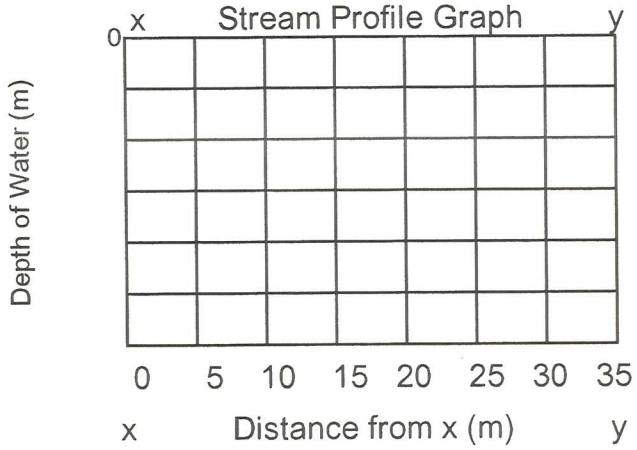
Name _____ Score _____

Topics 9 and 10 Free Response Answer Sheet

1, 2)



3) _____

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4) _____

5a) _____

5b) _____

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6) _____

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7) _____

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8) _____

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9) _____

_____

10) A _____ B _____ C _____ D _____

11) _____

_____

12) _____

_____

13) _____

_____

14)

15)

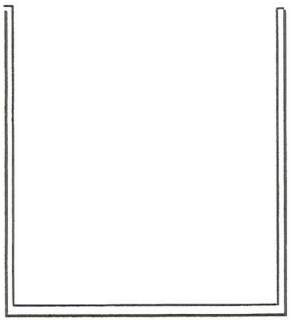
	Agent of Erosion	Surface Feature Formed
1)		
2)		
3)		

_____

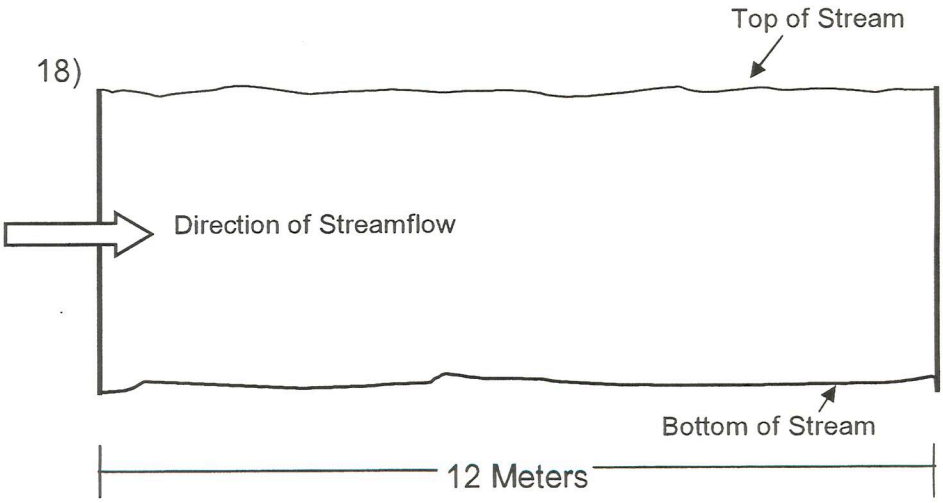
16a) _____

16b) _____

17)



18)



19) _____

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20) _____

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21) _____

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22) _____

23) _____

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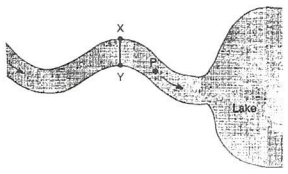
24) _____

_____

Topics 9&10 Free Response

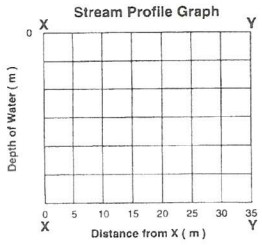
Base your answers to questions **1** through **4** on the diagram and the stream data table below.

