Dating Deep Blood Kettles name: _____

Introduction

By some estimates there were 60-75 million bison on the plains of North America before Europeans began settling there in the 1800s. Although the Plains Indians fished, gathered fruits, berries, and vegetables, and hunted other animals, they relied heavily on bison for food and for materials to make clothing, tools, and shelters.

Because of the bison's tremendous size and speed, Indians devised sophisticated strategies to kill large numbers of them simultaneously. One method was to stampede the bison over cliffs at locations known as "buffalo jumps", and then finish off and process the animals near the base of the cliff. Archaeologists refer to these as "kill sites". Many prefer the Blackfeet word "pishkun," which (loosely translated) means "deep blood kettle".

Hundreds of kill sites are scattered throughout the northern plains. "The First Peoples' Buffalo Jump" (formerly known as Ulm Pishkun) and the "Madison Buffalo Jump" are two of the better-known ones in Montana, and the "Head-Smashed-In" site 40 miles north of Glacier Park is world famous. Archeologists have learned much about Indian cultures from evidence left at these sites.

A. Questions for Discussion

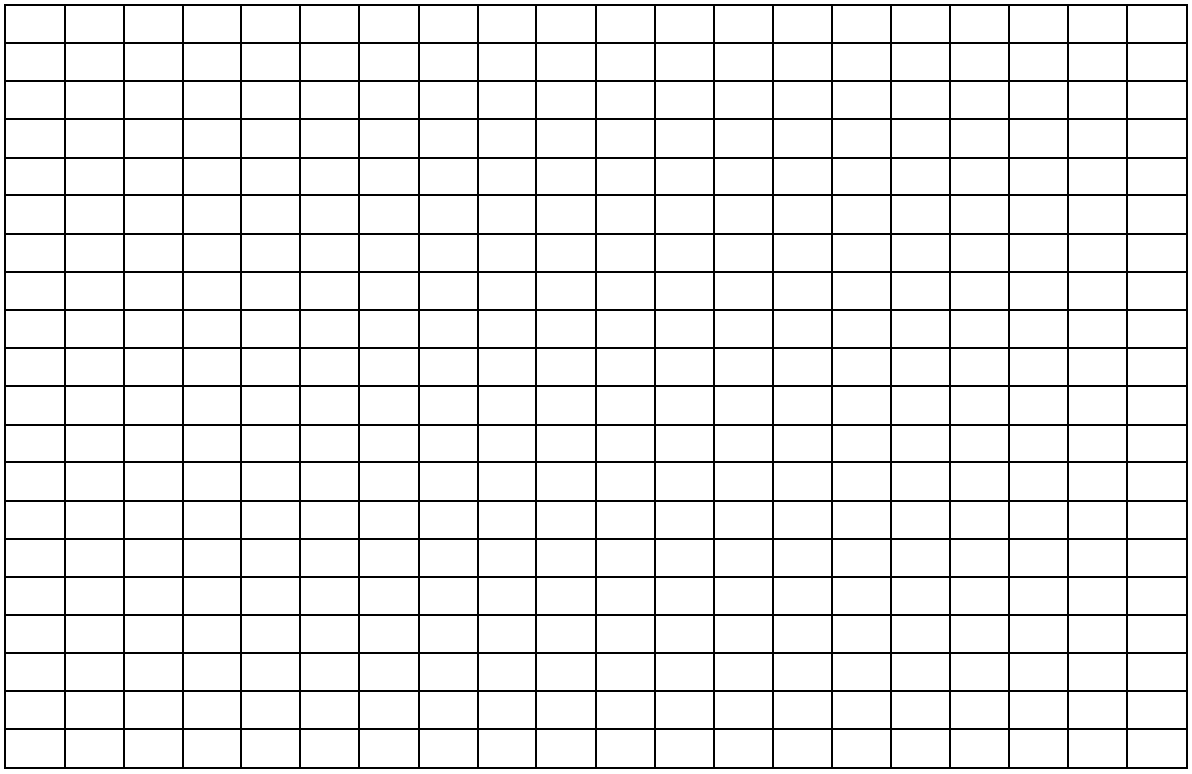
1. The most common type of carbon is Carbon-12, but another important type of carbon is a radioactive isotope called "Carbon-14". What is a radioactive isotope?

2. C-14 has a half-life of 5,730 years. Explain what this means.

3. Radiocarbon dating can be used to date materials that lived during the past 50,000 years. What types of materials found at bison kill sites could be dated using the Carbon-14 technique?

B. Design a graph to show how Carbon-14 decays over time. (6 points)

Carbon -14 Decay Graph



C. Follow-Up Questions (1 point each)

1. According to your graph, approximately what percentage of the original Carbon-14 would be present in the bones of wooly mammoth that died 20,000 years ago?

2. Analysis of charcoal (burned wood) from a kill site shows that it contains 95 % of its original Carbon-14. What happened to the other 5 % of the Carbon-14?

3. Bison bones at the base of a cliff in south-central Montana are found with arrows made by Shoshone Indians. The bones contain 90 % of the their original Carbon-14. According to your graph, how long ago were the Shoshone using this kill site?

4. Materials found at the First Peoples Buffalo jump near Great Falls indicate that the site was first used around 900 AD (about 1100 years ago). According to your graph, what percentage of the original Carbon-14 would have been present in those materials?

5. Read text pages 342-343. Look at the six types of fossils shown atop page 343. In which one of the six is the organism preserved the best? (NOTE: An asterisk* means "use sentences".)

6. *What does "petrified" mean, and how does a plant or animal become petrified?

7. List the four kinds of trace fossils described on page 343.

8. *Study figure 12 on page 345. In your own words, explain how they determined that "rock unit A" was deposited in "time 4".

9. Sketch the two fossils that were most important in determining that "rock unit B" was deposited in "time 2".

Page 346 states that "fossils provide clues to the characteristics of the environment." What do each of the following reveal about the environment where they lived?

10. *flat teeth:

11. *clam shells:

12. *corals:

13. *Read pages 350-351. Why can't radiocarbon dating be used to figure out how old igneous rock is?

Extra Credit (3 points for a good answer; Don't ask the teacher for help.) "To determine the age of sedimentary rock, geologists must relate the rock to datable masses of igneous rock." Explain what this means in your own words. Put your answer on back.