



**Pre-Visit Activity**

Ask the students to come up with three to five questions about dinosaurs or prehistoric life they hope to have answered during their trip. Have students bring their questions to the museum.

**Post-Visit Activities**

Have the students share at least one of their questions and the answer with the class or a fun fact they learned.

**Post Visit Discussion Questions**

Discuss with the students the kind of information that is usually NOT preserved in fossils, such as soft tissues, color and behavior. How would scientists know about these things?

Discuss why many dinosaurs were so large and others were small. Ask students to formulate ideas as to why. What are some of the advantages and disadvantages of this?

Working in groups, list what they, as humans, would need to survive during the Mesozoic Era. What would they eat? Where would they live? How would they protect themselves?

Discuss different extinction theories. Vote on the one the class thinks is the most possible. What are some of the endangered animals that exist today?

**DINOSAUR QUESTIONS AND ANSWERS
WHAT DO YOU ALREADY KNOW ABOUT DINOSAURS?**

**Q: Where did dinosaurs live?
A:** Evidence now shows that dinosaurs lived on all seven of the continents.

**Q: Did some dinosaurs live in water?
A:** No, although fossil trackways show dinosaurs wading into water and perhaps able to swim, no dinosaur was fully adapted to permanent life in water.

**Q: How many types of dinosaurs are there?
A:** Approximately 700 species of dinosaurs have been named; however, only about half of these are based on reasonably complete specimens that can be shown to be unique and separate species.

**Q: Did dinosaurs communicate?
A:** Dinosaurs probably did communicate both vocally and visually. The chambered headcrest on some dinosaurs such as the *Corythosaurus* or the *Parasaurolophus* might have been used to amplify grunts and bellows. Likewise, an angry *Triceratops* bull shaking his head at you, even silently, would have made himself very clearly understood.

**Q: Why did some dinosaurs grow to be so big?
A:** Paleontologists don’t know for certain, but perhaps a large body size protected them from most predators, helped to regulate internal body temperature, or let them reach new sources of food by browsing treetops like giraffes do today.

**Q: Were dinosaurs slow moving creatures because they had to drag their long, heavy tails?
A:** Dinosaur fossil tracks rarely include tail marks meaning their tails were probably elevated and carried off the ground, acting as a counterbalance for their long necks. Their tails may also have been used as a defensive weapon.

**Q: What color were dinosaurs?
A:** Directfossil evidence for dinosaur skin color is unknown. Paleontologists think that some dinosaurs most likely had protective coloration, such as pale undersides to reduce shadows, irregular color patterns (camouflage) to make them less visible in vegetation, and so on. Those dinosaurs that had enough armor, such as the stegosaurs and ceratopsians, may not have needed protective coloration but may have been brightly colored as a warning to predators or as a display for finding a mate. Perhaps dinosaurs were as brightly colored as modern lizards, snakes, or birds.

**Q: Were dinosaurs social animals?
A:** Some dinosaurs probably were social creatures. Recently discovered evidence indicates some species traveled together and some may even have migrated (because dinosaur fossils have been found above the Arctic Circle, where food supplies would have been seasonal).

**Q: Which dinosaurs had the largest brain in relation to its body? The smallest?
A:** *Troodon,* a rare dinosaur of the Cretaceous period had the largest brain in relation to its body. The *Stegosaurus*, with a brain the size of a walnut, had the smallest brain, relative to its size, of any dinosaur.

**Q: Were dinosaurs able to migrate long distances?
A:** Some probably did. Great numbers of trackways indicate that herds of Maiasaurs (duckbills) and Ceratopsians (horned dinosaurs) may have migrated between Alaska and the western United States. Today’s great migrators include the wildebeest of Africa and the caribou of Alaska.

**Q: How did the T. Rex get its name?
A:** *Tyrannosaurus rex* means tyrant lizard king and when the first fossils were found it was the largest meat-eating dinosaur found.

**Q: What is the difference between a paleontologist and an archeologist?
A:** While both are scientists, a paleontologist studies fossils and prehistoric life while an archaeologist studies artifacts and past human cultures.

