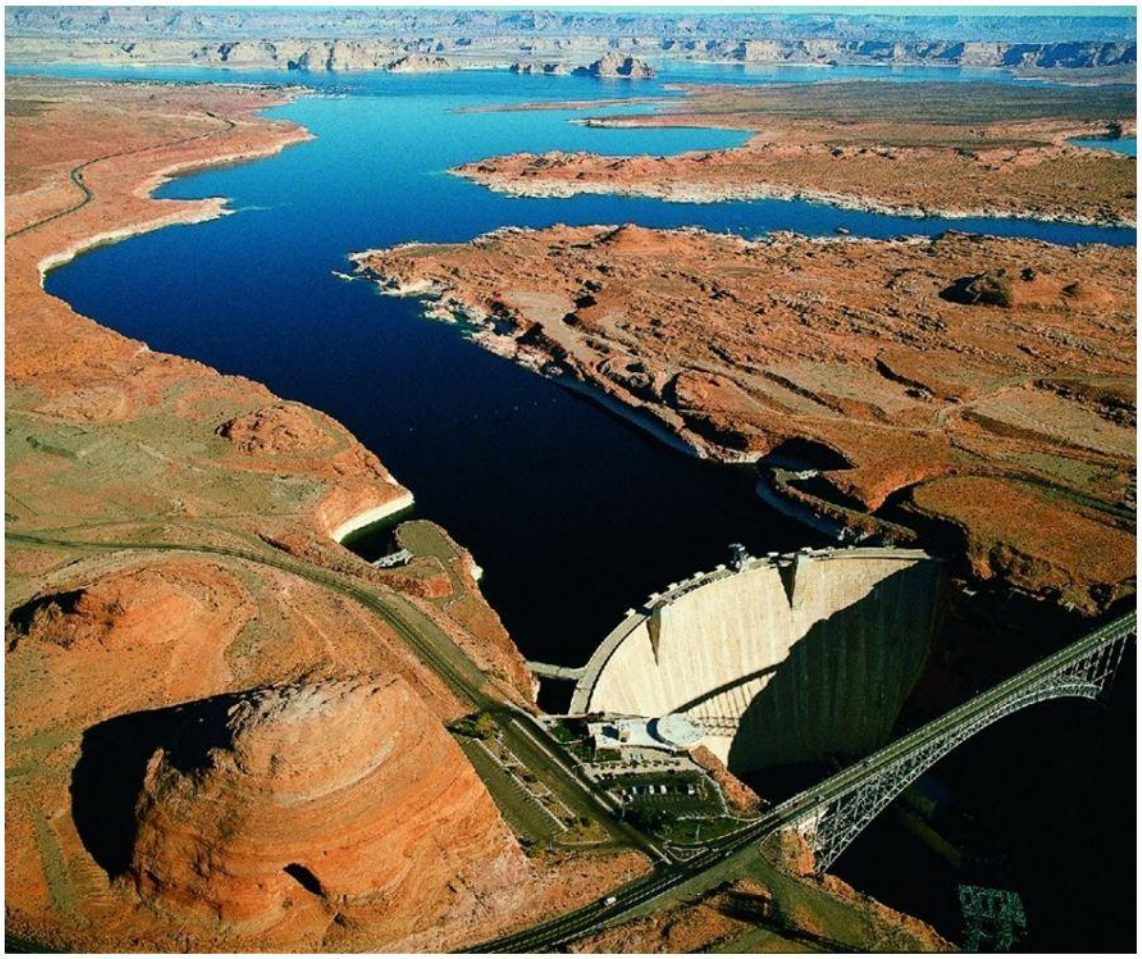


A) base levels
B) potholes
C) flooding
D) meandering
Answer: D
Diff: 1
Bloom's Taxonomy: Remembering/Understanding
Global Sci Out: G2
Section: 3.7 Stream Channels
Focus/Concepts: 3.7
ESLI: 5.6 Water shapes landscapes.

7) Examine this photograph. Identify the features seen here, and describe in detail the sequence of events which must have occurred in order to produce these features.

Answer: The photo shows incised meanders. Originally, the meanders probably developed on the floodplain of a stream that was relatively near base level. Then, a change in base level caused the stream to begin downcutting. One of two events could have occurred: Either the base level dropped, or the land on which the river flowed was uplifted. During the Ice Age, the ultimate base level dropped around the world, and many rivers incised downward. However, this photo appears to be in the arid American west, and so it's probably due to uplift of the Colorado Plateau beneath the meandering river.
Diff: 2
Bloom's Taxonomy: Applying/Analyzing
Global Sci Out: G2
Section: 3.8 Shaping Stream Valleys
Focus/Concepts: 3.8
ESLI: 5.6 Water shapes landscapes.

8) Examine the photo of Glen Canyon Dam in Arizona and the reservoir called Lake Powell that formed upstream of it. Describe what has happened to the base level on the Colorado River at this location since the dam was constructed. Make a prediction for what will happen at this location over the next several hundred years.



Answer: Glen Canyon Dam imposed a new local base level on the Colorado River at this location. As a result, the river upstream lost velocity, and shifted from being in the Zone of Erosion (Zone of Sediment Production) or the Zone of Transport to being in a new, temporary Zone of Deposition. Still waters of Lake Powell deposited their bed load and suspended load, filling in some of the space at the bottom of Lake Powell. Answers to the second part (predictions for the future) will vary, but one possibility is this: Without preventive maintenance, this massive sediment trap could eventually be filled with silt, and the waters of the Colorado River might overtop Glen Canyon Dam, creating a new waterfall. If the waterfall breaches the dam, then the river will relatively rapidly erode all of the new lake deposits and re-reveal Glen Canyon.
Diff: 3
Bloom's Taxonomy: Evaluating/Creating
Global Sci Out: G2
Section: 3.8 Shaping Stream Valleys
Focus/Concepts: 3.8
ESLI: 5.6 Water shapes landscapes.