

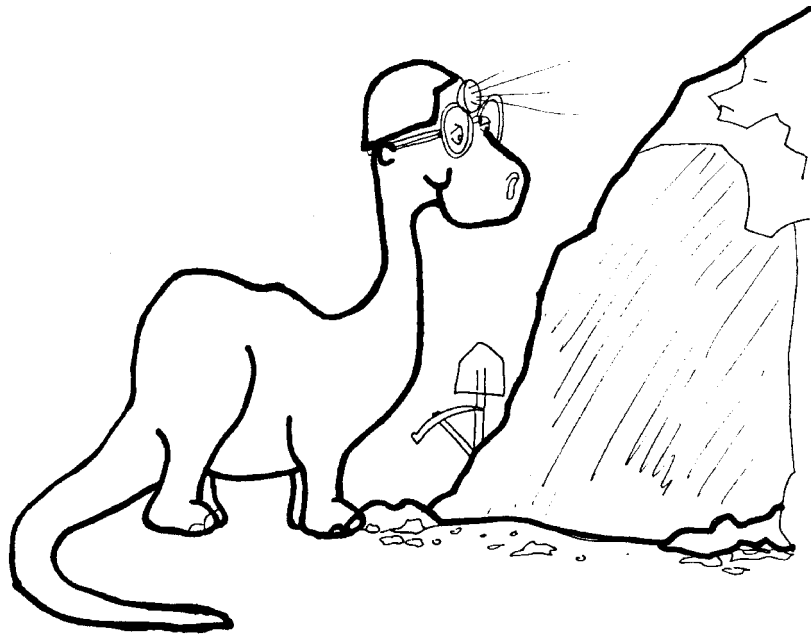


# Rock Cycle

Understanding the Earth's Crust



## KINDERGARTEN PAST LIFE



1 WEEK  
LESSON PLANS AND  
ACTIVITIES

## ROCK CYCLE OVERVIEW OF KINDERGARTEN

### CHEMISTRY

#### WEEK 1.

PRE: *Distinguishing the four types of matter.*

LAB: *Classifying heavy and light rocks.*

POST: *Exploring elements.*

### MINERALS

#### WEEK 2.

PRE: *Discovering how minerals grow.*

LAB: *Distinguishing different colors of minerals.*

POST: *Exploring the various colors of quartz.*

### ROCKS

#### WEEK 3.

PRE: *Exploring rocks derived from volcanoes.*

LAB: *Discovering two different types of igneous rocks.*

POST: *Exploring myths about rocks.*

#### WEEK 4.

PRE: *Exploring rocks created in or near water.*

LAB: *Discovering that sand can form different types of rocks.*

POST: *Observing and describing sand.*

### PAST LIFE

#### WEEK 5.

PRE: *Defining "dinosaur."*

LAB: *Classifying extinct and living animals.*

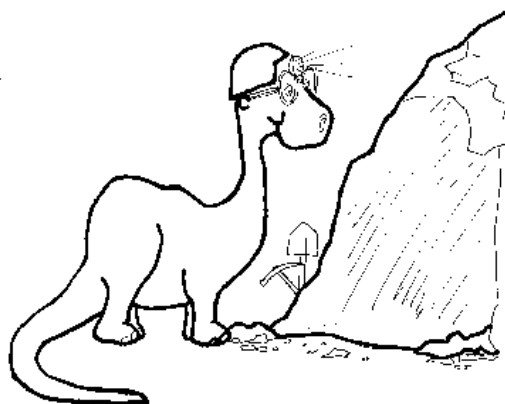
POST: *Contrasting dinosaurs, prehistoric and living animals.*

#### WEEK 6.

PRE: *Comparing extinct and living animals.*

LAB: *Distinguishing dinosaurs that eat meat.*

POST: *Dramatizing life during the age of dinosaurs.*



## ROCK CYCLE - PAST LIFE (KA)

### PRE LAB

Students use a worksheet to compare the truth about dinosaurs.

### OBJECTIVES:

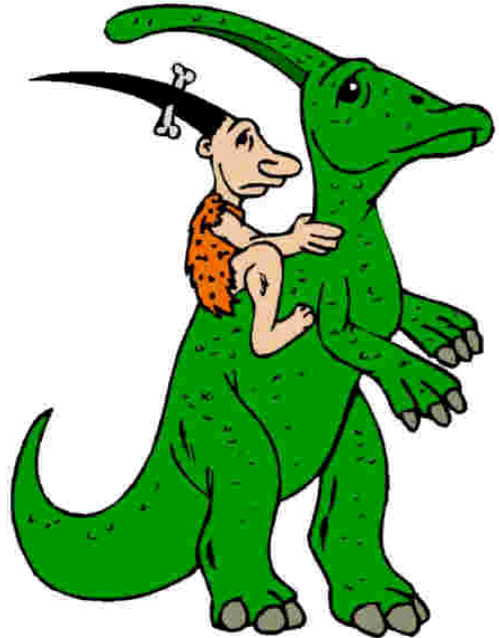
1. Defining dinosaurs.
2. Exploring misconceptions about dinosaurs.

