tpo_15_passage_3

Glaciers are slowly moving masses of ice that have accumulated on land in areas where more snow falls during a year than melts. Snow falls as hexagonal crystals, but once on the ground, snow is soon transformed into a compacted mass of smaller, rounded grains. As the air space around them is lessened by compaction and melting, the grains become denser. With further melting, refreezing, and increased weight from newer snowfall above, the snow reaches a granular recrystallized stage intermediate between flakes and ice known as firn. With additional time, pressure, and refrozen meltwater from above, the small firn granules become larger, interlocked crystals of blue glacial ice. When the ice is thick enough, usually over 30 meters, the weight of the snow and firn will cause the ice crystals toward the bottom to become plastic and to flow outward or downward from the area of snow accumulation. Glaciers are open systems, with snow as the system's input and meltwater as the system's main output. The glacial system is governed by two basic climatic variables: precipitation and temperature. For a glacier to grow or maintain its mass, there must be sufficient snowfall to match or exceed the annual loss through melting, evaporation, and calving, which occurs when the glacier loses solid chunks as icebergs to the sea or to large lakes. If summer temperatures are high for too long, then all the snowfall from the previous winter will melt. Surplus snowfall is essential for a glacier to develop. A surplus allows snow to accumulate and for the pressure of snow accumulated over the years to transform buried snow into glacial ice with a depth great enough for the ice to flow. Glaciers are sometimes classified by temperature as faster-flowing temperate glaciers or as slower-flowing polar glaciers. Glaciers are part of Earth's hydrologic cycle and are second only to the oceans in the total amount of water contained. About 2 percent of Earth's water is currently frozen as ice. Two percent may be a deceiving figure, however, since over 80 percent of the world's fresh water is locked up as ice in glaciers, with the majority of it in Antarctica. The total amount of ice is even more awesome if we estimate the water released upon the hypothetical melting of the world's glaciers. Sea level would rise about 60 meters. This would change the geography of the planet considerably. In contrast, should another ice age occur, sea level would drop drastically. During the last ice age, sea level dropped about 120 meters. When snow falls on high mountains or in polar regions, it may become part of the glacial system. Unlike rain, which returns rapidly to the sea or atmosphere, the snow that becomes part of a glacier is involved in a much more slowly cycling system. Here water may be stored in ice form for hundreds or even hundreds of thousands of years before being released again into the liquid water system as meltwater. In the meantime, however, this ice is not static. Glaciers move slowly across the land with tremendous energy, carving into even the hardest rock formations and thereby reshaping the landscape as they engulf, push, drag, and finally deposit rock debris in places far from its original location. As a result, glaciers create a great variety of landforms that remain long after the surface is released from its icy covering. Throughout most of Earth's history, glaciers did not exist, but at the present time about 10 percent of Earth's land surface is covered by glaciers. Present-day glaciers are found in Antarctica, in Greenland, and at high elevations on all the continents except Australia. In the recent past, from about 2.4 million to about 10,000 years ago, nearly a third of Earth's land area was periodically covered by ice thousands of meters thick. In the much more distant past, other ice ages have occurred.

question 1

The word “interlocked” in the passage is closest in meaning to

A intermediate

B linked

C frozen

D fully developed

question 2

According to paragraph 1, which of the following does NOT describe a stage in the development of firn?

A Hexagonal crystals become larger and interlock to form a thick layer.

B Snow crystals become compacted into grains.

C Granules recrystallize after melting, refreezing, and further compaction.

D Grains become denser owing to reduced air space around them.

question 3

According to paragraph 2, surplus snow affects a glacier in all the following ways EXCEPT:

A It provides the pressure needed to cause glacial ice to flow.

B It offsets losses of ice due to melting, evaporation, and calving.

C It brings about the formation of firn in the snow it buries.

D It results in temperate glaciers that are thicker than polar glaciers.

question 4

Paragraph 2 implies that which of the following conditions produces the fastest

moving glaciers?

A A climate characteristic of the polar regions

B A thick layer of ice in a temperate climate

C Long, warm summers

D Snow, firn, and ice that have been buried for several years

question 5

Why does the author consider "the hypothetical melting of the world`s glaciers" ?

A To contrast the effects of this event with the opposite effects of a new ice age

B To emphasize how much water is frozen in glaciers

C To illustrate the disastrous effects of a warming trend

D To support the claim that glaciers are part of Earth’ s hydrologic cycle

question 6

The discussion in paragraph 3 answers all the following questions EXCEPT:

A Where is most of Earth’ s freshwater?

B What effect would a new ice age have on sea levels?

