Weathering Erosion & Deposition A – B1

1. The water table usually rises when there is
   (1) a decrease in the amount of infiltration
   (2) a decrease in the amount of surface area covered by vegetation
   (3) an increase in the amount of precipitation
   (4) an increase in the slope of the land

2. The largest particles that a stream deposits as it enters a pond are 8 centimeters in diameter. The minimum velocity of the stream is approximately
   (1) 100 cm/sec   (3) 300 cm/sec
   (2) 200 cm/sec   (4) 400 cm/sec

3. The generalized landscape regions of New York State are classified according to
   (1) bedrock structure and elevation
   (2) bedrock type and index fossils
   (3) latitude and longitude
   (4) climate and topography

4. The block diagrams below show two landscape regions labeled A and B.

   ![A and B diagrams](image)

   What is the most probable cause of the difference in surface features between A and B?
   (1) A is the result of a humid climate, while B is the result of a dry climate.
   (2) A is at a high elevation, while B is located at sea level.
   (3) A is a plateau region, while B is a mountainous region.
   (4) A is composed of igneous bedrock, while B is composed of sedimentary bedrock.

5. Which graph best represents the relationship between the discharge of a stream and the velocity of stream flow?

   ![Graphs](image)

6. The block diagram below shows a region that has undergone faulting.

   ![Faulting](image)

   Which map shows the stream drainage pattern that would most likely develop on the surface of this region?

   ![Drainage patterns](image)

7. The map below shows the bend of a large meandering stream. The arrows show the direction of stream flow. Letters A, B, and C are positions on the streambed where erosion and deposition data were collected.

   ![Stream bend](image)

   Which table best represents the locations where erosion and deposition are dominant and where an equilibrium exists between the two processes? [A check mark (✓) represents the dominant process for each lettered location.]

<table>
<thead>
<tr>
<th>Erosion</th>
<th>Equilibrium</th>
<th>Deposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>C</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

8. Four quartz samples of equal size and shape were placed in a stream. Which of the four quartz samples below has most likely been transported farthest in the stream?

   ![Quartz samples](image)
9. The diagrams below represent four different examples of one process that transports sediments.

Which process is shown in these diagrams?
1) chemical weathering  2) wind action  3) mass movement  4) rock abrasion

10. The cross section below shows a stream flowing downhill. Points A through D are locations in the stream.

At which point would most deposition occur?
1) A  2) B  3) C  4) D

11. A stream flowing at a velocity of 250 centimeters per second is transporting sediment particles ranging in size from clay to cobbles. Which transported particles will be deposited by the stream if its velocity decreases to 100 centimeters per second?
1) cobbles, only  2) cobbles and some pebbles, only  3) cobbles, pebbles, and some sand, only  4) cobbles, pebbles, sand, silt, and clay

12. The landscape diagram below shows a fan-shaped pattern of sediment deposits.

The fan-shaped pattern of these sediments is most likely the result of deposition by
1) glacial ice  2) ocean waves  3) running water  4) prevailing winds

13. The map below shows the location of Grenville-age bedrock found in the northeastern United States.

In which New York State landscapes is Grenville-age bedrock exposed at Earth’s surface?
1) Erie-Ontario Lowlands and St. Lawrence Lowlands  2) Catskills and Allegheny Plateau  3) Tug Hill Plateau and Atlantic Coastal Plain  4) Hudson Highlands and Adirondack Mountains

14. U-shaped valleys and parallel grooves in bedrock are characteristics of erosion by
1) mass movement  2) wave action  3) running water  4) glacial ice

15. The model shown below illustrates stream erosion between locations A and B in the stream.

Placing a second block under location A will cause the stream’s velocity to
1) decrease and the rate of erosion to decrease  2) decrease and the rate of erosion to increase  3) increase and the rate of erosion to decrease  4) increase and the rate of erosion to increase

16. Which agent of erosion was primarily responsible for forming the long, narrow, U-shaped valleys in the Finger Lakes region of New York State?
1) wind  2) landslides  3) meandering streams  4) continental glaciers
17. The process represented by A is
(1) precipitation  (3) condensation
(2) transpiration  (4) saturation