### VOCABULARY:

extinct  
fossil  
dinosaur

### MATERIALS:

Carnegie Dinosaur Models  
*Let's Look at Dinosaurs*, by Gina Ingoglia (or other appropriate book)



### BACKGROUND:

Dinosaurs are fantasy creatures to children. Imagine real monsters that roamed the Earth at one time. No horror story could be more exciting. In contrast, "cute" commercial dinosaur toys and products are sometimes geared to sell to the public. It is your job as a teacher to make students aware of these misconceptions.

Here are some common misconceptions that you should discuss and correct with your students.

1) Dinosaurs did not live with people. "Fred Flintstone" and "Dino" could not have really lived together. Dinosaurs disappeared more than 60 million years before humans appeared on Earth. Define dinosaurs very clearly as a group of extinct animals that lived on the Earth a long time ago. They were probably related to the reptiles and birds of today.

2) You cannot go into your backyard and pick up dinosaur bones. There are only a few good dinosaur localities in the United States, notably Utah and Montana.

3) Dinosaurs were probably not all different colors. The colors probably ranged from green to brown to some shades of purple. Some dinosaurs may have even had feathers.

4) Dinosaurs are not found with their skeletons intact. Most of the fossils are disarticulated (not together) bones. Usually many individual bones are missing from the reconstructed skeleton. It is difficult for paleontologists to reconstruct dinosaurs with only a few bones.

5) Many dinosaurs were small. Dinosaurs are not the largest animals that ever

lived. The Blue Whale which swims in today's ocean is the largest animal known to have lived on the Earth.

6) Dinosaurs are extinct. *Extinct* means that all the individuals belonging to one type of plant or animal are dead. Once a group is extinct, it never reappears. The dinosaurs have been extinct for 65 million years. Your students will have difficulty grasping the magnitude of that many years (we all do), so just emphasize that dinosaurs have been extinct for a long, long time. Ask the class if they can think of any other animals or plants that are extinct. Woolly mammoths, saber-toothed cats, trilobites, and dodos are some possible answers.

7) Most modern grasses and flowers were not on the Earth when the dinosaurs roamed it.

8) The word "Dinosaur" actually refers to two major groups [Saurischia (lizard hipped) and Ornithischia (bird hipped)] of extinct animals that lived 65 through 230 million years ago.

## **PROCEDURE:**

1. Explain to students that an important difference between modern reptiles and dinosaurs is that dinosaurs are now extinct. You may want to go over some of the other misconceptions discussed above.

2. Read "*Let's Look At Dinosaurs*" aloud to class. You may want to summarize the text and make the pictures the central part of your discussion.

3. Show the large Carnegie dinosaur models to students. Ask the students to compare and contrast the different models. Describe the heads, teeth, claws, length of tails, methods of walking, and any other features of the models.

4. Instruct students to look at the coloring exercise and have them point out what is wrong with this picture. They should realize that children and dinosaurs did not live together and grasses and palm trees were not abundant when dinosaurs were dominant.

ROCK CYCLE - PAST LIFE (KA) PRE LAB



## ROCK CYCLE - PAST LIFE (KA)

### LAB

Students sort living and extinct animals.

### OBJECTIVES:

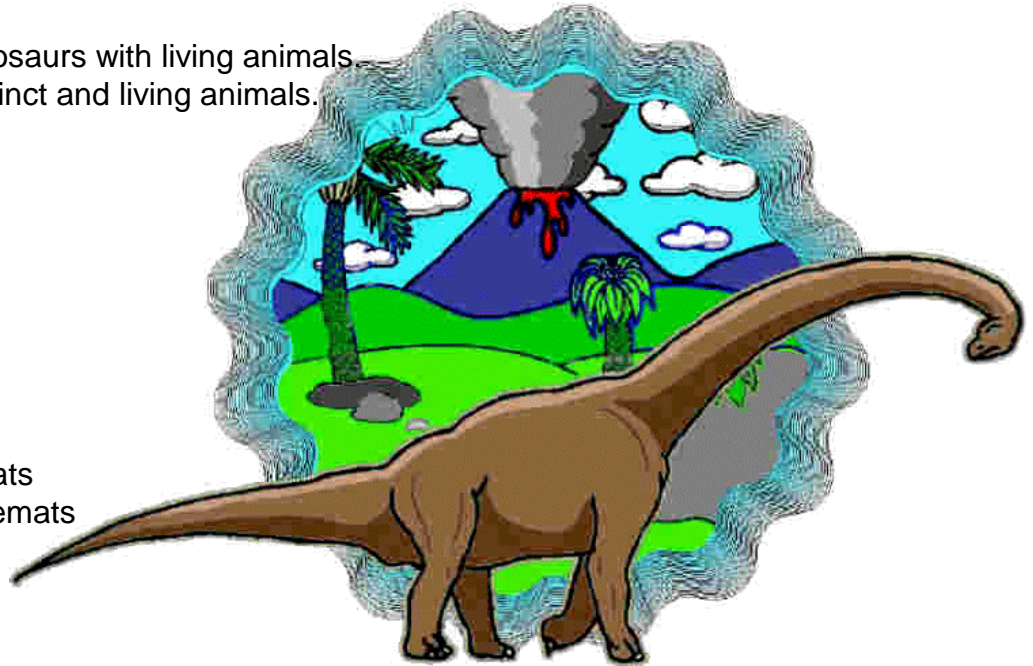
1. Comparing dinosaurs with living animals.
2. Contrasting extinct and living animals.