The diagram represents a stream flowing into a lake. Arrows show the direction of flow. Point *P* is a location in the stream. Line *XY* is a reference line across the stream. Points *X* and *Y* are locations on the banks. The data table gives the depth of water in the stream along line *XY*.



Stream Data Table

	Location X							Location Y
Distance from X (meters)	0	5	10	15	20	25	30	35
Depth of Water (meters)	0	5.0	5.5	4.5	3.5	2.0	0.5	0



1. Use the information in the data table to construct a profile of the depth of water. Using the grid and directions below.

   On the vertical axis, mark an appropriate scale for the depth of water. Note that the zero (0) at the top of the axis represents the water surface.

2. Use the information in the data table to construct a profile of the depth of water. Using the grid and directions below.

   Plot the data for the depth of water in the stream along line *XY* and connect the points. (Distance is measured from point *X*.)

3. State why the depth of water near the bank at point *X* is different from the depth of water near the bank at point *Y*.

4. At point *P*, the water velocity is 100 centimeters per second. State the name of the largest sediment that can be transported by the stream at point *P*.

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5. Base your answers to the following questions on the notes below written by a student during a field trip.

   Good view from this hilltop; chilly and windy. We rested to catch our breath, then collected samples. Rocks are visible everywhere. There are boulders, cobbles, and pebbles of many sizes and shapes mixed together. These surface rock fragments are composed of metamorphic rock sitting on the limestone bedrock. The teacher showed us parallel scratches in the bedrock. I saw almost no soil.

   a State the agent of erosion that deposited most of the sediment found.
   b State one observation recorded by the student that supports this conclusion.

6. Base your answers to the following questions on the notes below written by a student during a field trip.

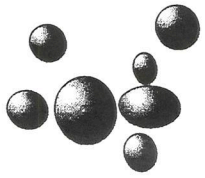
> It is cool in the shade, and the rock cliff above us still has some ice on it from winter. The rocks we are sitting on have sharp edges. Rock fragments at the bottom of the cliff are the same color as the cliff. Our teacher warned us to watch out for falling rocks.

Explain how ice in cracks on the cliff at location *C* may have helped cause weathering of the bedrock on the face of the cliff.

7. Base your answers to the following questions on the notes below written by a student during a field trip.

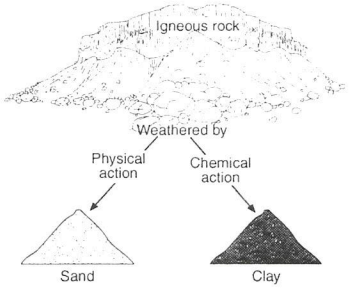
> It is rocky and the streambank is steep. Where we are standing, we can see a waterfall and rapids. It is cool by the water. From the streambed we collected pebbles and cobbles - some red, some white, others a mixture of many colors. The streambed is full of rocks of all sizes. The teacher warned us to be careful of the strong stream current.

Some samples of sediment collected from the streambed are shown below.



Explain why these samples are smooth and have rounded shapes.

Base your answers to questions **8** and **9** on the diagram below, which shows igneous rock that has undergone mainly physical weathering into sand and mainly chemical weathering into clay.

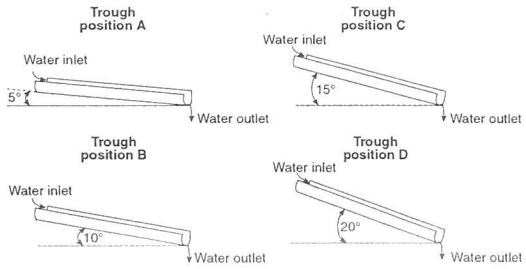


8. Compare the particle size of the physically weathered fragments to the particle size of the chemically weathered fragments.

9. Describe the change in temperature and moisture conditions that would cause an increase in the rate of chemical weathering into clay.

Base your answers to questions **10** through **12** on the information, diagram, and data table below.

A student used water, a trough, a timer, a Ping-Pong ball, and a metric ruler to investigate waterflow. The trough was set at different angles to compile the data in the data table provided below.