C What is the total amount of water in Earth’ s oceans?

D How much of Earth’ s water is in ice?

question 7

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

A As a glacier moves, it leaves behind rock formations that have been engulfed,

pushed, and dragged by the glacier.

B Glaciers reshape the landscape by carving into rock and transporting the resulting debris to distant locations.

C Glaciers carve the hardest rock formations with great energy and slowly reshape them into debris.

D The tremendous energy of slowly moving glaciers transports and finally deposits rock debris into large rock formations.

question 8

According to paragraph 5, in what way is the present time unusual in the history of Earth?

A There are glaciers.

B More land is covered by glaciers than at any time in the past.

C There is no ice age.

D No glaciers are found in Australia.

question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage.

Glaciers are slowly moving masses of ice that have accumulated on land in areas where more snow falls during a year than melts. Snow falls as hexagonal crystals, but once on the ground, snow is soon transformed into a compacted mass of smaller, rounded grains. [] As the air space around them is lessened by compaction and melting, the grains become denser. [] With further melting, refreezing, and increased weight from newer snowfall above, the snow reaches a granular recrystallized stage intermediate between flakes and ice known as firn. [] With additional time, pressure, and refrozen meltwater from above, the small firn granules become larger, interlocked crystals of blue glacial ice. [] When the ice is thick enough, usually over 30 meters, the weight of the snow and firn will cause the ice crystals toward the bottom to become plastic and to flow outward or downward from the area of snow accumulation. Glaciers are open systems, with snow as the system's input and meltwater as the system's main output. The glacial system is governed by two basic climatic variables: precipitation and temperature. For a glacier to grow or maintain its mass, there must be sufficient snowfall to match or exceed the annual loss through melting, evaporation, and

calving, which occurs when the glacier loses solid chunks as icebergs to the sea or to large lakes. If summer temperatures are high for too long, then all the snowfall from the previous winter will melt. Surplus snowfall is essential for a glacier to develop. A surplus allows snow to accumulate and for the pressure of snow accumulated over the years to transform buried snow into glacial ice with a depth great enough for the ice to flow. Glaciers are sometimes classified by temperature as faster-flowing temperate glaciers or as slower-flowing polar glaciers. Glaciers are part of Earth's hydrologic cycle and are second only to the oceans in the total amount of water contained. About 2 percent of Earth's water is currently frozen as ice. Two percent may be a deceiving figure, however, since over 80 percent of the world's fresh water is locked up as ice in glaciers, with the majority of it in Antarctica. The total amount of ice is even more awesome if we estimate the water released upon the hypothetical melting of the world's glaciers. Sea level would rise about 60 meters. This would change the geography of the planet considerably. In contrast, should another ice age occur, sea level would drop drastically. During the last ice age, sea level dropped about 120 meters. When snow falls on high mountains or in polar regions, it may become part of the glacial system. Unlike rain, which returns rapidly to the sea or atmosphere, the snow that becomes part of a glacier is involved in a much more slowly cycling system. Here water may be stored in ice form for hundreds or even hundreds of thousands of years before being released again into the liquid water system as meltwater. In the meantime, however, this ice is not static. Glaciers move slowly across the land with tremendous energy, carving into even the hardest rock formations and thereby reshaping the landscape as they engulf, push, drag, and finally deposit rock debris in places far from its original location. As a result, glaciers create a great variety of landforms that remain long after the surface is released from its icy covering. Throughout most of Earth's history, glaciers did not exist, but at the present time about 10 percent of Earth's land surface is covered by glaciers. Present-day glaciers are found in Antarctica, in Greenland, and at high elevations on all the continents except Australia. In the recent past, from about 2.4 million to about 10,000 years ago, nearly a third of Earth's land area was periodically covered by ice thousands of meters thick. In the much more distant past, other ice ages have occurred.

question 10

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

A. Glaciers, which at present contain 80 percent of Earth’ s freshwater, form when accumulated snow is compressed and recrystallized into ice over a period of years.

B. When glacial ice reaches a depth of 30 meters, the weight of the ice causes ice crystals at the bottom to flow, and the resulting movement of the glacier carves the landscape.

C. When there are glaciers on Earth, water is cycled through the glacier system, but the cycle period may be hundreds of thousands of years during periods of ice ages.

D. If global warming melted the world' s glaciers, sea level would rise about 60 meters worldwide.

E. The glacial system is governed by precipitation and temperature in such a way that glaciers cannot form in temperate latitudes.

F. Glaciers have had little effect on Earth' s surface because only 2 percent of Earth' s water is currently contained in glaciers, and there are fewer glaciers now than at most times in the past.