



NAME:

HOUR:

GEOLOGIC TIME SCALE

Introduction: The geologic time scale was developed by scientists as a means of representing the evolutionary history of Earth. Geologists in the 1700's and 1800's began to put together a timeline for the order in which different groups of rocks and fossils were formed. This timeline is known as the geologic time scale. Scientists first developed the geologic time scale by studying rock layers and fossils from around the world and putting them in order according to their relative age. When studying rock strata, scientists work on the premise that the oldest rock layers are found on the bottom, and the more recent layers are found closer to Earth's surface. It is assumed that rocks and fossils found in lower strata were formed before those found in the strata above. In relative dating, the age of a fossil is determined by comparing its placement with that of fossils in other layers of rock. More recently scientists have turned to radioactive dating as a means of dating rocks and fossils. In radioactive dating, scientists calculate the age of a rock or fossil based on the amount of remaining radioactive isotope it contains. In this way, scientists can determine the absolute age of a sample.

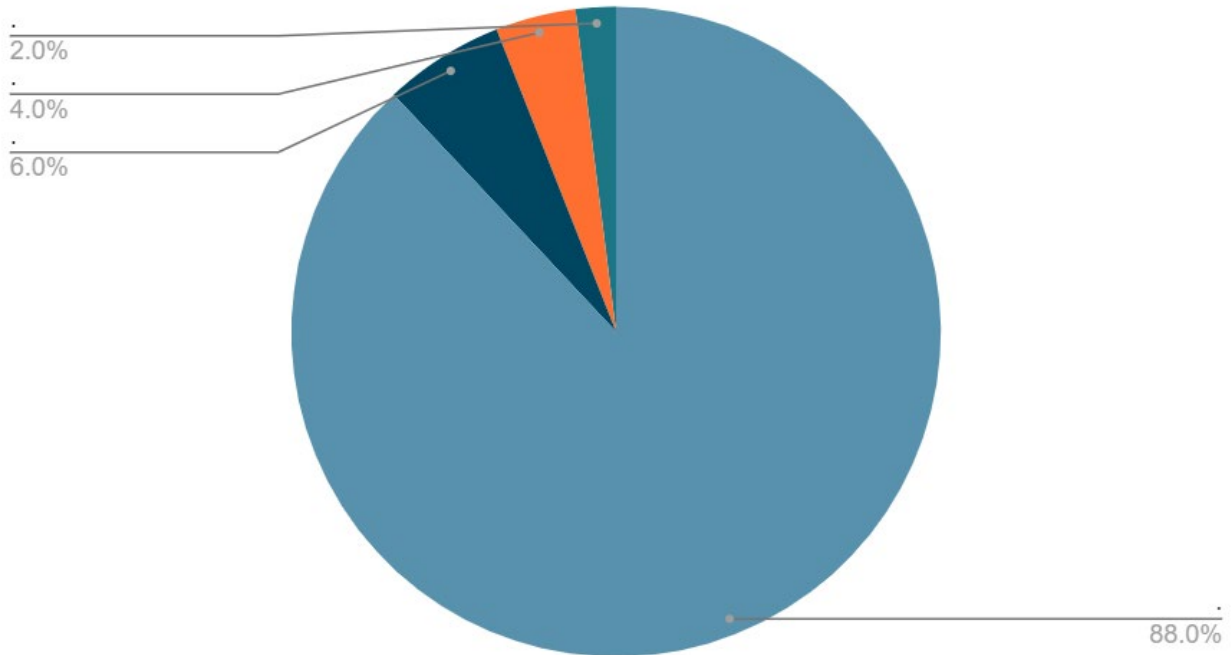
Take a moment to familiarize yourself with the Geologic Time Scale Reference Table you have been given. It should be noted that the dates used on the table are not "set in stone." Scientists constantly debate and revise the geologic time scale. There is not a definite division between the periods of history. The changes that have occurred on Earth have been slow and gradual. You will refer to this table as you work through the questions and activities in this lesson. By completing this activity you will get an overview of how life evolved from its earliest forms to its present day diversity.

Directions: Use the Geologic Time Scale Reference Table to answer the following questions.

- The history of life on earth takes place over what time span? _____
- All of geologic time is divided into four large units called _____. These larger units are further divided into smaller lengths of time called _____.
- List the four eras from most recent to the oldest. How long did each era last? (8pts)
 - _____
 - _____
 - _____
 - _____
- Calculate what percent of Earth's history has been spent in each era. Fill in the table below and complete a circle graph to illustrate your answers. Be sure to label each section of your pie chart.

Name of Era	Length of Era (Years)	% of Earth History

Length of Earth's Eras



5. What are the periods in the Paleozoic era? (6pts) _____

6. When did the Devonian period begin? _____
7. When did the Triassic period end? _____
8. In what era and period do we currently live? _____
9. Complete the following chart. Identify the era and period that each of the following first appeared.

