

SAMPLE EARTH SCIENCE GLACIERS EXAMINATION

Name: _____

GRADE: _____ / 25

Class: _____ Date: _____

GRADE (%): _____ / 100

PART I - MULTIPLE CHOICE

1. _____

7. _____

13. _____

2. _____

8. _____

14. _____

3. _____

9. _____

15. _____

4. _____

10. _____

16. _____

5. _____

11. _____

6. _____

12. _____

PART II - SHORT ANSWERS

17. _____

18. _____

19. _____

20. _____

21. _____

22. _____

23. _____

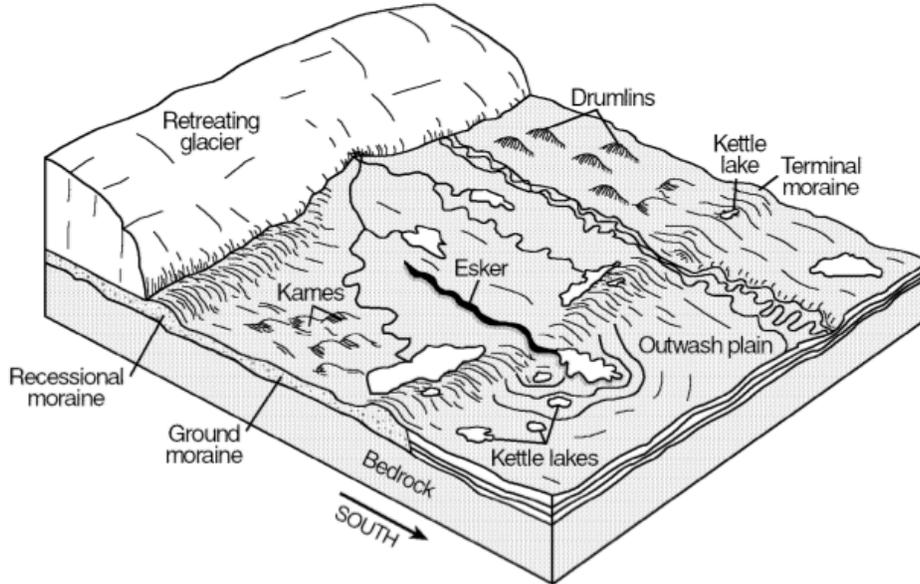
24. _____

25. _____

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Questions 1 and 2 refer to the following.

The block diagram below shows some of the landscape features formed as the *most recent* continental glacier melted and retreated across western New York State.



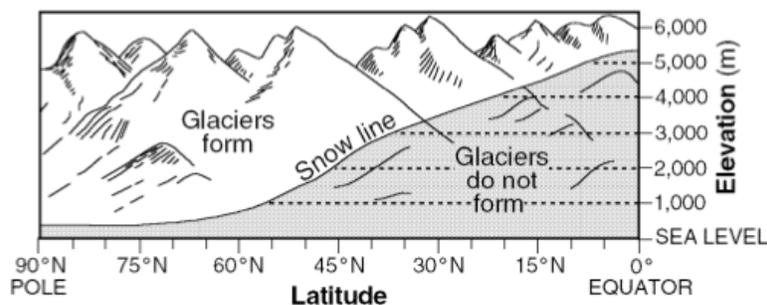
1. The shape of elongated hills labeled drumlins is most useful in determining the

A) rate of glacial movement	C) direction of glacial movement
B) age of the glacier	D) thickness of the glacial ice

2. The moraines pictured in the block diagram were deposited directly by the glacier. The sediments within these moraines are most likely

A) unsorted by size and unlayered	C) sorted by size and layered
B) unsorted by size and layered	D) sorted by size and unlayered

3. The graph below shows the snow line (the elevation above which glaciers form at different latitudes in the Northern Hemisphere).



- At which location would a glacier most likely form?
- A) 30° N latitude at an elevation of 3,000 m
 - B) 15° N latitude at an elevation of 4,000 m
 - C) 0° latitude at an elevation of 6,000 m
 - D) 45° N latitude at an elevation of 1,000 m

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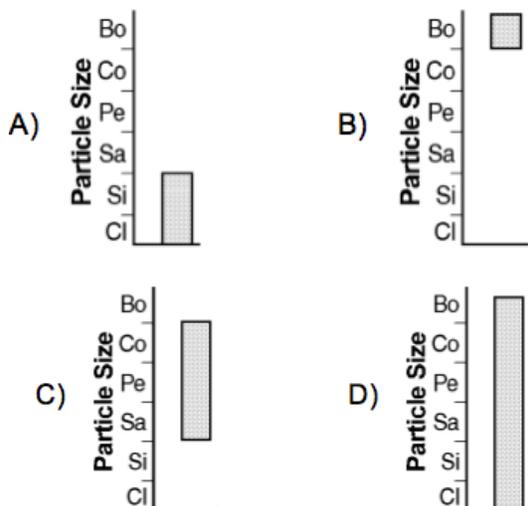
4. Outwash plains are formed as a result of deposition by