### VOCABULARY

extinct  
living  
dead

### MATERIALS:

Dinosaur Placemats  
Wild Animal Placemats  
Extinct Models  
Living Models



### BACKGROUND:

Extinct organisms are once-living organisms of the Earth that have vanished and can never live again. Dinosaurs once lived on this planet, but they are now extinct. Living organisms eat, grow, and reproduce in today's world. Living organisms can become extinct, if they all die and leave no offsprings.

The word "dinosaur" refers to the dominant land animals that lived between 225 million years and 65 million years ago. Although your students will not be able to understand the magnitude of that time span, emphasize that dinosaurs have been extinct for a long, long time.

Paleontologists (scientists who study ancient life and fossils) have grouped "dinosaurs" into two large groups: *Saurischians* (lizard-hipped) and *Ornithischians* (bird-like hipped). Animals like sabertooth cats, mastodons, and mammoths were not dinosaurs. They are usually referred to as *prehistoric* mammals. These animals lived in pre-civilization times with our ancestors, but not with the dinosaurs. Both groups, however, are extinct, but dinosaurs have been extinct much longer than prehistoric animals. The activity below stresses the difference between dinosaurs and prehistoric animals (both of which are extinct) and organisms that are living today.

## PROCEDURE:

1. Before class, mix several bags of Extinct Animals with one bag of Living Animals. Make a selection for each student group. You can easily add organisms from your own collection.

2. Hand out the dinosaur and wild animal placemats. Ask students the following questions.

Which of the wild animals is a mammal (all on the wild animal placemat except the ostrich and penguin are mammals)?

Which of the mammals on the placemat lives in water (the whale and seal live in water)?

Which placemat shows extinct animals and which shows living animals?

You may want to have the students look at the placemats for similarities. For instance, some students may see the kangaroo and *Tyrannosaurus rex* as similar because of their small forearms. The *Apatosaurus* and the elephant may look similar because they are both big and have similar feet.

3. Have the students work cooperatively to separate their collection of organisms into living and extinct groups. Instruct students to put the extinct organisms on the Dinosaur Placemats and the living ones on the Animal Placemats. See if the students can use the placemats to identify any of the organisms. The students will see similarities between the Living and Extinct groups. Discuss these similarities and differences with your students. Make sure students put the organisms back into the correct bags.

## ROCK CYCLE - PAST LIFE (KA)

### POST LAB

Students look at different dinosaur models to find information.

### OBJECTIVES:

1. Defining a dinosaur.
2. Contrasting dinosaur sizes.

### VOCABULARY:

dinosaur

### MATERIALS:

My Visit to the Dinosaurs, by Alike  
Carnegie Dinosaur Models



### BACKGROUND:

The fossil record of the dinosaurs suggests that they either walked with 4 legs or 2 legs. There were no true flying dinosaurs or swimming dinosaurs. There were flying and swimming reptiles in the Mesozoic, but these were not dinosaurs. The flying reptiles, closely related to the dinosaurs, are called pterosaurs. The swimmers belonged to several groups, including mosasaurs, ichthyosaurs and plesiosaurs, none of which were dinosaurs. Moreover, although the largest dinosaurs approached the size of the modern blue whale, the smallest known dinosaur was no larger than a chicken. Presently, the fossil record shows that the largest and smallest known dinosaurs roamed the Earth at the same time. *Seismosaurus* (the longest dinosaur) and *Compsognathus* (the smallest dinosaur) both lived during the Late Jurassic period of the Mesozoic, though in different parts of the world.

### PROCEDURE:

1. Before lab, cut pieces of string or tape about 3 meters (approximately 10 feet) long. Tape them to the floor of your classroom in a place where the whole class can observe them.
2. Read *My Visit to the Dinosaurs*. Make sure you use the pictures to compare sizes of dinosaurs.
3. Using the dinosaur models, have the students guess, or state, the lengths of the smallest and the largest known dinosaurs. Tell them that the longest dinosaur known was



a plant-eating sauropod (long-necked, long-tailed, walked on all four feet) dinosaur called *Seismosaurus*. Hold up the *Brachiosaurus* model as an example of a sauropod dinosaur. *Seismosaurus* was between 120 and 150 feet long, weighed about 80 tons, and is known from fossils found in New Mexico. There were a number of other long sauropod dinosaurs too, including *Diplodocus*, *Ultrasaurus*, and *Mamenchiasaurus* that were between 90 and 100 or more feet long. These big sauropods are sometimes referred to as supergiant dinosaurs.

