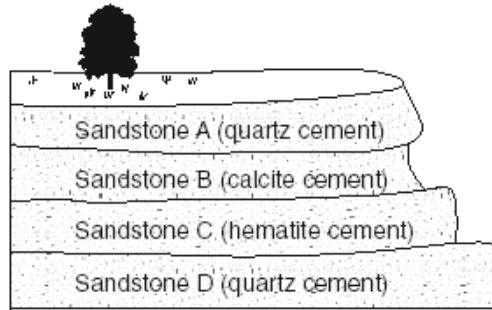


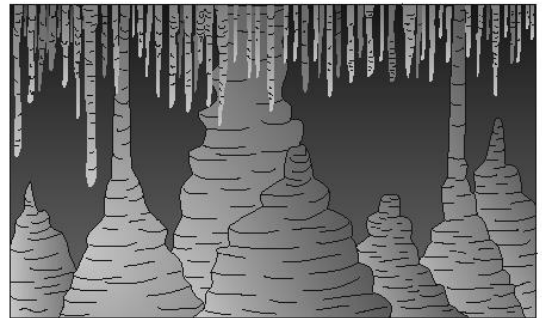
WEATHERING REVIEW

1. The diagram below shows an outcrop of different layers of sandstone in a region receiving heavy rainfall.

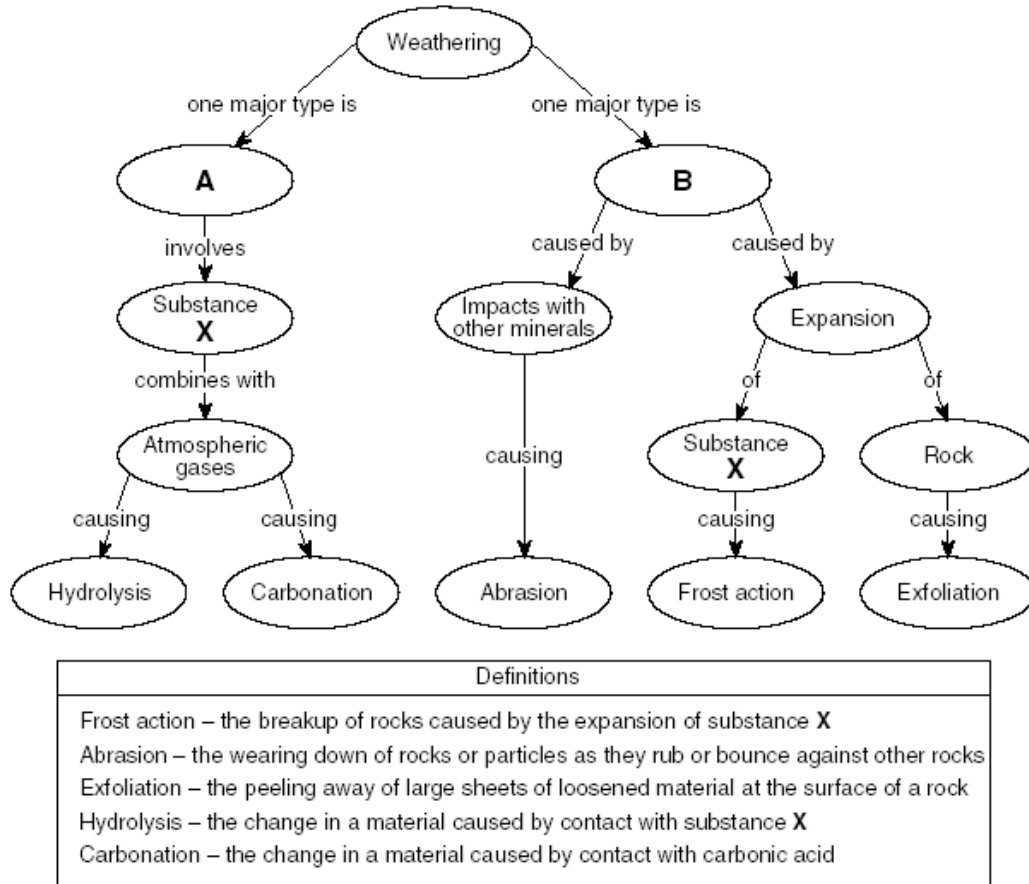


Which sandstone layer appears to be the *least* resistant to weathering?