- A) ocean waves
- B) meltwater from glaciers
- C) landslides
- D) winds from hurricanes

5. Which graph *best* represents the range of particle sizes that can be carried by a glacier?

KEY:

Cl = clay	Sa = sand	Co = cobbles
Si = silt	Pe = pebbles	Bo = boulders



6. The occurrence of parallel scratches on bedrock in a U-shaped valley indicates that the area has most likely been eroded by

- A) a stream
- B) a glacier
- C) wind
- D) waves

7. The long, sandy islands along the south shore of Long Island are composed mostly of sand and rounded pebbles arranged in sorted layers. The agent of erosion that most likely shaped and sorted the sand and pebbles while transporting them to their island location was

- A) glaciers
- B) ocean waves
- C) wind
- D) landslides

8. Glaciers often form parallel scratches and grooves in bedrock because glaciers

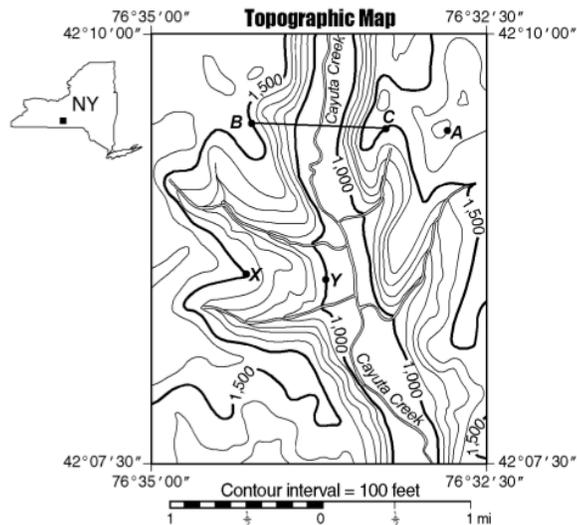
- A) drag loose rocks over Earth's surface
- B) deposit rounded sand in V-shaped valleys
- C) deposit sediment in unsorted piles
- D) continually melt and refreeze

9. Which statement *best* describes sediments deposited by glaciers and rivers?

- A) Glacial deposits are sorted, and river deposits are unsorted.
- B) Glacial deposits and river deposits are both unsorted.
- C) Glacial deposits and river deposits are both sorted.
- D) Glacial deposits are unsorted, and river deposits are sorted

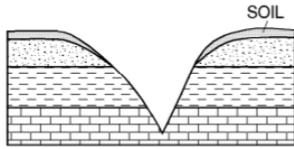
10. At the end of the Ice Age, the valley now occupied by Cayuta Creek (pictured at right) was a channel for southward flowing glacial meltwater. Into which present-day river valley did this meltwater most likely flow?

- A) Susquehanna River
- B) Genesee River
- C) Hudson River
- D) Delaware River



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11. The cross section below shows a V-shaped valley and the bedrock beneath the valley.



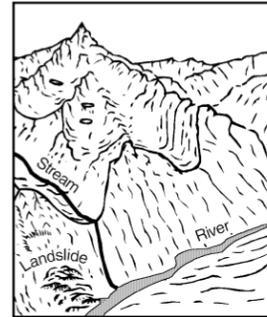
Which agent of erosion is responsible for cutting most V-shaped valleys into bedrock?

- A) glacial ice
- B) running water
- C) surface winds
- D) ocean waves

12. Which phase change requires water to gain 540 calories per gram?

- A) water vapor condensing
- B) liquid water freezing
- C) liquid water vaporizing
- D) solid ice melting

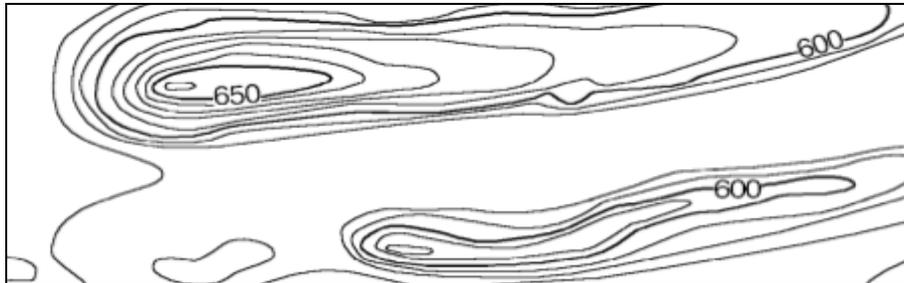
13. The diagram below shows a glacial landscape.



Which evidence suggests that ice created this landscape?