The smallest dinosaur, *Compsognathus*, was a bipedal (walked on its hind legs only), meat-eater that was about two feet long. *Compsognathus* was no larger than a chicken.

4. Tell the class that the dinosaur models are made to scale, with the exception of the *Velociraptor*. That is, except for *Velociraptor*, compared to each other the models are as big as they were in real life. A living *Brachiosaurus* would have been much bigger than a living *Iguanodon* as the *Brachiosaurus* model is bigger than the *Iguanodon* model.

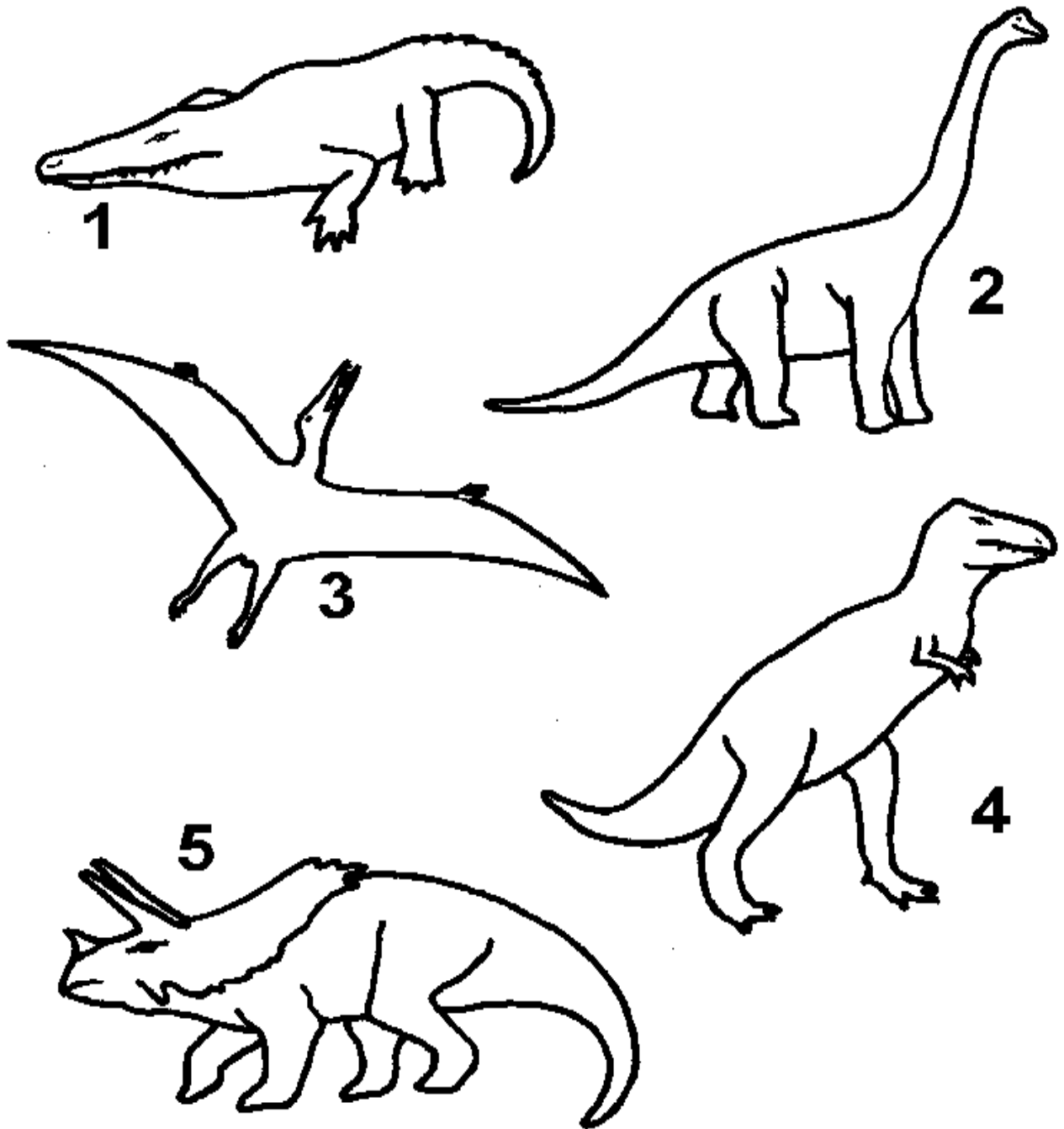
Have the class line up the dinosaur models from smallest to largest. Fit the *Velociraptor* into its real position using the summary of body lengths for each type of dinosaur model listed below. Children can imagine what these sizes mean by comparing them to your ten-foot tape on the floor, or by measuring themselves and figuring out how many of their own bodies it would take to make the lengths of the different dinosaurs.