- (1) A (3) C
(2) B (4) D
2. Which characteristic would most likely remain constant when a limestone cobble is subjected to extensive abrasion?
- (1) shape (3) volume
(2) mass (4) composition
3. 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
4. The diagram below shows some features in a cave. Which type of rock was chemically weathered by acidic groundwater to produce the cave and its features?
- (1) siltstone (3) quartzite
(2) basalt (4) limestone



Base your answers to questions 5 through 7 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.



5. Which term best identifies the type of weathering represented by A?

(1) physical	(3) chemical
(2) biological	(4) glacial

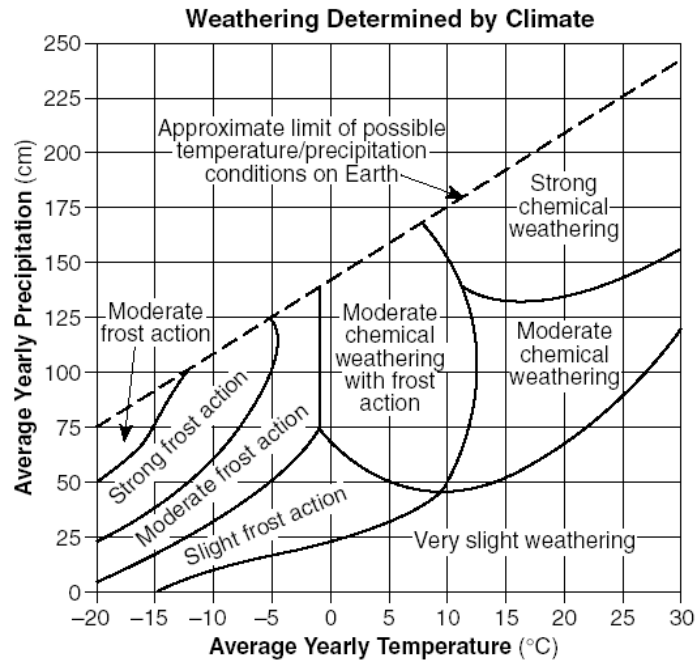
6. Which substance is represented by X on both sides of the flowchart?

(1) potassium feldspar	(3) hydrochloric acid
(2) air	(4) water

7. Which weathering process is most common in a hot, dry environment?

(1) abrasion	(3) frost action
(2) carbonation	(4) hydrolysis

Base your answers to questions 8 and 9 on the graph below, which shows the effect that average yearly precipitation and temperature have on the type of weathering that will occur in a particular region.

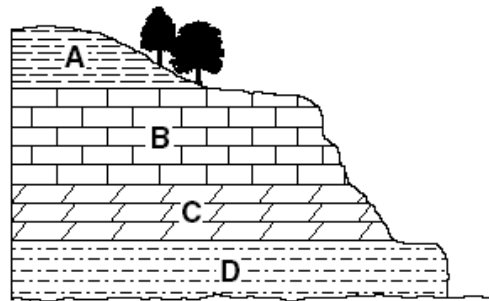


8. Which type of weathering is most common where the average yearly temperature is 5°C and the average yearly precipitation is 45 cm?
- | | |
|----------------------------------|----------------------------------------------------|
| (1) moderate chemical weathering | (3) moderate chemical weathering with frost action |
| (2) very slight weathering | (4) slight frost action |
9. The amount of chemical weathering will increase if
- (1) air temperature decreases and precipitation decreases
 - (2) air temperature decreases and precipitation increases
 - (3) air temperature increases and precipitation decreases
 - (4) air temperature increases and precipitation increases

10. The cross section shows sedimentary bedrock layers A, B, C, and D exposed at Earth's surface.

Which layer appears to be the *least* resistant to weathering?

