**How Are Dinosaur Fossils Date & Identified?**

**I. Introduction**

 In this exploration you will estimate the age of and identify dinosaur fossils. You will use radiometric dating of rock layers and information about dinosaur fossils. Fossils are remains, imprints, or traces of organisms that were once alive. By studying fossils, scientists can learn where, when, and how those organisms lived. Reptile species that survived the mass extinctions of the Paleozoic Era readily adapted to their drier environments of the Mesozoic Era starting about 248 million years ago. Reptiles became the dominant animal in the Jurassic Period that started about 206 million years ago. Some of the reptiles evolved into archosaurs, the common ancestor of crocodiles, dinosaurs, and birds. The first small dinosaurs appeared during the Triassic Period at the beginning of the Mesozoic Era. Throughout this era, new species of dinosaurs evolved. In the Cretaceous Period starting about 144 million years ago, the dinosaurs became extinct.

 The best places to find fossils are arid areas with rocky outcrops. There are three basic kinds of rocks : igneous (formed from melting rock), sedimentary (eroded by wind or water and later redeposited), and metamorphic (changed by extreme heat or pressure). Almost all fossils are found in sedimentary rocks. This is because the intense heat and pressure that create igneous and metamorphic rocks often destroy fossils. Scientists use a method called absolute dating to date rocks. Absolute dating uses the radioactive decay of an isotope mineral in an igneous and in a metamorphic rock to determine the age of the rock layer below and/or above a sedimentary rock layer. When a radioactive isotope (parent material) decays, it forms a new isotope, a daughter product. The half-life of a radioactive element is the time it takes for half of its atoms to decay into the daughter product. When two half-lives have passed, one-fourth of the original isotope’s atoms remain and three-fourths have turned into the daughter product. By measuring the amounts of parent and daughter materials in a rock and by knowing the half-life of the parent material, a geologist can calculate the absolute age of the rock. This method is called radiometric dating.

**II. Procedure**

 1. Start the activity by going to the following website :

<http://glencoe.mheducation.com/sites/dl/free/0078802849/383955/BL_17.html> .

 2. A dinosaur fossil is shown. Examine the fossil, paying particular attention to its size in

 relation to the metric ruler.

 3. Select the rock samples gathered from the rock layers above and below the fossil site and drag

 and drop them, one at a time, to the mass spectrometer for radiometric analysis. Click the

 “Start” button tom display the results on the monitor for each rock.

 4. During your observation, click on the Dinosaur Reference Guide to view information helpful

 in determining which dinosaur the fossil might belong to.

 5. Record your observation data on the rock layers and dinosaur fossils in the Data Table.

 6. Select the “Reset” button to reset the lab exploration to investigate a different dinosaur fossil.

 7. Repeat steps 2-6 for the remaining dinosaur fossils.

**III. Data**

 1. Record your data in the Table below.

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| --- | --- | --- | --- | --- |
|  **Fossils** |  **Dinosaur**  **Species** | **Absolute Dating** **Of Rock Layer** **Below** | **Absolute Dating** **Of Rock Layer** **Below** |  **Geologic** **Time** **Period** |
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**IV. Analysis & Conclusions**

 **1. Describe the steps you took to estimate the age of one of the fossils.**

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 **2. Describe the steps you took to identify one of the dinosaurs from the fossil.**

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 **3. How could you determine that two species of dinosaurs lived in the same time period?**

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 **4. What evidence supports the hypothesis that birds evolved from dinosaurs?**

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 **5. Describe some features that dinosaurs share with modern living reptiles.**

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 **6. What information would an artist use to reconstruct a model of a dinosaur?**

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 **7. How could a paleontologist determine that a dinosaur was a plant eater or a carnivore?**

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 **8. What other evidence besides fossil bones might be useful in describing the behavior of a**

 **dinosaur?**

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