5. Hand out the "What is a dinosaur" worksheet and have the students color in animals they think are dinosaurs. Review responses when everyone is finished. The answers are:

(1) a crocodile, which is a reptile; it has a sprawled posture, so cannot be a dinosaur; (2) a dinosaur; (3) not a dinosaur; it is a pterosaur, a reptile; dinosaurs did not fly (4) and (5) are dinosaurs.

ROCK CYCLE - PAST LIFE (KA) POST LAB

WHICH ONE OF THESE ARE DINOSAURS?



## ROCK CYCLE - PAST LIFE (KB)

### PRE LAB

Students color a worksheet comparing

### OBJECTIVES

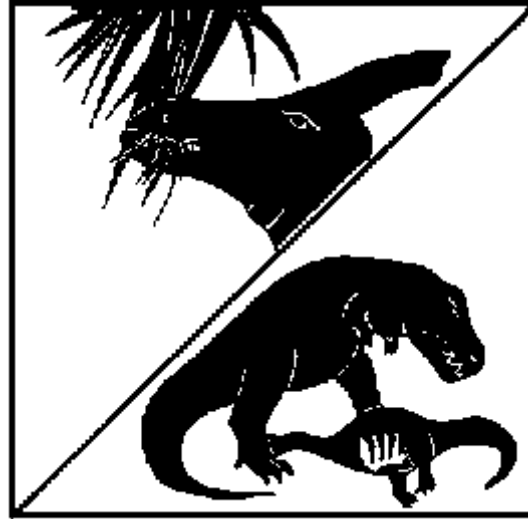
1. Comparing dinosaurs and prehistoric animals.
2. Contrasting dinosaur eating habits.

### VOCABULARY:

extinct  
prehistoric  
mammal  
herbivore  
carnivore

### MATERIALS:

crayons



### BACKGROUND:

A common mistake made by manufacturers of dinosaur toys and games is to call dinosaurs "prehistoric" animals. Strictly speaking, the term "prehistoric" means before written history. Dinosaurs certainly lived before humans or writing, but in practice prehistoric is used by most people to refer to the time from the beginning of the Ice Age (the Pleistocene Epoch, beginning 1.8 million years ago) to the beginning of written history. Classifying dinosaurs as prehistoric leads to incorrect notions, for example, that the dinosaurs were contemporaneous with large mammals like mammoths and saber-toothed cats, or worse, that dinosaurs lived at the same time as humans.

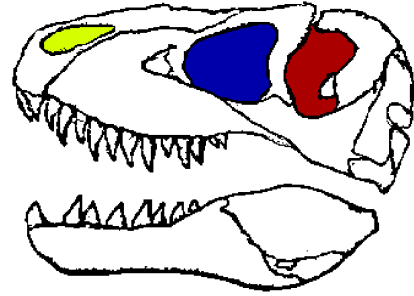
The second goal of the Pre lab is to introduce the concept of eating habits and food types. Different dinosaurs ate different types of food. The Mesozoic dinosaurs included carnivores (meat-eaters), herbivores (plant-eaters) and omnivores (plant- and meat-eaters). Paleontologists can tell what different dinosaurs ate by looking at the shape of their teeth and the shape of their bodies and comparing them with the shapes of modern carnivores, herbivores and omnivores. Teeth are the most common type of vertebrate body part found as fossils



Herbivore

and more resistant to chemical destruction than the other bones in the vertebrate skeleton. From fossil teeth we get valuable information about the eating habits, sizes, and growth patterns of ancient animals, including dinosaurs.

Children (and even adults) often identify meat-eating behavior as a negative trait and plant-eating behavior as a positive trait. This mind-set leads to the bizarre notion of 'good' animals and 'bad' animals, especially when it comes to dinosaurs. We encourage you to address this issue during the Pre Lab. Explain feeding habits in the context of the food chain.



### PROCEDURE:

1. Before lab, mix the extinct dinosaurs, non-dinosaurs and prehistoric animal models. Make enough collections for each student group.