Life Forms	Era	Period
Earliest fish		
First multicellular life		
First reptiles		
First humans		
First prokaryotic cells		
Earliest mammals		
First colonization of land		
First amphibians		
First eukaryotic cells		
Earliest flowering plants		
Earliest dinosaurs		

10. Referring back to question 4, divide the box below to create a linear scale model of the four eras of Earth's history. 2mm= 1% The box must be divided in such a way to show the length of time spent in each era. Be sure to label each section.

11. Do all periods in an era last the same length of time? _____

12. Examine the information given in the geologic time scale table. How do scientists decide when one period ends and another period begins?



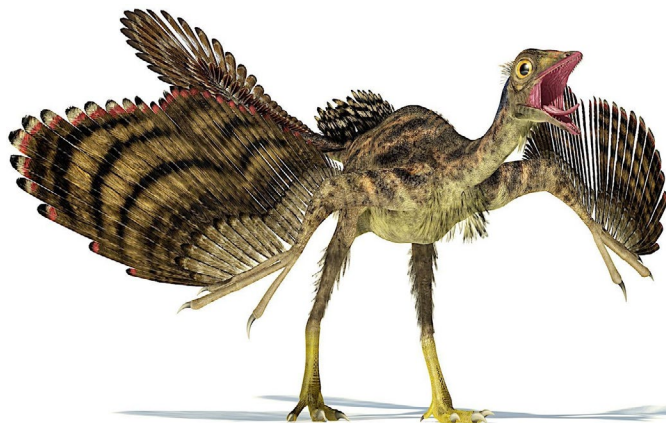
13. Which period is referred to as "The Age of Fishes"? Why does this period have this distinction? _____

14. Which era is referred to as "The Age of Reptiles"? _____

15. Which era is referred to as "The Age of Mammals"? _____

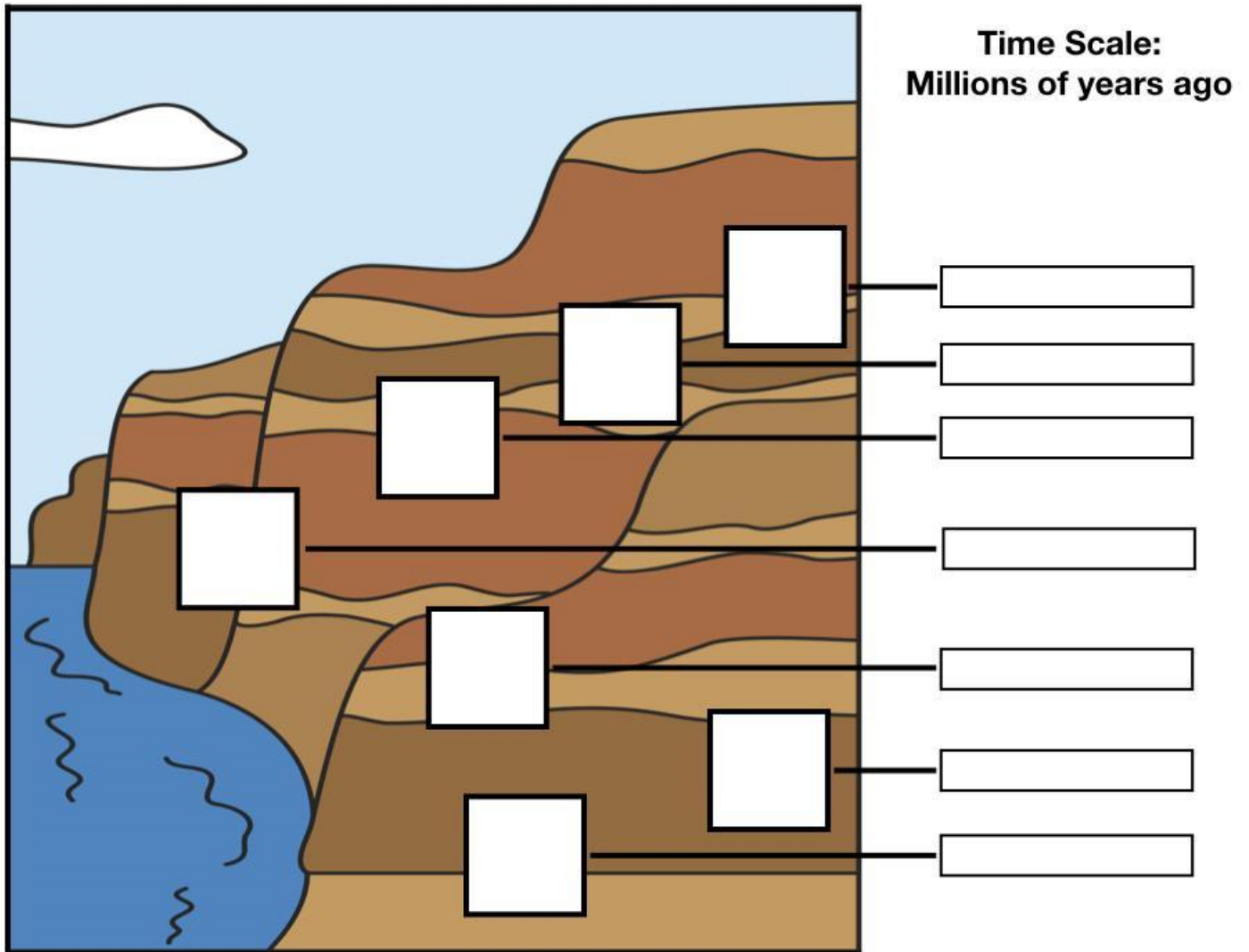
16. A transitional fossil is a fossil that shows the evolution from an ancestral group to a descendent group. It shows characteristics of both groups of organisms. One possible transitional fossil is that of Archaeopteryx. From fossils discovered of this organism, scientists deduce that it may have looked like the animal seen in this picture.