Data Table

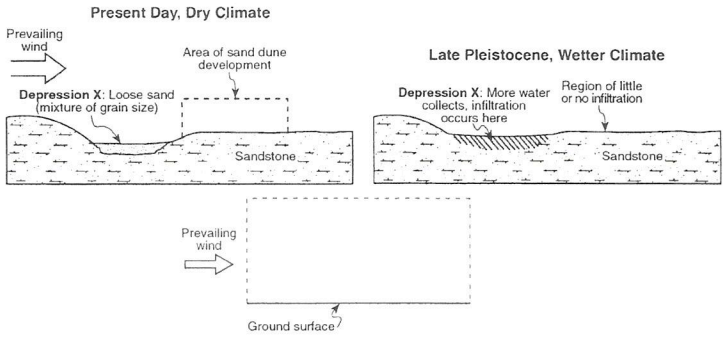
Trough Position	Slope (degrees)	Length of Trough (meters)	Time (seconds)	Velocity (meters/second)
A	5	1.5	4.4	
B	10	1.5	3.5	
C	15	1.5	2.7	
D	20	1.5	2.3	

10. Calculate the average velocity of the water flowing down the trough in each position, *A, B, C,* and *D*. Record your answers in the data table provided above. Express your answers to the *nearest tenth.*

11. State the purpose of the student's investigation.

12. Based on the data and the values you calculated for average stream velocity, state an appropriate conclusion to this investigation.

Base your answers to questions **13** and **14** on the cross section below. The cross section represent a part of Texas where weakly cemented sandstone is exposed at the surface. The mineral cement holding the sandstone grains together is calcite. Area *X* is a circular depression of loose sand that has been partially removed by prevailing winds. Sand dunes have developed downwind from depression *X*.



13. The cross section above (Late Pleistocene, Wetter Climate) shows this same area of Texas near the end of the last ice age when this area had a much wetter climate. More infiltration of rainwater was occurring at area *X* . Scientists infer that depression *X* was an area where slightly acidic rainwater collected and infiltrated into the sandstone.

    Describe the effect that the slightly acidic infiltrating water had on the calcite cement holding the sandstone together.

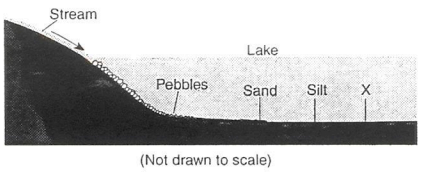
14. On the diagram of the area of sand dune development provided above, draw a sketch showing the general sideview of a sand dune formed by a wind blowing in the direction indicated. Your sketch should clearly show any variations in the slope of the sides of the dune.

15.

Agent of Erosion	Surface Feature Formed
(1)	
(2)	
(3)	

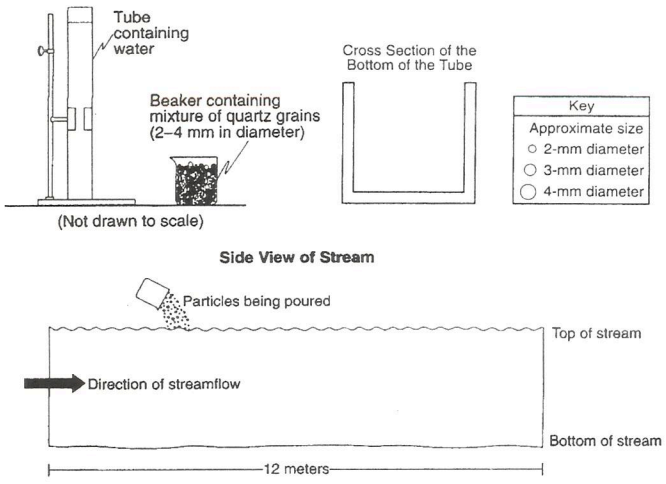
Complete the table above, by listing *three* agents of erosion and identifying *one* characteristic surface feature formed by *each* agent of erosion.

