

Brain POP[®] CARBON DATING

Date: _____

Name: _____

Class: _____

1 How is an isotope different from the standard form of a chemical element?

- A It has a different number of protons
- B It has a different number of neutrons
- C It has a different number of electrons
- D It has a different number of positrons

2 Compared to the amount of carbon atoms on Earth, the amount of radioactive carbon atoms is infinitesimal. In this sentence, what is the best synonym for "infinitesimal"?

- A Tiny
- B Large
- C Equal
- D Dangerous

3 Which of the following best describes the nucleus of an atom of carbon-14?

- A Four protons, 10 neutrons
- B Six protons, eight neutrons
- C Eight protons, six neutrons
- D 10 protons, four neutrons

4 What is radioactive decay?

- A The physical wear and tear that ancient artifacts exhibit over long periods of time
- B The ability of radioactive atoms to destroy other atoms
- C The effect of exposing radioactive material to the human body
- D The ability of radioactive elements to decay into different elements over time

5 What is the relationship between carbon-14 and nitrogen?

- A Nitrogen and carbon-14 react to form radioactive elements
- B Over time, nitrogen becomes carbon-14
- C Over time, carbon-14 becomes nitrogen
- D Carbon-14 can be used to date ancient nitrogen

6 Let's say you have a sample of 10 milligrams of carbon-14. How many milligrams will you have in 5,700 years?

- A 5 mg
- B 10 mg
- C 0 mg
- D 20 mg





7 How much carbon-14 do you have in your system today, compared with the amount you had when you were born?

- A More
- B Less
- C The same amount
- D None

8 What can you learn about an organism from the amount of carbon-14 in its remains?

- A How long ago it died
- B What its diet consisted of
- C Which biological kingdom it belonged to
- D Which living animals it's most closely related to

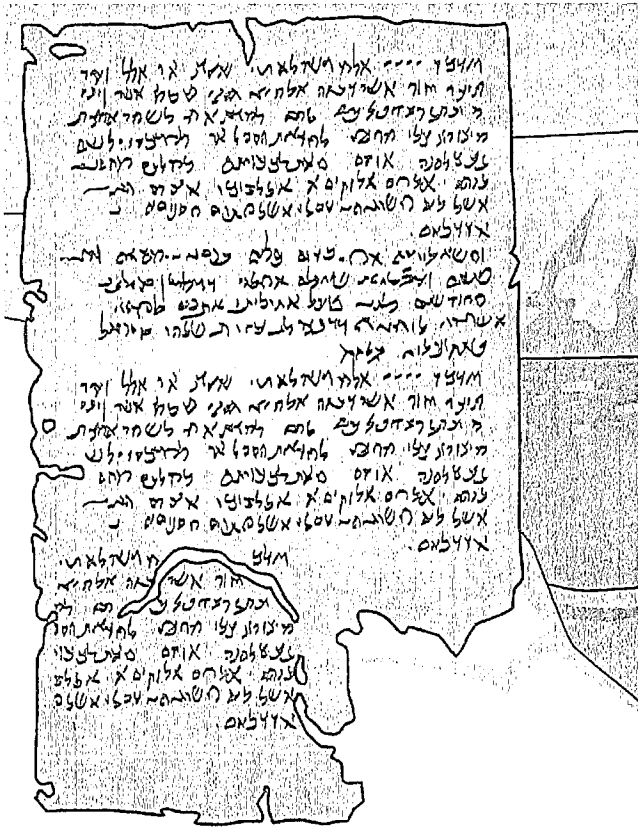
9 Which of the following items can be dated with carbon-14?

- A 
- B 
- C 
- D 

10 Why can't carbon-14 dating be used on dinosaur remains? Choose the best answer.

- A The remains of living creatures cannot be accurately dated with carbon-14
- B The carbon-14 isotope did not exist during the age of the dinosaurs
- C Dinosaurs were reptiles who had no carbon-14 in their systems
- D Carbon dating is only accurate to 60,000 years ago--well after the age of the dinosaurs

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IN PRACTICE



You may have heard a rumor that carbon-14 dating doesn't really work. Some people will argue that different parts of the same fossil were carbon-dated to different eras, and stuff like that. So, can carbon-dating be trusted?

The answer is yes. But as Tim mentions in the movie, carbon-14 dating has its limitations.

Compared with other radiometric isotopes like uranium-238, carbon-14 has a relatively short half-life. That means that carbon-14 is good for dating objects up to 50,000 or 60,000 years old—and that's it. If it's used to date anything older than this, it will give incorrect results.

Otherwise, carbon-14 dating is extremely accurate. Results obtained from carbon-14 dating match evidence discovered in tree-rings, which are extremely accurate measurers of time.

The process has also been tested on items whose dates we know, like the Dead Sea Scrolls—an ancient set of Biblical manuscripts found in the West Bank (pictured)—and pieces of wood from Ancient Egyptian tombs. In addition, when an object is dated using both carbon-14 and another radiometric isotope, the results have been consistent with one another.

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AROUND THE WORLD

Here's a listing of some interesting items that were dated using carbon-14!

Haraldskær woman: The body of a 2,500-year-old woman was preserved in a bog in Jutland, Denmark and discovered in 1835. Many people believed she was Queen Gunhild, a tragic heroine from an ancient Viking saga! But in the 1970s, carbon dating proved that she'd lived 1,500 years before the time of the saga.

Ancient footprints of Acahualinca:

A group of ancient footprints (pictured) was found in Managua, Nicaragua in the 1870s.

During the 1970s, carbon-14 dating proved that they were 6,000 years old, making them the oldest record of human existence in both North and South America!

Roopkund skeletons: In 1942, a park ranger stumbled on the remains of several hundred skeletons near the edge of a lake in northern India, in the Himalaya mountain range. Carbon dating established that the people buried there lived sometime between 1100 and 1400. After studying the remains, scientists determined that they were probably all killed by a hailstorm. However, the reason why so many people—males and females, adults and children—were in this remote area remain a mystery.