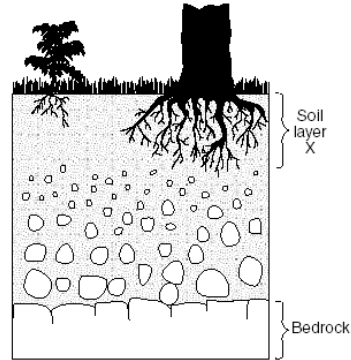
- | | |
|-------|-------|
| (1) A | (3) C |
| (2) B | (4) D |



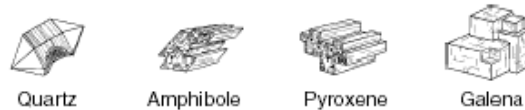
11. The cross section shows soil layer X, which was formed from underlying bedrock.

Which change would most likely cause soil layer X to increase in thickness?

- (1) a decrease in slope
- (2) a decrease in rainfall
- (3) an increase in biologic activity
- (4) an increase in air pressure



12. The diagram below shows four mineral samples, each having approximately the same mass.



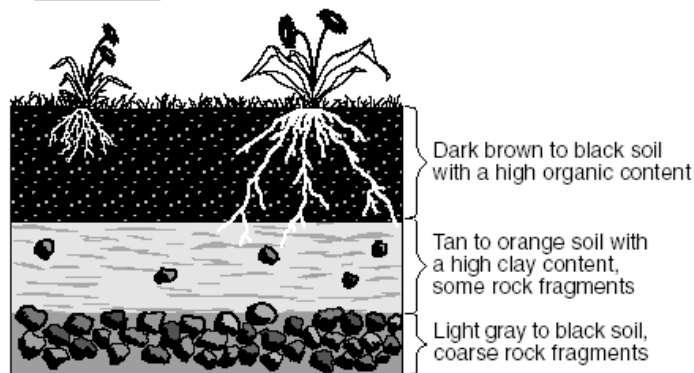
If all four samples are placed together in a closed, dry container and shaken vigorously for 10 minutes, which mineral sample would experience the most abrasion?

- (1) quartz
- (2) amphibole
- (3) pyroxene
- (4) galena

13. Why are Precambrian gneiss cobbles and boulders commonly found on top of the surface bedrock in the Catskills?

- (1) The surface bedrock of the Catskills is composed of Precambrian gneiss.
- (2) The surface bedrock of the Catskills has been overturned.
- (3) Many meteorites composed of gneiss have landed in the Catskills.
- (4) Glaciers transported these rocks from the Adirondacks to the Catskills.

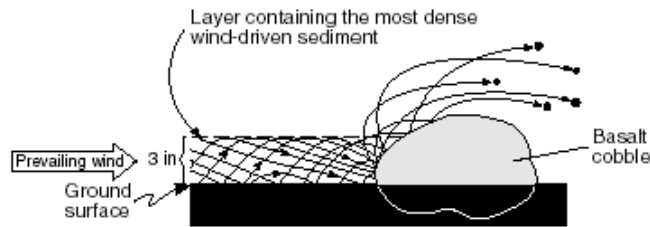
14. The cross section below shows layers of soil.



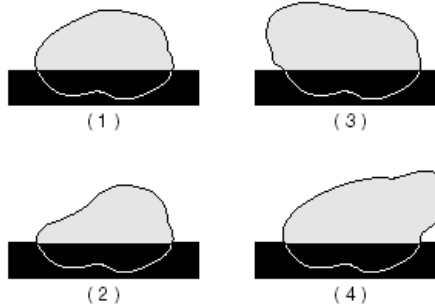
Which two processes produced the layer of dark brown to black soil?

