Blizzard Bag #1

Lesson 4.2 Drilling for History

Read the attached article and answer the following questions.

Due: 10 days after the calamity day

Lesson 4.2 Drilling for History

ice sheet: a massive, thick covering of glacial ice; the Antarctic ice sheet is the largest mass of ice on Earth, and it contains more than 60 percent of Earth's fresh water

EPICA: acronym for the *European Project for Ice Coring in Antarctica*

glacials: the coldest periods during ice ages, when glaciers extend from the poles to cover large portions of Earth

interglacials: the warmest periods during ice ages, lasting somewhere between 10,000 and 30,000 years

According to ice core analysis, Earth's atmosphere contains more carbon dioxide today than it has in the last 800,000 years, and levels have risen at a faster rate than ever before.

Some ice cores have also been taken from the tops of Earth's tallest mountains. However, global warming is melting these once-permanent features, and a race is on to get samples before it's too late.

What can scientists learn from ice samples taken from the frozen polar regions?

On the barren, frozen continent of Antarctica, a group of scientists worked for nearly 10 years—from 1996 to 2004—to complete a single task. They bored a single, narrow hole straight down through the thick **ice sheet** and removed long, cylindrical pieces of ice, one after another, until they had a series of them stretching more than a mile and a half. The **EPICA** ice core is still the longest one ever removed from anywhere on Earth. It contains over 750,000 years of historical information about Earth's climate.

Ice cores contain surprisingly precise information about temperatures and other atmospheric conditions that occurred in Earth's past. Like the rings inside tree trunks that were created with each year's new growth, ice cores contain layers that were created with each season's snowfall. The winter snow that falls on polar regions is dense and hard compared to the fluffier snow that falls during summer. Ice cores contain alternating shades of dark, dense layers created by winter snows and light layers created by summer snows. One light and one dark layer combine to show a single year in Earth's past. The layers in an ice core that are nearest to Earth's surface came from more recent years, and the layers become older the deeper they go.

As new layers of snow accumulate, they compress the lower layers and trap air and particles from the atmosphere into the snow. Scientists can analyze each layer for its chemical content to find great amounts of information about Earth's atmospheric conditions in the past. Temperature and humidity levels can be determined by how much of certain chemicals are found. The presence or absence of other chemicals can tell scientists how high sea levels were, how much carbon dioxide was in the air, or what the sun's activity was at the time. Ash found in a layer can even indicate that a volcano erupted somewhere in the world.

The EPICA ice core revealed that Earth has experienced eight **glacials** during the last 800,000 years, with warmer periods, called **interglacials**, occurring every 100,000 years or so. Human civilization arose during the most recent interval of warm weather, and scientists estimate that this current interglacial should last about another 15,000 years. However, an increase in greenhouse gases is reversing what should be a long period of cooling off, and average temperatures are rising instead. Is the next glacial period simply on hold, or has this natural cycle been interrupted for good?

NAME _____

Circle the letter of the best answer to each question below.

1. The EPICA ice core revealed that
   - **a.** Earth's climate has remained remarkably stable for nearly a million years.
   - **b.** carbon dioxide levels were highly toxic half a million years ago.
   - **c.** Earth has experienced eight ice ages during the last 800,000 years.
   - **d.** Both b and c

2. The different layers in an ice core are visible because
   - **a.** the snow that falls during winter is different from the snow that falls in summer.
   - **b.** the ice freezes at different temperatures from one year to the next.
   - **c.** strong winds that blow only in winter leave obvious marks on the polar ice.
   - **d.** each summer the top layer of snow melts and creates a visible line in the ice core.

Write your answers on the lines below.

3. Why do ice cores taken from polar regions contain much older information about Earth's climate than ice cores taken from mountaintops?

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4. How do gases and particles get trapped in the different layers in an ice core?

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5. The oldest layers in an ice core are thinner and harder to distinguish from one another compared to the more recent layers. Why do you think this is?

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Unifying Concepts and Processes

One of the most important steps in analyzing data taken from an ice core is to compare it with data taken from another ice core that came from somewhere far away. Why do think this comparison is important?

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