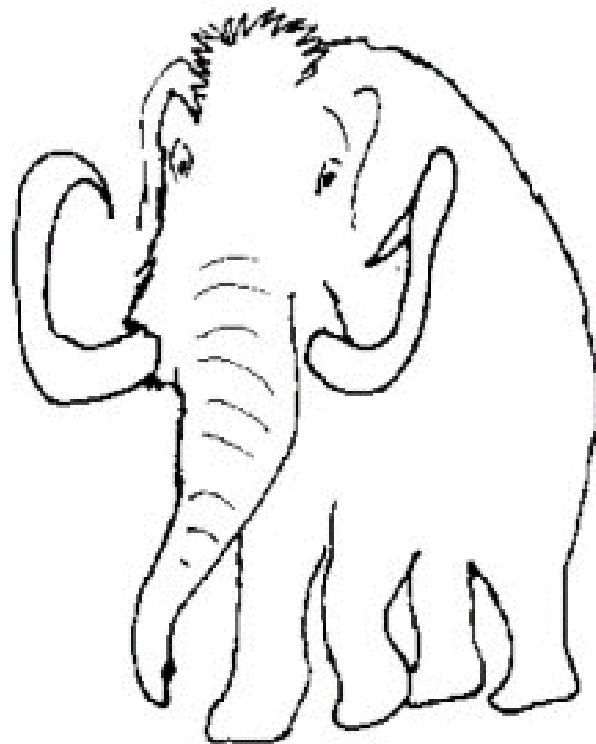
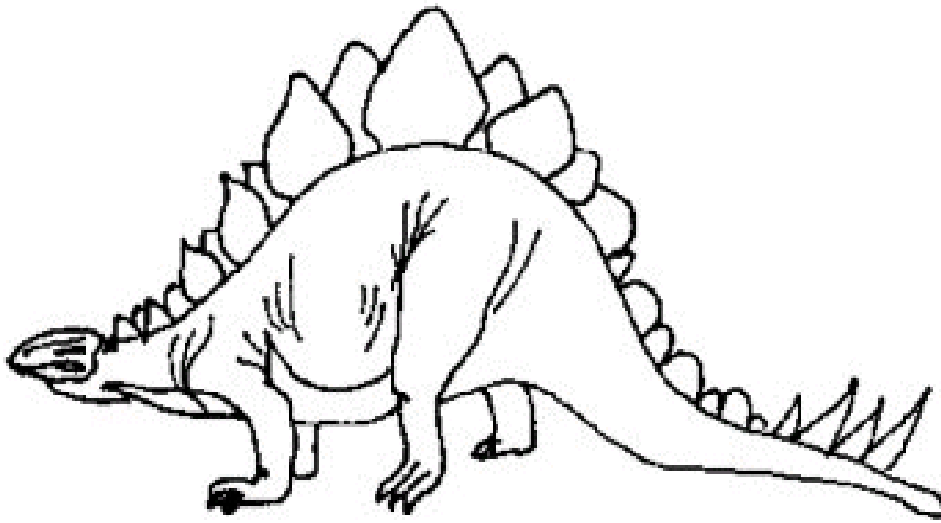
2. Discuss the difference between extinct and prehistoric animals with the class. Point out that prehistoric (or Ice Age) animals lived with our human ancestors and that some prehistoric animals are extinct (like mammoths) and some are not (like bison). The dinosaurs lived long before humans appeared on earth. Therefore, they are extinct but not prehistoric.

3. Have the students sort the animal model collections into dinosaurs, non-dinosaurs and prehistoric animals.

The following are dinosaurs: *Palaeocincus*, *Camptosaurus*, *Brontosaurus* (=Apatosaur), *Iguanodon*, *Corythosaurus*, *Tyrannosaurus*, *Brachiosaurus*, *Parasaurolophus*, *Ankylosaurus*, *Polacanthus*, *Triceratops*, *Protoceratops*, and *Stegosaurus*.

4. Have the students color the worksheet.

**ROCK CYCLE - PAST LIFE (KB) PRE LAB**



**WRITE THE WORD DINOSAUR AND PREHISTORIC MAMMAL NEXT TO THE CORRECT PICTURES**

## ROCK CYCLE - PAST LIFE (KB)

### LAB

Students use models to determine herbivores and carnivores.

### OBJECTIVES:

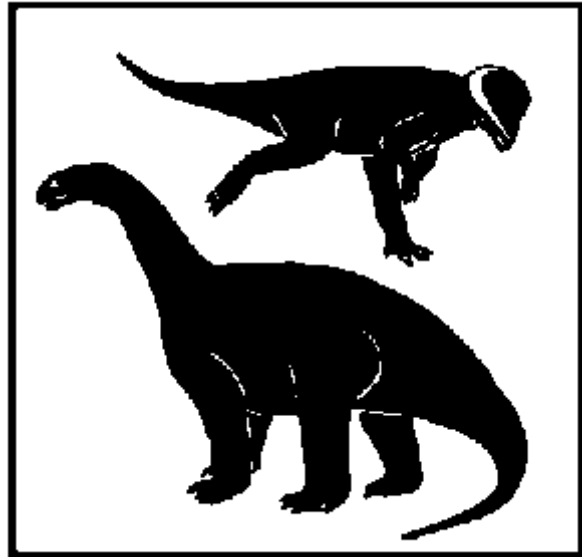
1. Distinguishing dinosaur meat-eaters from dinosaur plant-eaters.
2. Comparing tooth shapes.