18. Rainwater will enter the ground at X if the ground is
(1) saturated and permeable
(2) saturated and impermeable
(3) unsaturated and permeable
(4) unsaturated and impermeable

19. The amount of runoff at Y will increase as the
(1) slope of the land decreases
(2) porosity of the soil increases
(3) evaporation rate exceeds the infiltration rate
(4) precipitation rate exceeds the infiltration rate

20. Which process in the water cycle is directly
responsible for cloud formation?
(1) condensation  (3) precipitation
(2) infiltration  (4) evaporation

21. A soil sample with a large amount of space between the particles will have a
(1) low permeability rate  (3) high porosity
(2) low infiltration rate  (4) high capillarity

22. The largest sediment particles that can be transported by a stream traveling at a velocity of
200 centimeters per second are
(1) boulders  (3) pebbles
(2) cobbles  (4) sand

23. Which two landscape regions in New York State have the oldest surface bedrock?
(1) Allegheny Plateau and Newark Lowlands
(2) Tug Hill Plateau and Erie-Ontario Lowlands
(3) Taconic Mountains and the Catskills
(4) Adirondack Mountains and Hudson Highlands

24. Which graph best represents the relationship between the slope of a river and the particle size that can be transported by that river?

1-10-22 What elevation and bedrock structure are generally found in the Catskills?
(1) low elevation and horizontal sedimentary bedrock structure
(2) high elevation and horizontal sedimentary bedrock structure
(3) low elevation and folded metamorphic bedrock structure
(4) high elevation and folded metamorphic bedrock structure

25. The map below shows a meandering stream. Points A, B, C, and D represent locations along the stream bottom.

At which location is the greatest amount of sediment most likely being deposited?
(1) A  (2) B  (3) C  (4) D

26. The diagram below shows the surface features of a landscape.

Based on the features shown, which erosional agent had the greatest effect on tree growth and the structures that humans have built on this landscape?
(1) running water  (3) prevailing wind
(2) moving ice  (4) mass movement
Base your answers to questions 27 through 31 on the passage and map below. The map shows the generalized landscape regions of Vermont.

**Landscape Regions of Vermont**

Most of Vermont’s landscape regions consist of ancient, weathered mountains that were covered by several ice sheets during the last ice age. When the ice melted, sand, cobbles, and boulders were deposited throughout the state. Vermont is divided into six landscape regions.

1. The Vermont Lowlands region has a mild climate, with Lake Champlain moderating its temperature.
2. The Green Mountains run the length of Vermont and were formed over 400 million years ago. Most of the bedrock is metamorphic and the region is known for its deposits of talc and asbestos.
3. The Taconic Mountains extend into New York State. Slate and marble are commonly mined in this region.
4. The Valley of Vermont is a narrow valley between two mountain ranges. Most of the bedrock in the region is limestone and marble.
5. The Vermont Piedmont covers the largest area of the state. This region consists of rolling hills and valleys. Granite mining is an important industry.
6. The Northeast Highlands is a mountainous region composed of granite bedrock.

**Generalized Landscape Regions of Vermont**

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**Questions 27 through 31**

27. The classification of landscape regions is primarily based on which factors?
   (1) climate, vegetation, and surface features
   (2) bedrock type, structure, and elevation
   (3) state boundaries, streams, and rivers
   (4) nearness to mountains, lakes, and oceans

28. Which Vermont landscape region is a continuation of New York State’s Champlain Lowlands landscape?
   (1) Vermont Lowlands
   (2) Valley of Vermont
   (3) Taconic Mountains
   (4) Green Mountains

29. During which geologic period did a major orogeny form the Taconic Mountains?
   (1) Cretaceous
   (2) Devonian
   (3) Permian
   (4) Ordovician

30. Some of the bedrock in the Green Mountains is actually green in color because of the presence of the mineral chlorite. Which other mineral can cause rocks to appear green?
   (1) sulfur
   (2) magnetite
   (3) olivine
   (4) halite