- (1) melting and solidification of magma
- (2) erosion and uplifting
- (3) weathering and biologic activity
- (4) compaction and cementation

15. The cross section below shows the movement of wind-driven sand particles that strike a partly exposed basalt cobble located at the surface of a windy desert.



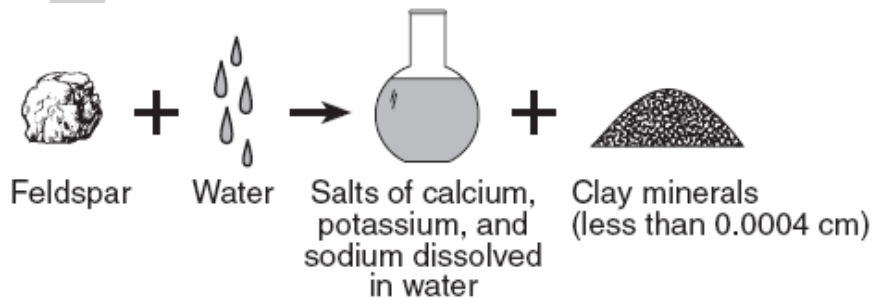
Which cross section best represents the appearance of this cobble after many years of exposure to the wind-driven sand?



16. 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?



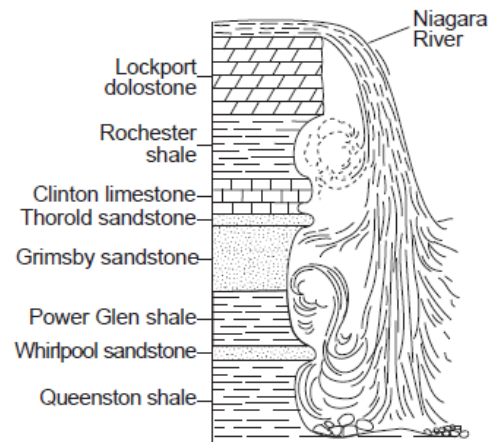
17. The diagram below represents a naturally occurring geologic process.



Which process is best illustrated by the diagram?

- (1) cementation
 (2) erosion
 (3) physical weathering
 (4) chemical weathering

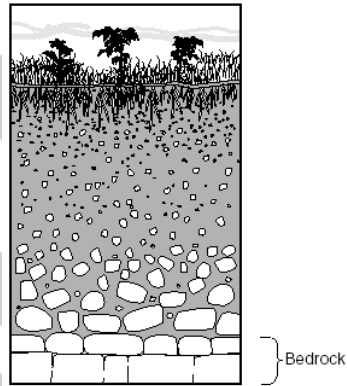
18. The generalized cross section below shows the sedimentary rock layers at Niagara Falls in western New York State.



Which rock layer appears to be most resistant to weathering and erosion?

- (1) Lockport dolostone
- (2) Rochester shale
- (3) Grimsby sandstone
- (4) Queenston shale

19. The cross section below shows a soil profile.



This soil was formed primarily by

- (1) erosion by glaciers
- (2) erosion by running water
- (3) capillarity and human activity
- (4) weathering and biological activity

20. Chemical weathering occurs most rapidly in climates which are

- | | |
|------------------|----------------|
| 1 moist and warm | 3 dry and cold |
| 2 moist and cold | 4 dry and warm |

21. Which change in the climate of New York State would most likely cause the greatest increase in chemical weathering of local bedrock?

