1 The diagram below shows a model of the water cycle. The arrows show the movement of water molecules through the water cycle. The circled numbers represent the processes that occur as the water molecules reach the different stages of the water cycle.



Complete the table below by identifying the name of the water cycle process occurring at each number.

Number	Water Cycle Process
1	
2	
3	
4	
5	
6	

2 Which surface soil type has the *slowest* permeability rate and is most likely to produce flooding?

(1)	pebbles	(3)	silt
(2)	sand	(4)	clay

- 3 A stream flowing at a velocity of 75 centimeters per second can transport
 - (1) clay, only
 - (2) pebbles, only
 - (3) pebbles, sand, silt, and clay, only
 - (4) boulders, cobbles, pebbles, sand, silt, and clay
- 4 The cross section below shows a profile of a sediment deposit.



(Drawn to scale)

The pattern of sediment size shown indicates that these sediments were most likely deposited within a

(1) landslide(2) drumlin

- (3) moraine(4) delta
- 5 What will be the most probable arrangement of rock particles deposited directly by a glacier?
 - (1) sorted and layered
 - (2) sorted and not layered
 - (3) unsorted and layered
 - (4) unsorted and not layered

- 6 Which agent of erosion is mainly responsible for the formation of the depressions occupied by both the kettle lakes and finger lakes found in New York State?
 - (1) wind (3) streams
 - (2) waves (4) glaciers
 - 7 The diagram below shows a section of a meander in a stream. The arrows show the direction of stream flow.



The streambank on the outside of this meander is steeper than the streambank on the inside of this meander because the water on the outside of this meander is moving

- (1) slower, causing deposition
- (2) faster, causing deposition
- (3) slower, causing erosion
- (4) faster, causing erosion
- 8 The cross sections below show a three-stage sequence in the development of a glacial feature.



Which glacial feature has formed by the end of stage 3?

- (1) kettle lake
- (2) finger lake

- (3) drumlin
- (4) parallel scratches

9 The map below shows barrier islands in the ocean along the coast of Texas.



Which agent of erosion most likely formed these barrier islands?

- (1) mass movement
- (2) wave action
- (3) streams(4) glaciers

10 The cross section below 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
- 11 The diagram below shows four mineral samples, each having approximately the same mass.

Amphibole



Quartz







Pyroxene

Galena

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

Base your answers to questions 12 through 13 on the diagram below, which shows a coastal region in which the land slopes toward the ocean. Point X is near the top of the hill, point Y is at the base of the hill, and point Z is a location at sea level. The same type of surface bedrock underlies this entire region. A stream flows from point X through point Y to point Z. This stream is not shown in the diagram.



12 Which cross section best shows the pattern of sediments deposited by the stream as it enters the ocean near point *Z*?



- 13 Compared to the stream velocity between point *X* and point *Y*, the stream velocity between point *Y* and point *Z* is most likely
 - (1) greater, since the slope of the land decreases
 - (2) greater, since the slope of the land increases
 - (3) less, since the slope of the land decreases
 - (4) less, since the slope of the land increases

Base your answers to questions 14 and 15 on the two graphs below, which show the relationship between the amount of rainfall during a storm and the amount of discharge into a nearby stream. Letter A represents the time when approximately 50% of the precipitation from the storm has fallen. Letter B represents the time when peak runoff from the storm is flowing into the stream. The delay is the difference in time between letters A and B on the graph. Graph I shows data before urbanization in an area. Graph II shows data after urbanization in the same area.



- 14 The delay time between points A and B on both graphs is due mainly to the time needed for
 - (1) groundwater to evaporate
 - (2) precipitation water to move into the streams
 - (3) green plants to absorb precipitation
 - (4) rainfall rate to decrease
- 15 How did urbanization affect delay time between points *A* and *B* and the maximum stream discharge?
 - (1) The delay time decreased, and the maximum discharge decreased.
 - (2) The delay time decreased, and the maximum discharge increased.
 - (3) The delay time increased, and the maximum discharge decreased.
 - (4) The delay time increased, and the maximum discharge increased.

Base your answers to questions 16 and 17 on the diagrams below. Diagrams *A*, *B*, and *C* represent three different river valleys.



16 Which bar graph best represents the relative gradients of the main rivers shown in diagrams *A*, *B*, and *C*?



- 17 Most sediments found on the floodplain shown in diagram A are likely to be
 - (1) angular and weathered from underlying bedrock
 - (2) angular and weathered from bedrock upstream
 - (3) rounded and weathered from underlying bedrock
 - (4) rounded and weathered from bedrock upstream

18 The diagram below shows tubes *A* and *B* partly filled with equal volumes of round plastic beads of uniform size. The beads in tube *A* are smaller than the beads in tube *B*. Water was placed in tube *A* until the pore spaces were filled. The drain valve was then opened, and the amount of time for the water to drain from the tube was recorded. The amount of water that remained around the beads was then calculated and recorded. Data table 1 shows the measurements recorded using tube *A*.



Data Table 1: Tube A							
water required to fill pore spaces	124 mL						
time required for draining	2.1 sec						
water that remained around the beads after draining	36 mL						

If the same procedure was followed with tube *B*, which data table shows the measurements most likely recorded?

Data Table 2: Tube B							
water required to fill pore spaces	124 mL						
time required for draining	1.4 sec						
water that remained around the beads after draining	26 mL						

(1)

Data Table 2: Tube B							
water required to fill pore spaces	168 mL						
time required for draining	3.2 sec						
water that remained around the beads after draining	46 mL						

(2)

	Data Table 2: Tube B							
	water required to fill pore spaces	124 mL						
	time required for draining	3.2 sec						
	water that remained around the beads after draining	36 mL						

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Data Table 2: Tube B							
water required to fill pore spaces	168 mL						
time required for draining	1.4 sec						
water that remained around the beads after draining	36 mL						

(4)

Base your answers to questions 19 through 21 on the data table below and on your knowledge of Earth science. The data table shows the average monthly discharge, in cubic feet per second, for a stream in New York State.

Data Table

Month	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Discharge (ft ³ /sec)	48	52	59	66	62	70	72	59	55	42	47	53

19 On the grid in your answer booklet, plot with an X the average stream discharge for *each* month shown in the data table. Connect the **X**s with a line.



Average Monthly Stream Discharge

20 State the relationship between this stream's discharge and the amount of suspended sediment that can be carried by this stream.

21 Explain *one* possible reason why this stream's discharge in April is usually greater than this stream's discharge in January.