31. Which processes formed the granite that is mined in Vermont?
   (1) compaction and cementation of sediments
   (2) cooling and solidification of magma
   (3) uplift and weathering of bedrock
   (4) application of heat and pressure to shale

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32. The diagram below shows an outcrop of different layers of sandstone in a region receiving heavy rainfall. Which sandstone layer appears to be the least resistant to weathering?
   (1) A
   (2) B
   (3) C
   (4) D

33. Deposition within a meandering stream usually occurs on the inside of the curves because the
   (1) water velocity decreases
   (2) stream gradient increases
   (3) water is deeper
   (4) stream is narrower
34. Which process led to the formation of thick salt deposits found in the bedrock at some locations in New York State?
(1) melting  (3) condensation
(2) runoff   (4) evaporation

35. The diagram below shows a laboratory setup. The rubber band holds filter paper across the base of the open tube to hold the soil sample. The tube was placed in the water as shown. The upward movement of water is represented by arrows. The height of the water that moved upward within the soil was measured. Students repeated this procedure using soils with different particle sizes. Results of the experiment are shown in the data table.

![Diagram of laboratory setup]

**Data Table**

<table>
<thead>
<tr>
<th>Average Soil Particle Diameter (cm)</th>
<th>Height of Water in Column (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.006</td>
<td>30.0</td>
</tr>
<tr>
<td>0.2</td>
<td>8.0</td>
</tr>
<tr>
<td>1.0</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Results of this experiment lead to the conclusion that
(1) capillarity is greater in soils with larger particles
(2) capillarity is greater in soils with smaller particles
(3) permeability is greater in soils with larger particles
(4) permeability is greater in soils with smaller particles

36. New York State’s generalized landscape regions are identified primarily on the basis of elevation and
(1) bedrock structure   (3) geologic age
(2) climate zones     (4) latitude

37. What is the largest sediment that can be transported by a stream that has a velocity of 125 cm/sec?
(1) cobbles   (3) sand
(2) pebbles   (4) clay

38. The photograph below shows a valley.

![Photograph of a valley]

Which agent of erosion most likely produced this valley’s shape?
(1) wave action   (3) blowing wind
(2) moving ice   (4) flowing water

39. Which two landscape regions in New York State have the oldest surface bedrock?
(1) Allegheny Plateau and Newark Lowlands
(2) Tug Hill Plateau and Erie-Ontario Lowlands
(3) Taconic Mountains and the Catskills
(4) Adirondack Mountains and Hudson Highlands

40. Which characteristic would most likely remain constant when a limestone cobble is subjected to extensive abrasion?
(1) shape   (3) volume
(2) mass    (4) composition

41. The diagram below shows two identical containers filled with uniform particles that were sorted by size.

![Diagram of two containers]

Which characteristic is most likely the same for these particle-filled containers?
(1) infiltration rate   (3) capillarity
(2) water retention   (4) porosity
42. The groin structure will change the pattern of deposition along the shoreline, initially causing the beach to become
(1) wider on the western side of the groin
(2) wider on the eastern side of the groin
(3) narrower on both sides of the groin
(4) wider on both sides of the groin

43. Which two minerals are most likely found in the beach sand that was eroded from the headlands?
(1) quartz and olivine
(2) plagioclase feldspar and amphibole
(3) potassium feldspar and biotite
(4) pyroxene and calcite

44. The sediments that have been deposited by streams flowing into the lagoon are most likely
(1) sorted and layered
(2) sorted and not layered
(3) unsorted and layered
(4) unsorted and not layered

45. Which event will most likely occur during a heavy rainfall?
(1) Less sediment will be carried by the streams.
(2) An increase in sea level will cause more sediments to be deposited along the shoreline.
(3) The shoreline will experience a greater range in tides.
(4) The discharge from the streams into the lagoon will increase.