### VOCABULARY:

carnivore  
herbivore  
omnivore

### MATERIALS:

dinosaur placemats  
dinosaur globe  
Carnegie dinosaur models  
other dinosaur models



### BACKGROUND:

Paleontologists rely on several different types of fossil clues to interpret the eating habits of extinct animals, including dinosaurs. Teeth are the best clues to determine what dinosaurs ate. Dinosaurs with sharp, pointed, serrated teeth throughout their mouths, like *Tyrannosaurus*, *Allosaurus*, or *Coelophysis*, ate meat. Their teeth acted like built-in steak knives for slicing soft flesh. The plant-eating dinosaurs had flatter, wider teeth for grinding up tough plant material. The duckbilled dinosaurs (the hadrosaurs) were one type of plant-eating dinosaur. Some of these had thousands of teeth in their mouths for grinding vegetation. Even with many teeth, some of the herbivore dinosaurs weren't able to grind plant material well enough in their mouths to be able to digest it. Some of them swallowed stones, called *gastroliths*, that stayed in their digestive tract to help pulverize food after it was swallowed. There were also omnivorous (both plant- and meat-eating) dinosaurs that had teeth that were intermediate in shape, between those of the carnivores and those of the herbivores.

Dinosaur posture is also a clue to food type. All of the carnivorous dinosaurs were bipedal (walked on two legs), while all of the herbivorous dinosaurs were either quadrupedal (walked on four legs) or spent some time on two and some time on four legs. Physical characteristics are also clues to dinosaur eating habits. Carnivores had large, sharp claws. Herbivores commonly had armatures such as horns, bony skull frills, plates, thickened bones, or tail/thumb spikes for protection. Carnivores had little or no armature, probably because it

probably because it would have slowed them down in their pursuit of prey.

This lab reviews the difference between carnivores and herbivores. Students will learn to tell the differences between them by recognizing key physical traits.

### PROCEDURE:

1. Explain to the class that we can make very good guesses about what different dinosaurs ate by looking at the shapes of their teeth and bodies. Dinosaurs with sharp, pointed teeth that walked on two legs were carnivores (meat-eaters); dinosaurs with flatter, grinding teeth that walked on four legs (all or part of the time) were plant-eaters.

2. Play "grind and chew" with the class. Have the class stand in a circle. An animal that eats plants has both vertical and lateral motion in the lower jaw. Make a motion with your jaws to illustrate the cow-like, sideways, grinding motion of a herbivore. Carnivores "bite" with an upward and downward (mainly vertical) motion, like a lion. Demonstrate the difference in this second type of motion to the class. Have students join you practicing carnivore and herbivore eating motions. Because humans eat both plants and meat, our jaw motion allows for both grinding and chewing.

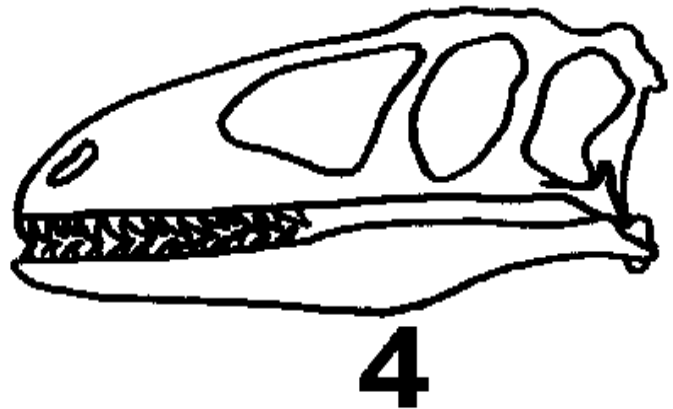
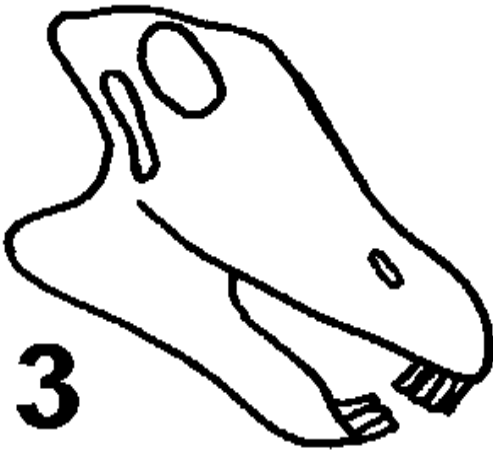
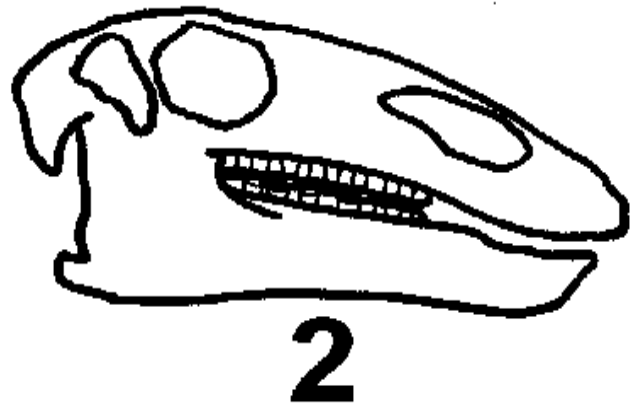
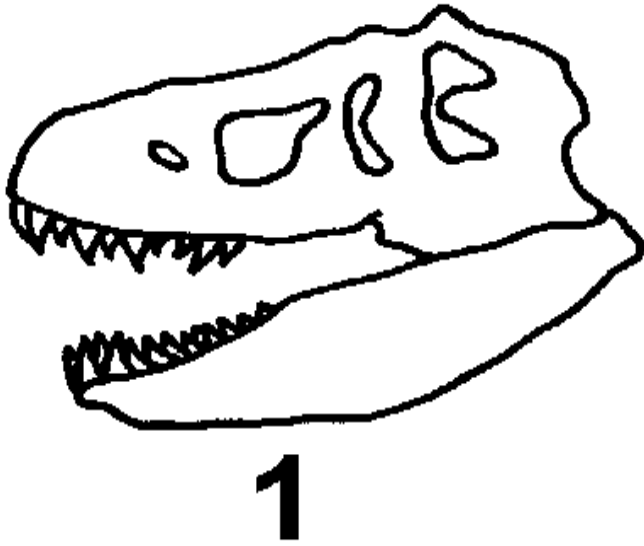
3. Hand out the worksheet and have students color dinosaurs with herbivore-like teeth *green* and those with carnivore-like teeth *red*. (Skulls 1 and 4 are carnivores; skulls 2 and 3 are herbivores.)