**FUN FACTS**

**What is a dinosaur?**

* Dinosaurs are animals that evolved into many sizes and shapes from a group of crocodile-like reptiles called thecodonts.
* Dinosaurs varied in size. One of the largest, the *Brachiosaurus,* was over 70 feet long and up to 40 feet tall. In contrast, *Compsognathus,* was 2 feet long and weighed about 6.5 pounds, approximately the size of a chicken.
* The word dinosaur means “terrible lizard.”
* Dinosaurs were carnivores (meat eaters), herbivores (plant eaters) or omnivores (both meat- and plant eaters).
* We can determine the diet of a dinosaur by the shape of its teeth. Most carnivores (meat eaters) had sharp teeth for ripping and tearing. Herbivores had teeth that adapted to their diet. Most had sharp, scissor-like teeth in the front for shearing off plant material. Some had peg-like teeth to strip the leaves or needles from a twig or branch. A few had flat teeth used to grind fibrous plants.
* Some dinosaurs, such as *Velociraptor,* were considered to be quite fast, while others like *Ankylosaurus* were probably slow and lumbering. Most of the fast dinosaurs walked on two feet, while the slower dinosaurs walked on four feet.
* Unlike modern reptiles such as lizards and crocodiles that walk with sprawling legs, all dinosaurs walked erect with their legs under their bodies for support, some on two legs, others on four.
* Some dinosaurs also had grasping hands. These dinosaurs, unlike other reptiles, would have been able to grasp and hold things, such as their prey.
* Like many of today’s reptiles and sharks, dinosaurs could grow replacement teeth throughout their lives.
* No one truly knows what dinosaurs looked like, how they were colored, or how they died. Scientists use body fossils, fossil prints (a type of fossil) and the habits of similar modern animals to create theories.

**Fun Dino Fact: Hadrosaurs, also known as the duckbill dinosaurs, had hundreds of self-sharpening teeth in rows lining their jaws – about 960 teeth in all!**

**The Earliest Dinosaur**

* The oldest known dinosaur fossils date from the Triassic Period, about 230 million years ago.
* These fossils were found in Argentina in South America.
* The dinosaurs of the Triassic Period tended to be small and lightly built.
* They were bipedal (moved around on two feet) and were either carnivores or omnivores.
* Most were 10 to 15 feet long and may have been very agile and fast.

**Dinosaur Eggs**

* Dinosaurs laid eggs like many modern animals, such as birds and reptiles.
	+ Paleontologists believe some dinosaurs, such as theropods, may have been altrical*,* (meaning an animal that needs intense parental care during incubation and for a period of time after hatching).
	+ Others, such as sauropods, may have been precocial (meaning the animal can take care of itself immediately after hatching).
	+ There is evidence that *Maiasaura* babies could not leave the nest and had to be fed by their parents.

**Fact or fiction: Giant dinosaurs laid giant eggs?

Fiction: Dinosaurs may have grown into giants, but their eggs were relatively small. The largest dinosaur eggs were about the size of a basketball, but most were much smaller.**

**Fossils**

* Fossils are the remains, or evidence, of ancient life older than 10,000 years preserved in rock or some other material, such as tar or permafrost.
* Studying fossils is the best way for scientists to learn about dinosaurs.
* There are two main types of fossils, body fossils and trace fossils*.* Body fossils are the direct physical remains of organisms, such as teeth, bones, claws, shells, wood, seeds, and leaves. Trace fossils are the indirect evidence of ancient activity (behavior), including tracks, trails, burrows, borings, footprints, eggs and egg nests, coprolite, gizzard stones (gastroliths), and imprints of skin and plants.
* Usually only the hard parts of the body can be fossilized. The softer tissues usually decompose before they can be fossilized.
* The teeth, bones, claws and shells usually last longer, especially if they are buried quickly in mud, sand or silt. This protects these parts from weather damage, rotting and scavengers.
* Fossils have the same shape as the original object, but their chemical make-up is altered, reflecting the minerals that have replaced the organic material. Sometimes some of the major bone constituent remains.
* Because fossils are rocks, they usually take on the color of their geological chemical composition, rather than the color of original matter.

**Fun Fossil Fact: Fossils have been found on every continent, including Antarctica!**

**Different Types of Dinosaurs**

The following drawing is of a typical, large sauropod, which is a four-legged, slow-moving herbivore.

* Long neck for eating leaves or needles off trees.
* Big gut to digest lots of plant material.
* Four columnar legs
* Tail for counterbalancing the long neck

**Fun Fact: Sauropod means “lizard feet” because they had five toes like lizards.**

The following is a drawing of a theropod, a fast, bipedal (two-legged) carnivore.

Tail for counterbalancing head and neck

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Short arms and claws

Long back legs

* Short arms and claws.
* Long back legs.
* Tail for counterbalancing bigger head and neck.

**Extinction**

There are many theories on how dinosaurs became extinct. Three of the most popular are:

* Volcanic eruptions caused climate change.
* A continental shift caused the weather to change faster than dinosaurs could adapt.
* A meteorite strike on earth produced huge clouds of debris, blocking the rays of the sun resulting in a colder climate; therefore killing off all of the plants and animals that dinosaurs used as food. Scientists have found evidence in rock of a meteorite impact. They have also found the probable crater.

**Dinosaur Size Scale**



**Largest:** *Argentinosaurus*, possibly as big as 114 to 147 ft long this dinosaur would have been longer than three buses put together.