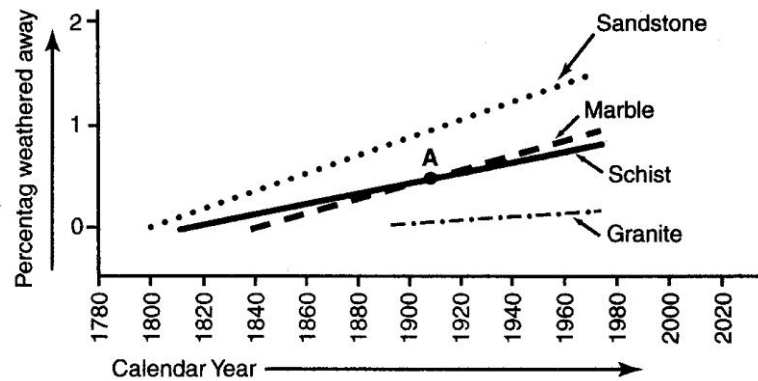
- | | |
|-----------------------------------|-----------------------------------------|
| 1 lower the temperature in winter | 3 higher atmospheric pressure in summer |
| 2 lower humidity in winter | 4 higher precipitation in summer |

22. Water is a major agent of chemical weathering because water

- 1 cools the surroundings when it evaporates
- 2 dissolves many of the minerals that make up rocks
- 3 has a density of about 1 gram per cubic centimeter
- 4 has the highest specific heat of all common Earth materials

23. The principal cause of the chemical weathering of rocks on the Earth's surface is
- 1 rock abrasion
 - 2 the heating and cooling of surface rock
 - 3 mineral reactions with air and water
 - 4 the expansion of water as it freezes
24. As particle size decreases, the rate of weathering will
- 1 increase
 - 2 decrease
 - 3 remain the same

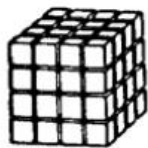
Base your answers to **questions 25 through 28** on your knowledge of Earth Science, the *Earth Science Reference Tables*, and the graph below which was prepared from the results of a study of four different types of cemetery stones. The graph shows the relationship between the ages of four cemetery stones and the percentage of each stone which had weathered away.



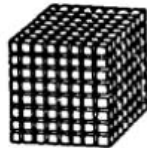
25. Which rock was found to have been exposed to weathering for the least number of years?
- 1 granite
 - 2 schist
 - 3 marble
 - 4 sandstone
26. In this study, which rock was most resistant to weathering?
- 1 marble
 - 2 schist
 - 3 granite
 - 4 sandstone
27. What total percentage of the schist should have weathered away by the year 2020?
- 1 1.0%
 - 2 2.0%
 - 3 0.5%
 - 4 1.5%
28. Studies have shown that pollutants added to the atmosphere in recent years are accumulating to cause an increase in the rate of weathering of marble. This factor should cause the line in the graph for marble in the future to
- 1 increase in slope (curve upward)
 - 2 decrease in slope (curve downward)
 - 3 remain at the same slope

Weathering Review #2

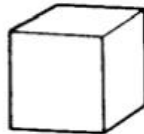
- Which is the best example of physical weathering?
 - the cracking of rock due to freezing and thawing of water
 - the transportation of sediment in a stream
 - the reaction of limestone with acid rainwater
 - the formation of a sandbar along the side of a stream
- Two tombstones, A and B, have each been standing in a cemetery for 100 years. The same style and size of lettering is clear on A but not on B. Which is the most probable reason for the difference?
 - B was more protected from the atmosphere than A.
 - A's minerals are more resistant to weathering than those of B.
 - A is more porous than B.
 - B is smaller than A.
- Which property of water makes frost action a common and effective form of weathering?
 - Water dissolves many Earth materials.
 - Water cools the surroundings when it evaporates.
 - Water expands when it freezes.
 - Water contracts when it freezes.
- Soil horizons (layers) develop as a result of
 - capillary action and solution
 - erosion and deposition
 - leaching and color changes
 - weathering processes and biological activity
- Why does one gram of finely ground salt dissolve more rapidly in water than an equal mass of coarsely ground salt?
 - grinding changes the chemical composition of salt
 - finely ground salt is less dense than coarsely ground salt
 - more surface area is exposed in finely ground salt
 - the solubility of salt is proportional to the mass of the salt
- Four samples of the same material with identical composition and mass were cut as shown in the diagrams below. When subjected to the same chemical weathering, which will weather the fastest?



