



## RELATIVE VS. ABSOLUTE DATING

### Activity Overview

#### BIG IDEA

The only way to know anything of the ecology of the past is because of the wide variety of fossils that have been found. People tend to think of all fossils as dinosaurs, but really fossils are any evidence of any past life, large or small, plant, animal, or even bacterial.

#### OBJECTIVE

Students will explore the other kinds of fossils besides dinosaurs.

#### BACKGROUND

Paleontology combines geology and biology to study extinct organisms preserved in rocks. Knowledge of a wide variety of fossil types allows paleontologists to specialize in certain groups of organisms.

Paleontologists tend to specialize in a particular field of study, perhaps a particular type of animal. For instance they may specialize in ice-age mammals or the very first land animals. They may specialize in invertebrates or fish, and paleobotanists study ancient plants.

Micropaleontology works with fossils that can be found on a microscopic level, such as bacteria, fungal spores, pollen grains, or the tiniest shells and bones. A paleoecologist would study how all the different organisms of a time period interacted with each other. Paleoanthropologists study the most ancient of human fossils, but the study of ancient human cultures is actually archaeology, a branch of science that is often confused with paleontology.

A wide variety of fossils from every time era have been discovered in Montana. Some of the earliest ocean life is preserved in the Madison Group Limestone, which is a whitish-grey rock that forms many cliff faces in Western and Central Montana. Lewis and Clark Caverns is carved out of the Madison Limestone. Madison Limestone is from the oldest era - the Paleozoic.

Ammonites and Trilobites, have been persevered in Paleozoic formations, but are now extinct.



## RELATIVE VS. ABSOLUTE DATING

### Activity Overview (Cont.)

#### BACKGROUND (CONT.)

Plesiosaurs and small ratlike mammals lived at the same time as dinosaurs, however large mammals such as Woolly Mammoths, Woolly Rhinos, and Saber-toothed Cats became dominant long after the dinosaurs went extinct.



## RELATIVE VS. ABSOLUTE DATING

### Museum Instructions

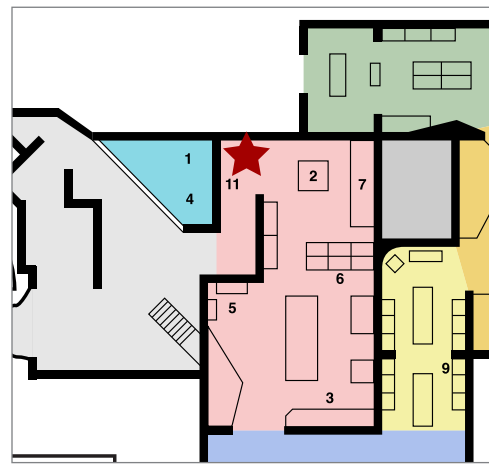
#### MATERIALS

Student activity sheets, clipboards, pencils (Pens, crayons, and markers are not allowed in exhibit spaces)

#### ACTIVITY TIME

30 minutes

#### LOCATION



#### INSTRUCTIONS

*This activity can be used to explore fossilization, paleo-ecology, and geologic time.*

Most of the life forms described on the student work sheet can be found within the Landforms and Lifeforms and Dinosaurs Under the Big Sky Exhibits. To research each life form described, you will have to go through the entire exhibit to find them. The plant fossils are located near the end of the exhibit, past the Tyrant Kings section. Ice-Age Mammals can be found up the stairs near the Viewing Lab.

*For students who have mobility needs, access to the ice-age mammals section can be accomplished through the third floor of the Children's Discovery Center, which is accessible via elevator. Please ask Museum staff for assistance.*

Dragonflies and grass fossils are not currently found in the exhibit. Students may be able to research these items on personal electronic devices, or teachers can share relevant information with your students from the Background Information section of this lesson. A description of where each life form is found in the geologic column can be found in the Background Information section of this lesson.



## RELATIVE VS. ABSOLUTE DATING

### Classroom Instructions

#### MATERIALS

- Small 6 – 12 oz paper cups, or paper bowls for larger items
- Playdough (or equivalent)
- Plaster of Paris
- Water
- Mixing Bowl
- Stirring Stick
- Items to make a trace fossilization. Leaves work well, as do pine cones, feathers, small toys, or anything that you can make an impression into playdough. Students can go on a scavenger hunt near your school to find items, or can bring items from home. The item will not be destroyed.

#### ACTIVITY TIME

45 minutes

#### INSTRUCTIONS

This activity can be used to support lessons involving paleontology and fossilization. Providing a demonstration of how imprint fossils are formed can be helpful in understanding fossilization. We will use playdough and plaster to create an imprint fossil.

Place a bit of playdough in the bottom of a paper cup or bowl, and smush it in to fit the cup or bowl

Next, take the item to be fossilized and press it into the playdough until you have an impression of the item.