**Smallest**: *Compsognathus,* this dinosaur was only 2 feet long, about the sized of a chicken.

**Fastest:** *Ornithomimus*, resembling an ostrich, this dinosaur has been estimated to have run at speeds of 40-50 mph.

**Biggest Brain:** Troodontids, these dinosaurs had the largest brain-to-body ratio of all the dinosaurs. They are believed to have been as intelligent as modern-day birds.

**Smallest Brain:** *Stegosaurus*, the *Stegosaurus* had a brain the size of a walnut, possibly assisted by a bundle of nerves in its hips.

**Earliest:** *Eoraptor*, this dinosaur from Argentina was believed to have lived 227,000,000 years ago.

**First Discovered:** *Iguanodon*, this dinosaur was discovered in England by Mary Ann Mantell in 1822.

**DINOSAUR ACTIVITIES**

**Creative Writing Ideas**

1. Write a descriptive essay about being a dinosaur living in a particular region. What would the dinosaur eat; would it be a meat eater or a plant eater? How big would it be? What would it look like? What kind of plants and other animals/dinosaurs would be there? What would the weather be like? Would it be warm, hot or cool? Would the climate be wet or dry? What other details would you like to add?
2. What would happen if the dinosaurs had never died out? Or if they suddenly made a come back? What would you do if you found a baby hadrosaur on your doorstep one morning? “What if” situations are a fun way for children to use their imagination. This creative writing activity gives them the opportunity to put their imaginings on paper. Have them draw a picture to illustrate their story.

Below are some “what if” suggestions to use or allow them to make up their own.

*What if*….

-you were shipwrecked on an island of dinosaurs?

-you made the first dinosaur discovery?

-the dinosaurs hadn’t become extinct?

-you were accidentally locked in a dinosaur museum overnight?

-you built a time machine and went back to the Cretaceous Period?

-you drank a potion that turned you into a dinosaur?

-the dinosaurs reappeared?

-you found a baby dinosaur?

-the dinosaurs had never existed? (What type of animal may have been in its place?)

-you found a big egg, kept it warm and a dinosaur hatched from it?

-you could see a dinosaur no one else could see?

**Dinosaur Unscramble**

|  |  |
| --- | --- |
| TXCNIET |  |
| SOINUDAR |  |
| RENIRCAVO |  |
| SFISOSL |  |
| ETTEH |  |
| GSEG |  |
| IBREHEOVR |  |
| PTINFOOSRT |  |
| TOGOAPYLLNEO |  |
| OCDLODBOLDE |  |
| OPCRTILEO |  |
| IGD TISE |  |
| RUJSASCI |  |

**Dinosaur Unscramble Answer Key**

|  |  |
| --- | --- |
| CTNIEXT | EXTINCT |
| SOINUDAR | DINOSAUR |
| RENIRCAVO | CARNIVORE |
| SFISSOL | FOSSILS |
| ETTEH | TEETH |
| GSEG | EGGS |
| IBREHEOVR | HERBIVORE |
| PTINFOOSRT | FOOTPRINTS |
| TOGOAPYLLNEO | PALEONTOLOGY |
| OCDLODBOLDE | COLDBLOODED |
| OPCRTILEO | COPROLITE |
| IGD TISE | DIG SITE |
| RUJSASCI | JURASSIC |

**Making An Imprint Fossil**

**Supplies:
 “Stone” Dough Mix “Fossils to Imprint”**

½ cup of salt Twigs

1 cup of flour Leaves (stiff bay leaves work well)

½ cup of brewed coffee (cold) Seashells

1 cup of used coffee grounds Chicken bones

Measuring cups Plastic dinosaur models for skin

Mixing spoon for texture or footprints

Mixing bowls

###### **Procedure:**

1. Measure salt, flour, coffee, and coffee grounds. Add each to the bowl and stir together until well mixed.
2. Turn this dough out onto a large sheet of waxed paper and knead until smooth.
3. Break off a piece large enough for the imprint you want to make, roll it into a ball, and use the heel of your hand to flatten it out.
4. Press the object you wish to make a fossil imprint of firmly into the dough. You can use more than one object if you like. Carefully remove the objects to leave the prints behind. Let your fake stone dry overnight and you will have an imitation fossil!

**\*\*\*\*** You could also use clay, Crayola Model Magic or plaster of paris or any other type of modeling material you wish.

###### **Discussion Point**

What you are doing is very much like the way real imprint fossils were created. Millions of years ago plants, bugs, or other animals left impressions in soft mud. This mud eventually dried and became rock.

Much of what we know about ancient, extinct plants and animals comes from such imprints since neither skin or feathers are likely to survive as actual fossils, the way bones do. This is how we know what the texture of dinosaur skin was and why scientists believe some dinosaurs may have had feathers.

**Dinosaur Poem**

Write a poem below. Begin each line with a word that begins with the letter on that line.

D I N O S A U R