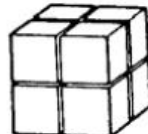
(1)



(2)



(3)



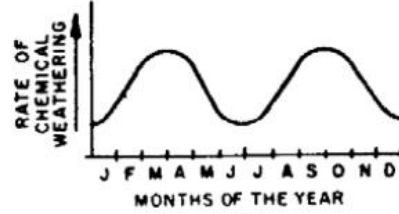
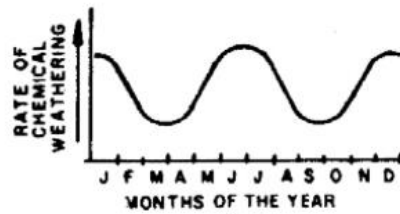
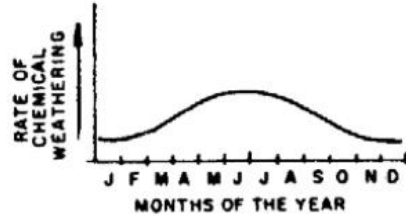
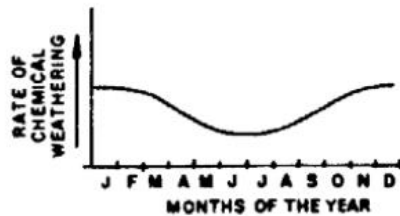
(4)

7. Two different kinds of minerals, A and B, were placed in the same container and shaken for 15 minutes. The diagrams below represent the size and shape of the various pieces of mineral before and after shaking.



What caused the resulting differences in shapes and sizes of minerals?

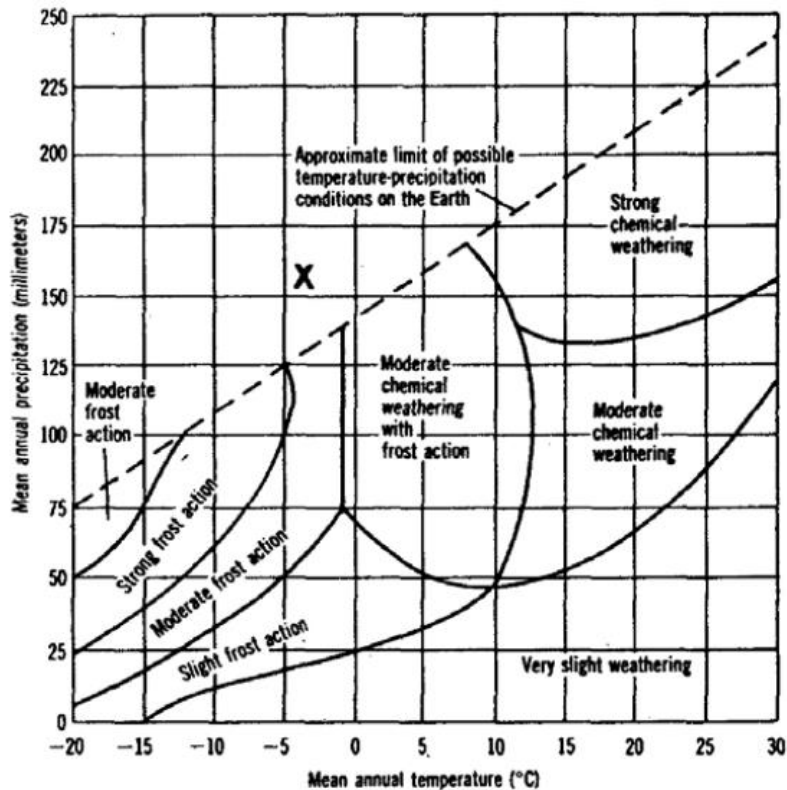
- 1 Mineral B was shaken harder.
 - 2 Mineral B had a glossy luster.
 - 3 Mineral A was more resistant to weathering.
 - 4 Mineral A consisted of smaller pieces before shaking began.
8. Assume that the rate of precipitation throughout the year is a constant. Which graph would most likely represent the chemical weathering of most New York State bedrock?