- A) U-shaped valleys
- B) sorted sediment on valley floor
- C) many stream valleys
- D) the landslide

Questions 14 & 15 refer to the following map that shows a portion of a drumlin field near Palmyra, New York



← N

14. The drumlins in the given map are composed of sediments transported and deposited directly by glacial ice. These sediments are likely to be:

- A) well sorted in horizontal layers
- B) unsorted and not in layers
- C) well-rounded, small particles
- D) found underwater, mixed with organic materials

15. From what compass direction did the glacial ice generally advance?

- A) west C) south B) east D) north

16. Where is the most deposition likely to occur?

- A) the mouth of a river, where it enters an ocean
- B) a site where glacial ice scrapes bedrock
- C) top of a slope in a streambed
- D) the side of a sand dune facing the wind

PART II: SHORT ANSWERS

Question 17 refers to the paragraphs below.

WATCHING THE GLACIERS GO

Mountain glaciers and ice caps in tropical areas of the world are melting fast and may vanish altogether by the year 2020. That was the chilling news last year from Lonnie Thompson, a geologist at Ohio State University's Byrd Polar Research Center who has been studying icy areas near the equator in South America, Africa, and the Himalayas for two decades.

It doesn't take a glacier scientist to see the changes. In 1977, when Thompson visited the Quelccaya ice cap in Peru, it was impossible not to notice a school bus-size boulder stuck in its grip. When Thompson returned in 2000, the rock was still there but the ice wasn't -- it had retreated far into the distance.

Most scientists believe the glaciers are melting because of global warming -- the gradual temperature increase that has been observed with increasing urgency during the past decade.

Last year a panel of the nation's top scientists, the National Research Council, set aside any lingering skepticism about the phenomenon, concluding definitively that average global surface temperatures are rising and will continue to do so.

--"Watching the Glaciers Go," *Popular Science*, vol. #7, January 2002

17. Describe *one* action humans could take to reduce the global warming that is melting the Quelccaya ice cap.

18. Some glaciers currently exist near Earth's equator due to the cold, snowy climate of certain locations. Which type of landform exists where these glaciers occur? _____

19. Describe the arrangement of sediment deposited directly from glaciers.

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Questions 20 and 21 refer to the following.

The notes below were written by a student during field trips to three different locations in New York State.

NOTES: 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.

20. State the agent of erosion that deposited most of the sediment that was found.

21. State *one* observation recorded by the student that supports this conclusion.

Question 22 refers to the paragraph below that describes some factors that affect Earth's climate.

Earth's climate is in a delicate state of balance. Many factors affect climate. Any small change in the factors may lead to long-term cooling or warming of Earth's atmosphere. For example, during the last 100 years, measurements have shown a gradual increase in atmospheric carbon dioxide. This change has been linked to an increase in Earth's average atmospheric temperature. Variations in the tilt of Earth's axis have been similarly linked to the occurrence of ice ages. Both the increases in temperature and the occurrence of ice ages have been linked to changes in global sea level.

22. State *one* way that the recent increase in average global temperature can cause changes in ocean water level.

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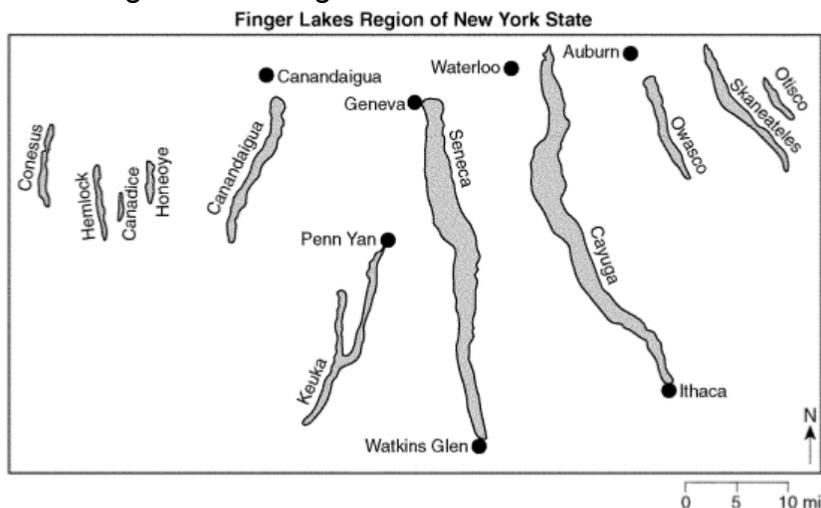
Questions 23 and 24 refer to the photograph below shows a mountainous region cut by a large valley in its center.



23. Describe additional geologic evidence that might be found on the valley floor that would support the idea that glacial ice formed the valley shown.

24. What characteristic of the large valley shown supports the inference that glacial ice formed the valley?

25. A map of the Finger Lakes Region is shown below.



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