46. Which soil conditions normally result in the greatest amount of runoff?
(1) low permeability and gentle slope
(2) low permeability and steep slope
(3) high permeability and gentle slope
(4) high permeability and steep slope

47. Which event is an example of chemical weathering?
(1) rocks falling off the face of a steep cliff
(2) feldspar in granite being crushed into clay-sized particles
(3) water freezing in cracks in a roadside outcrop
(4) acid rain reacting with limestone bedrock

48. The entire area drained by a river and its tributaries is called a
(1) delta (3) valley
(2) watershed (4) floodplain

49. A meandering stream deposits most of its sediments on the
(1) inside of meanders where the stream flows faster
(2) inside of meanders where the stream flows slower
(3) outside of meanders where the stream flows faster
(4) outside of meanders where the stream flows slower

50. Which natural agent of erosion is mainly responsible for the formation of the barrier islands along the southern coast of Long Island, New York?
(1) mass movement (3) prevailing winds
(2) running water (4) ocean waves

51. Which profile best shows the general depositional pattern that occurs when water from a stream enters the ocean?

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<table>
<thead>
<tr>
<th></th>
<th>Stream</th>
<th>Ocean surface</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bedrock</td>
<td>Sand, Pebbles</td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td>Clays, Silt</td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td>Clays, Silt</td>
</tr>
<tr>
<td>(3)</td>
<td></td>
<td>Sand, Silt</td>
</tr>
<tr>
<td>(4)</td>
<td></td>
<td>Sand, Silt</td>
</tr>
</tbody>
</table>
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52. During a heavy rainstorm, runoff is most likely to occur if the surface soil is
(1) firmly packed clay-sized particles
(2) loosely packed sand-sized particles
(3) covered by trees, shrubs, and grasses
(4) unsaturated and has a gentle slope
53. By which process do plants add water vapor to the atmosphere?
(1) precipitation  (3) condensation
(2) transpiration  (4) absorption

54. The photograph below shows a large boulder of metamorphic rock in a field in the Allegheny Plateau region of New York State.

The boulder was most likely moved to this location by
(1) glacial ice  (3) streamflow
(2) prevailing wind  (4) volcanic action

55. The diagram below shows sand particles being moved by wind.

At which Earth surface locations is this process usually the most dominant type of erosion?
(1) deserts and beaches
(2) deltas and floodplains
(3) glaciers and moraines
(4) mountain peaks and escarpments

56. The map below shows a meandering river. Points A and B are locations on the banks of the river.

What are the dominant processes occurring at locations A and B?
(1) deposition at location A; erosion at location B
(2) erosion at location A; deposition at location B
(3) deposition at both locations A and B
(4) erosion at both locations A and B

57. The block diagrams below, labeled A, B, and C, show the relative elevation and rock structure of three different landscape regions.

Which set correctly identifies the landscape region shown in each block diagram?
(1) A–mountain, B–plateau, C–plain
(2) A–mountain, B–plain, C–plateau
(3) A–plateau, B–mountain, C–plain
(4) A–plateau, B–plain, C–mountain

Base your answers to questions 58 through 60 on the map of Long Island, New York. AB, CD, EF, and GH are reference lines on the map.

58. Which agent of erosion transported the sediments that formed the moraines shown on the map?
(1) water  (3) ice
(2) wind  (4) mass movement

59. The cross section below represents the sediments beneath the land surface along one of the reference lines shown on the map.

Along which reference line was the cross section taken?
(1) A  (2) CD  (3) EF  (4) GH

60. A major difference between sediments in the outwash and sediments in the moraines is that the sediments deposited in the outwash are
(1) larger  (3) more angular
(2) sorted  (4) older

61. Most sandstone bedrock is composed of sediment that was
(1) sorted by size and not layered
(2) sorted by size and layered
(3) unsorted and not layered
(4) unsorted and layered
Base your answers to questions 62 through 65 on the photographs and news article below.

FRANCONIA, N.H. — Crowds of visitors were drawn to Franconia Notch on Sunday to mourn the loss of New Hampshire’s well-known symbol — the Old Man of the Mountain granite profile.