9. Transported rock materials are more common than residual rock materials in the soils of New York State. Which statement best explains this observation?
- 1 Solid rock must be transported to break.
 - 2 Weathering changes transported rock materials more easily than residual rock material.
 - 3 Most rock materials are moved by some agent of erosion at some time in their history.
 - 4 Residual rock material forms only from bedrock that is difficult to change into soil.

10. Limestone caves form as a result of
- 1 hydrolysis, a type of chemical weathering
 - 2 carbonation, a type of chemical weathering
 - 3 frost action, a type of physical weathering
 - 4 abrasion, a type of chemical weathering
11. Which correctly pairs the weathering process with its product?
- | | |
|-------------------------------|---------------------|
| 1 exfoliation → clay material | 3 hydrolysis → sand |
| 2 carbonation → calcite | 4 oxidation → rust |

Use the diagram below to answer questions 12-13.



12. Which climatic conditions would produce very slight weathering?
- 1 a mean annual temperature of 25°C and a mean annual precipitation of 100 mm
 - 2 a mean annual temperature of 15°C and a mean annual precipitation of 25 mm
 - 3 a mean annual temperature of 5°C and a mean annual precipitation of 50 mm
 - 4 a mean annual temperature of -5°C and a mean annual precipitation of 50mm
13. Why is no frost action shown for locations with a mean annual temperature greater than 13°C?
- 1 Very little freezing takes place at these locations.
 - 2 Large amounts of evaporation take place at these locations.
 - 3 Very little precipitation falls at these locations.
 - 4 Large amounts of precipitation fall at these locations.

14. Which change in the climate of New York State would most likely cause the greatest increase in chemical weathering of local bedrock?
- 1 lower the temperature in winter
 - 2 lower humidity in winter
 - 3 higher atmospheric pressure in summer
 - 4 higher precipitation in summer
15. Water is a major agent of chemical weathering because water
- 1 cools the surroundings when it evaporates
 - 2 dissolves many of the minerals that make up rocks
 - 3 has a density of about 1 gram per cubic centimeter
 - 4 has the highest specific heat of all common Earth materials
16. The principal cause of the chemical weathering of rocks on the Earth's surface is
- 1 rock abrasion
 - 2 the heating and cooling of surface rock
 - 3 mineral reactions with air and water
 - 4 the expansion of water as it freezes

The weathering of four different rock samples with different masses was studied. Each rock sample was placed in a separate beaker containing 500 milliliters of a dilute acid for 10 minutes. Bubbling was observed in some of the beakers. The data table below shows the mass of each sample, in grams, before placement in the acid and after removal from the acid.

Data Table

Rock	Mass Before (g)	Mass After (g)
limestone	19.72	19.64
granite	20.77	20.77
gneiss	26.83	26.83
marble	20.81	20.73

17. Which Earth process is being modeled in this experiment?
- (1) physical weathering in the hydrosphere
 - (2) physical weathering in the mesosphere
 - (3) chemical weathering in the hydrosphere
 - (4) chemical weathering in the mesosphere
18. Which table correctly shows the classification of the rock samples based on the amount of weathering during this experiment?

Group A	Group B
limestone marble	granite gneiss

(1)

Group A	Group B
limestone	granite marble gneiss

(3)

Group A	Group B
limestone granite gneiss	marble

(2)

Group A	Group B
limestone granite	gneiss marble

(4)

19. Approximately what percentage of the marble sample remained after the experiment?
- (1) 0.4%
 - (2) 8.0%
 - (3) 20.7%
 - (4) 99.6%

20. Which property of the gneiss sample prevented it from weathering?
- (1) crystalline texture
 - (2) mineral composition
 - (3) density
 - (4) cleavage