4. Display the Carnegie dinosaur models and other dinosaur models. Ask the class to identify carnivores and herbivores. If you want to extend the lab, use the dinosaurs in the extinct animal models. The Dinosaur Placemats can also be used. The eating habits of the Carnegie Model dinosaurs are given below..

<b>Carnivore</b>	<b>Herbivore</b>	<b>Omnivore</b>
<i>Velociraptor</i>	<i>Apatosaurus</i>	<i>Struthiomimus</i>
<i>Tyrannosaurus</i>	<i>Stegosaurus</i>	
	<i>Brachiosaurus</i>	
	<i>Parasaurolophus</i>	
	<i>Triceratops</i>	
	<i>Euoplocephalus</i>	
	<i>Pachycephalosaurus</i>	
	<i>Maiasaura</i>	

ROCK CYCLE - PAST LIFE (KB) LAB

EXAMPLES OF HERBIVORE, AND CARNIVORE DINOSAURS





## ROCK CYCLE - PAST LIFE (KB)

### POST LAB

Students learn about where dinosaurs lived using songs.

### OBJECTIVES

1. Discovering information about dinosaurs through songs.
2. Dramatizing how dinosaurs lived.

### VOCABULARY

dinosaur  
herbivore  
carnivore

### MATERIALS

Dinosaur globe



### BACKGROUND:

Each type of dinosaur roamed only certain areas of the earth. The dinosaur globe can help students visualize where dinosaurs lived. There was never a particular type of dinosaur that lived everywhere on Earth. Animals that cannot swim or fly, which includes dinosaurs, are usually isolated on one continent. Within that continent, these animals may be further isolated from each other by high mountain ranges or extreme climatic zones (deserts, for example). Most modern land-living animals have a patchy global distribution similar to that of dinosaur fossils. For example, kangaroos are native to Australia and are not found in the "wild" in other parts of the world. Humans are unusual in this regard. We have built devices like boats and airplanes that allow us to travel beyond our natural continental boundaries.

Songs may be used to encourage students to "act out" dinosaur behavior and contrast the appearance and lifestyles of different dinosaurs. During this post lab we encourage review of dinosaurs through music. Use the songs provided in the procedure section or original songs made up in class or songs chosen from one of the many dinosaur music albums available commercially.

### PROCEDURE:

1. Point out to students that the globe shows that different kinds of dinosaurs lived in different parts of the world during the Mesozoic Era.
2. Divide the class into "Meat-eaters" and "Plant-eaters." Lead the following two

songs. Have everyone join in as the appropriate groups move around the room acting like their type of dinosaur. The meat-eaters should walk on two legs and act predatory and ferocious. The plant-eaters should munch shrubbery and be on the watch for predators. You should use props for this activity if possible. Fangs, plastic claws, armor (horns, plates, frills), and fake ferns, would all be fun. If you like, you may make up your own songs in lieu of, or in addition to, the ones given here. Your class might enjoy "brainstorming" to set dinosaur facts to popular song music. If you wish, you may bypass music altogether and make up your own dinosaur rap.

**SONG 1** (sing to the tune of "Twinkle, Twinkle Little Star")

"Three-horned face, *Triceratops*,  
Eat plants all day. I never stop.  
*Tyrannosaurus* eats my friends,  
But horns and frill are my defense.  
Three-horned face, *Triceratops*,  
Eat plants all day. I never stop."

**SONG 2** (sing to the tune of "I'm a Little Teacup")

"I'm *Tyrannosaurus* big and strong,  
Front arms are short, but my claws are all long.  
When I hunt for dinner, hear me roar,  
And chase the smaller dinosaurs."