The 700-ton natural formation was just a pile of rocks after breaking loose from its 1,200-foot-high mountainside perch. It was unclear when the outcropping fell because clouds had obscured the area Thursday and Friday; a state park trail crew discovered the collapse Saturday morning.

The famous mountain’s history dates millions of years. Over time, nature carved out a 40-foot-tall profile resembling an old man’s face, and it eventually became New Hampshire’s most recognizable symbol.

The Buffalo News, May 5, 2003

62. Which agent of erosion is most likely responsible for the collapse of the granite profile?
(1) running water      (3) wave action
(2) glacial ice            (4) mass movement

63. The granite bedrock formed when
(1) sediments were buried
(2) a volcano erupted
(3) magma cooled underground
(4) limestone recrystallized

64. The rock of the Old Man of the Mountain most likely includes a mineral with a composition of
(1) NaCl       (3) FeS₂
(2) SiO₂          (4) PbS

65. What does granite bedrock found high on a mountaintop indicate?
(1) The crust has been sinking.
(2) Global temperatures have cooled.
(3) A large amount of erosion has occurred.
(4) Sea level has risen.

Base your answers to questions 66 through 68 on the flowchart below, which shows a general overview of the processes and substances involved in the weathering of rocks at Earth’s surface. Letter X represents an important substance involved in both major types of weathering, labeled A and B on the flowchart. Some weathering processes are defined below the flowchart.

66. Which term best identifies the type of weathering represented by A?
(1) physical       (3) chemical
(2) biological      (4) glacial

67. Which substance is represented by X on both sides of the flowchart?
(1) potassium feldspar        (3) air
(2) hydrochloric acid          (4) water

68. Which weathering process is most common in a hot, dry environment?
(1) abrasion      (3) frost action
(2) carbonation     (4) hydrolysis

Definitions
Frost action — the breakup of rocks caused by the expansion of substance X
Abrasion — the wearing down of rocks or particles as they rub or bounce against other rocks
Exfoliation — the peeling away of large sheets of loosened material at the surface of a rock
Hydrolysis — the change in a material caused by contact with substance X
Carbonation — the change in a material caused by contact with carbonic acid
1. Which column contains particles with a diameter of 0.4 cm? [1]

2. Describe the relationship between the sediment size and the permeability that will be observed when water is poured through these sediments. [1]

3. An equal amount of water is poured through each column. On the grid below draw a line to show the relative amount of water retained in the sediment after the water flows through each column. [1]

<table>
<thead>
<tr>
<th>Data Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
</tbody>
</table>

4. The cross-sectional diagram below shows the stream entering the lake. On the diagram, indicate the expected pattern of deposition of the three particles by placing the letters A, B, and C in the appropriate boxes along the lake bottom. [1]

5. Explain why the particles are deposited after the stream enters the lake. [1]
Base your answers to questions 6 through 8 on the map and the stream data table located to the right. The map represents a stream flowing into a lake. An arrow shows the direction of streamflow. Points A and B are locations at the edge of the stream. Line AB is a reference line across the stream surface. Line CD is a reference line along the lake bottom from the mouth of the stream into the lake. The data table gives the depth of the water and distance from point A, in feet, along line AB.

<table>
<thead>
<tr>
<th>Distance from Point A (ft)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of Water (ft)</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>11</td>
<td>13</td>
<td>16</td>
<td>17</td>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

6. On the grid below construct a profile of the depth of water below line AB, following the directions.

- Mark an appropriate numerical scale showing equal intervals on the axis labeled “Depth of Water.” The zero (0) on the depth of water axis represents the stream surface. [1]
- Using the data table, plot with an X the depth of water at each distance from point A to point B. Connect the Xs with a smooth, curved line. Points A and B have already been plotted. [1]

7. Using the map and the data table, explain why the depth of water 20 feet from point A is different from the depth of water 20 feet from point B. [1]

8. The sediments being carried by the stream include clay, pebbles, sand, and silt. List these sediments in the most likely order of deposition from point C to point D. [1]