16. The cross section below illustrates the normal pattern of sediments deposited where a stream enters a lake. Letter *X* represents a particular type of sediment.



a Briefly explain why deposition of sediment usually occurs where a stream enters a lake.
b Name the type of sediment most likely represented by letter *X*.

Base your answers to questions **17** and **18** on the diagram below, which shows a clear plastic tube contain ing water and a beaker containing a mixture of rounded quartz grains of different sizes.

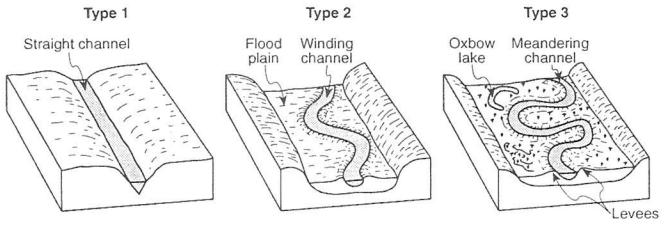


17. When the rounded quartz grains are poured all at once into the tube, the grains will settle to the bottom of the tube. On the cross section provided above, draw the approximate grain sizes and pattern of arrangement of the rounded quartz grains at the bottom of the tube.

18. The side-view diagram above shows the same mixture and amount of rounded quartz grains being poured all at once into a moving stream with a depth of 3 meters. Describe the general location of the 2-mm-diameter rounded quartz grains compared to the 4-mm-diameter rounded quartz grains as they are transported and deposited downstream.

Topics 9&10 Free Response

Base your answers to questions **19** through **21** on the block diagrams below, which show three types of streams with equal volumes.

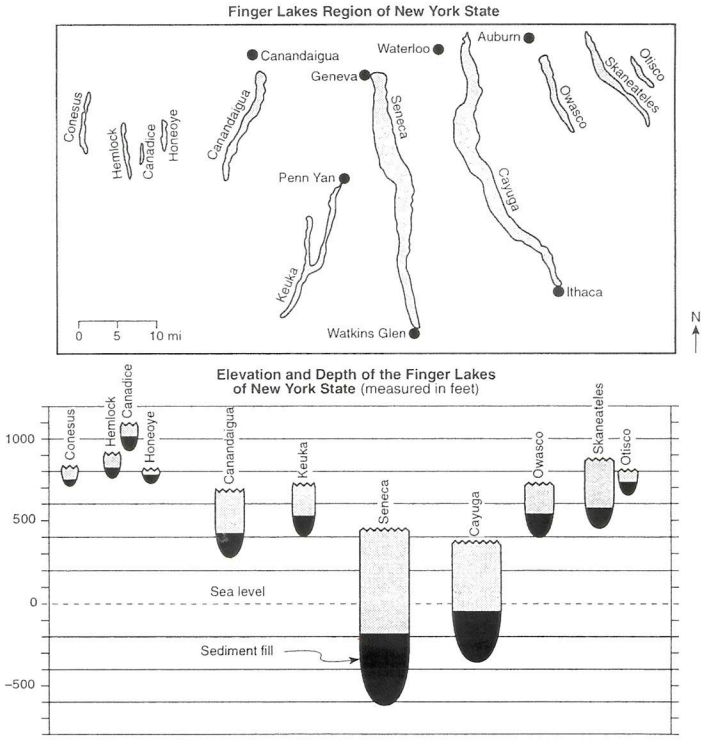


19. Explain how the differences between the type 1 and type 3 stream channels indicate that the average velocities of the streams are different.

20. Explain why the outside of the curve of a meandering channel experiences more erosion than the inside of the curve.

21. Explain how the cobbles and pebbles that were transported by these streams became smooth and rounded in shape.

Base your answers to questions **22** through **24** on the map and cross section of the Finger Lakes Region shown below and on your knowledge of Earth Science.



22. According to the cross section, how thick from top to bottom is the sediment fill in Seneca Lake?

23. State *one* possible explanation for the north-south orientation of the Finger Lakes.

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24. During some winters, a few of the Finger Lakes remain unfrozen even though the land around the lakes is frozen. Explain how the specific heat of water can cause these lakes to remain unfrozen.