What two animal groups are represented in this fossil? List the characteristics of each group that you can see in this picture.



17. Fossils from the Precambrian time are extremely rare. List reasons why this is true.

18. Over millions of years, a flowing river cut a canyon through a mountain exposing many different layers of rock. Upon examining the strata, paleontologists discovered an amazing assortment of fossils! Locate the page called “Images for Questions 17 and 18.” At the top of the page of images you will find pictures of 7 different living organisms. These organisms lived at different times in Earth’s history. Using the “Geologic Time Scale Reference Table”, determine where each of the 7 organisms would be found in the rock strata and the approximate time each organism first appeared on Earth. Cut out the 7 images, then tape or glue each picture into the correct square below. In the rectangular boxes to the right of the picture, write the approximate time (in millions of years) to indicate the age of each organism.



19. Five additional fossils were also found by scientists. (See the page called “Images for Questions 17 and 18.”) Use your deductive reasoning skills to determine where to best place these five organisms, in relation to the 7 organisms found in the squares. Cut out the images, then tape each image where you think it best fits in Earth’s history. Using the dates you listed in the rectangular boxes above, estimate the approximate age of each fossil.

Estimated age of human bone: _____

Estimated age of Plesiosaur: _____

Estimated age of Ostracoderm: _____

Estimated age of Jellyfish: _____

Estimated age of Whale: _____

20. In question 18, you used a method of dating called relative dating. What is relative dating?

21. What is the assumption being made when scientists date objects by relative dating? How might this assumption lead to the inaccurate dating of a sample? _____

22. Two types of dating methods are used to establish the age of a rock or fossil. How is radiometric dating different from relative dating? _____

23. What major event occurred at the end of the Cretaceous period? _____

24. Locate the two-page diagram showing the blank geologic time scale. Follow the instructions below to complete this activity:

- Tape the two pages together so that the table is lined up across the two pages.
- Locate your Geologic Time Scale Reference Table. You will refer to this table repeatedly in order to complete this activity.
- Along the bottom of your two-page blank geologic time scale diagram, you will notice three rows. On these rows you will place information for the era, the periods, and the time frame that each occurred in millions of years.
- Write the names of the four eras, in order from earliest to latest, along the bottom row.
- Each era, except for the Precambrian time, is divided into smaller periods. Write the names, in order from earliest to latest, of the periods in each of the three eras.
- When did each time period occur? Write the dates in the row labeled "Millions of Years."
- Next, you will insert pictures into the rectangular boxes to show the order of events in Earth's history. Please note that the diagram is not a scaled diagram. Locate the page called, "Images for Question 24." Cut out each of the rectangular boxes on this page. Use your geologic time scale reference table to determine where each cutout should be placed on your two-page diagram. Tape each picture to your two-page diagram.



25. Look at the pictures you placed on your two-page diagram. From these pictures, determine the difference between gymnosperms and angiosperms. _____
- _____
- _____
26. Your two-page diagram is not a “scaled” diagram. What changes would have to be made in order for the diagram to be a “scaled” diagram? (Refer to your answer in question 4.) _____
- _____
- _____
27. How does the length of time the dinosaurs roamed the Earth compare to the amount of time humans have existed on Earth? _____
- _____
- _____
28. It is difficult to visualize the scale of Earth’s history. One analogy that is often used is to scale down all of Earth’s history into one calendar year. This allows you to “see” how long one era is in comparison to another.
- a) If Earth’s history has lasted 4.6 billion years (4600 million years), and one calendar year has 365 days, how many years would be represented by one calendar day? _____
- b) The Precambrian period lasted 4060 million years. If the Precambrian period started on January 1 of our calendar, how many calendar days did it last? _____
- c) The Paleozoic era would last how many days? _____
- d) The Mesozoic era would last how many days? _____
- e) The Cenozoic era would last how many days? _____
- f) When would modern humans appear on our one-year calendar? (50,000 years ago)
- _____