Remove the item.

Mix plaster of paris and water in a ratio of about 2-1 in a mixing bowl, add more plaster or water as needed so that it is about the consistency of toothpaste.

Did you remove the item from the playdough? Pour the plaster of paris over the top of the playdough, so that the entire imprint is covered, with some extra.

Wait 24 –48 hours until the plaster of paris is completely dry. Tear open the paper cup or bowl, and remove the playdough. What's left will be an impression of your object, preserved in plaster.



## RELATIVE VS. ABSOLUTE DATING

### Classroom Instructions (Cont.)

#### INSTRUCTIONS (CONT.)

If desired, the imprint can be stained with tea or coffee to look like a fossil, or painted.

With real imprint fossils, an object has been pressed into mud, and then covered with a different layer of mud. Usually this forms shale or slate, which then breaks apart into flat sheets, preserving the impression of a plant or part of an animal. An imprint fossil can also be found with a body fossil, such as when skin impressions are found with a dinosaur skeleton.

# MOR THAN DINOS



11

## Relative vs. Absolute Dating

NAME \_\_\_\_\_

Dinosaurs get a lot of our attention at the Museum of the Rockies, but in the “wild” you’re actually much more likely to find a fossil of something that is NOT a dinosaur! A fossil is evidence of past life, and that includes all life, such as sea animals, insects, mammals, and even plants.

There are two main types of fossils – body fossils and trace fossils. A body fossil is when the hard parts of the body of an animal or plant (such as wood or bones) is replaced and preserved by minerals or an impression of body or leaf is preserved. Trace fossils are fossils of things that animals did (such as nests or footprints). Impression fossils are impressions of parts of living things (such as leaves and skin impressions).

Research each fossil on the left, and match it with its correct location in the geologic time column on the right. Did it live before, after, or with the dinosaurs? Some organisms may have lived in more than one time period.



Dragonfly \_\_\_\_\_



Trilobite \_\_\_\_\_



Plesiosaur \_\_\_\_\_



Fig Tree \_\_\_\_\_



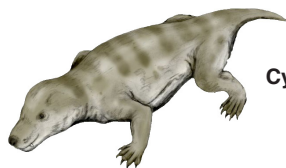
Pine Cone \_\_\_\_\_



Woolly Mammoth \_\_\_\_\_



Belemnite \_\_\_\_\_



Cynodont \_\_\_\_\_



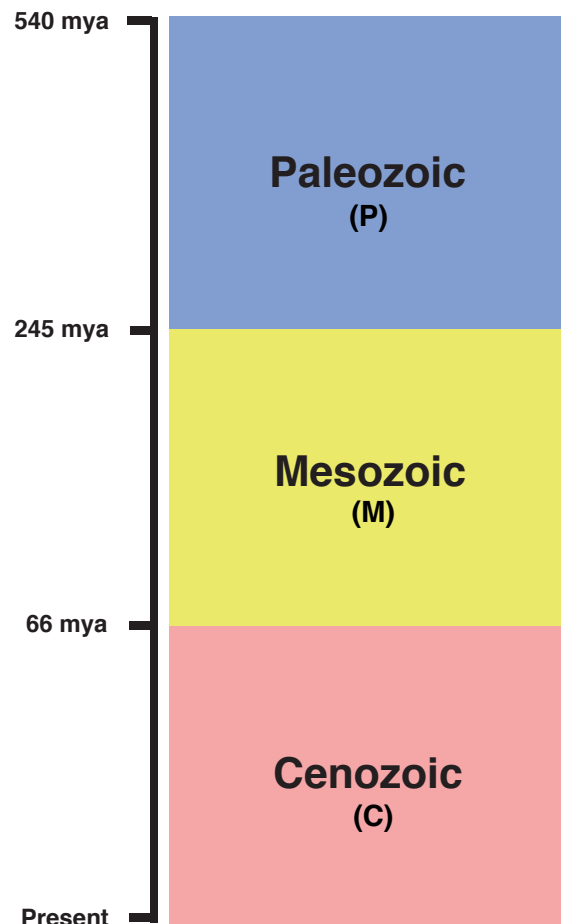
Woolly Rhino \_\_\_\_\_



Saber-tooth Cat \_\_\_\_\_



Ammonite \_\_\_\_\_



# MOR THAN DINOS



11

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NAME \_\_\_\_\_ ANSWER KEY \_\_\_\_\_

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Dragonfly PMC



Trilobite P



Plesiosaur M



Fig Tree MC



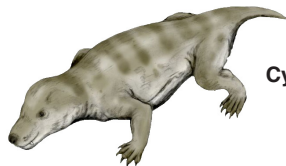
Pine Cone PMC



Woolly Mammoth C



Belemnite P



Cynodont MC



Woolly Rhino C



Saber-tooth Cat C



Ammonite PM

