

Collecting Dinosaurs

Self-Guided Tour Grades 1-4



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***Italicized items indicate activities to be performed.*

The Museum of Texas Tech University



Photo courtesy of Patrice Fay

The Museum of Texas Tech University is an Educational, scientific, cultural, and research element of Texas Tech University. It consists of several components: the main Museum building, the Moody Planetarium, the Natural Science Research Laboratory, the research and educational elements of the Lubbock Lake Landmark, and the Val Verde County research Site

Mission Statement

The mission of the Museum is to collect, preserve, interpret and disseminate knowledge about natural and cultural material from Texas, the Southwest, and other regions related by natural history, heritage, and climate. The Museum's collections, exhibitions, programming and research complement the diverse state, national and international communities. Through classroom instruction, practicum and fieldwork, the Museum provides both theoretical and practical education. It is dedicated to acting as a responsible partner to Texas Tech and the community of museums

Group Reservations

Reservations for touring the Museum are required, including for self-guided tours. Bookings must be made at least two weeks prior to your visit. Please remember to reserve clipboards and pencils as well. Call (806) 742-2456 to reserve your tour time.

Dinosaurs and Stamp Collecting Introduction

Dear Teachers and Parents,

The purpose of this self-guided tour is to create a better understanding of the world of dinosaurs and stamp collecting. Many students are fascinated with both stamp collecting and dinosaurs. What better way to combine them than through collecting dinosaur stamps? In order to use this guide you will need to utilize the Vertebrate Paleontology Gallery inside the MoTTU main galleries; and the dinosaur stamp board located just outside the Moody Planetarium. The activities are intended for students/children in 1st through 4th grades. Italicized items on the table of contents indicate an activity to be performed. Please feel free to make reproductions of activity sheets prior to your museum visit.

Designed to enhance the science curriculum of the TEKS, Dinosaurs and Stamp Collecting explores the lives of dinosaurs through stamp collecting. Students will learn about different dinosaurs, paleontologists, the history of the postage stamp, stamp collecting and much more!

TEKS Standards Met

| Science | Social Studies | Art |
|-------------------------------------|--|--------------------------------|
| 112.1, 112.2, 112.3 112.5, 112.6 | 113.1, 113.2, 113.3 113.4, 113.5, 113.6 | 117.5, 117.8 117.11, 117.14 |

TEKS EXPANDED

§112. Science

(a) Introduction.

(1) The study of science includes simple classroom and field investigations to help students develop the skills of asking questions, gathering information.

(2) As students learn science skills, they identify components of the natural world including rocks, soil, and natural resources. Students observe that heat from the Sun or friction is an example of something that causes change. In addition, students identify basic needs of living things, explore ways that living things depend on each other, and separate living organisms and nonliving things into groups. Students identify parts that can be put together with other parts to do new things.

(3) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(5) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.

§113. Social Studies

(a) Introduction.

(1) Students begin to develop the concepts of time and chronology by measuring calendar time by days, weeks, months, and years. Students communicate what they have learned in written, oral, and visual forms.

(3) The eight strands of the essential knowledge and skills for social studies are intended to be integrated for instructional purposes. Skills listed in the geography and social studies skills strands in subsection (b) of this section should be incorporated into the teaching of all essential knowledge and skills for social studies. A greater depth of understanding of complex content material can be attained when integrated social studies content from the various disciplines and critical-thinking skills are taught together.

(4) Throughout social studies students build a foundation in history; geography; economics; government; citizenship; culture; science, technology, and society; and social studies skills.

§117 Art

(a) Introduction.

(1) Four basic strands--perception, creative expression/performance, historical and cultural heritage, and critical evaluation--provide broad, unifying structures for organizing the knowledge and skills students are expected to acquire. Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks. They express their thoughts and ideas creatively, while challenging their imagination, fostering reflective thinking, and developing disciplined effort and problem-solving skills.

Glossary

Acidity - excessive acid quality.

Adhesive - a substance that causes something to adhere, as glue or rubber cement.

Bipedal – two footed.

Benjamin Franklin -American statesman, diplomat, author, scientist, and inventor.

Biology - The science of life and of living organism.

Carnivorous – flesh eating

Dinosaur - Any of various extinct, often gigantic, carnivorous or herbivorous reptiles of the orders Saurischia and Ornithischia that were chiefly terrestrial and existed during the Mesozoic Era.

Ecology - The science of the relationships between organisms and their environments.

Engrave -To carve, cut, or etch into a material.

First Day Cover - The first day of issue is the day on which a postage stamp, postal card or stamped envelope is put on sale, within the country or territory of the stamp-issuing authority

Fossil - A remnant or trace of an organism of a past geologic age, such as a skeleton or leaf imprint, embedded and preserved in the earth's crust

Geology - The scientific study of the origin, history, and structure of the earth.

George Washington – 1st President of the United States.

Glassine - A nearly transparent, resilient glazed paper resistant to the passage of air and grease

Herbivores – an animal that feeds chiefly on plants.

Imperforate - (of a number of stamps joined together) lacking the perforations usually separating individual stamps

Interpret – to explain the meaning of.

Knighthood - The rank, dignity, or vocation of a knight

Legendary – Very famous

Microprint - a microphotograph reproduced in print for reading by a magnifying device.

Museum - A building, place, or institution devoted to the acquisition, conservation, study, exhibition, and educational interpretation of objects having scientific, historical, or artistic value.

Paleontology - The study of the forms of life existing in prehistoric or geologic times, as represented by the fossils of plants, animals, and other organisms.

Pelvis - the structure of the vertebrate skeleton supporting the lower limbs in humans and the hind limbs or corresponding parts in other vertebrates.

Philatelic - the collecting of stamps and other postal matter as a hobby or an investment.

Pre-Historic - Of, relating to, or belonging to the era before recorded history

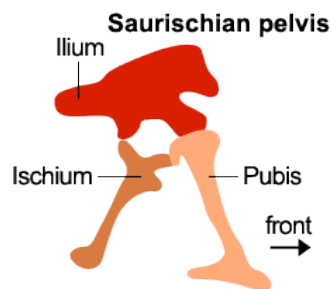
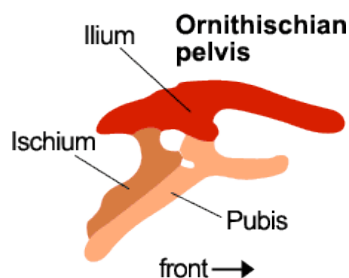
Preserve - to keep up; maintain.

Quadrupedal - an animal, esp. a mammal having four feet.

Vertebrate - having vertebrae; having a backbone or spinal column.

Lesson 1 What is a Dinosaur

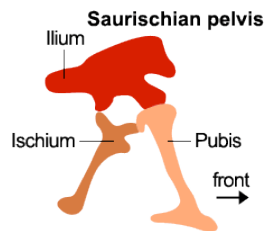
- 🌈 Location: Classroom
 - 🌈 Procedure: The following pages contain background information and activities that should be reviewed prior to visiting the Museum of Texas Tech University.
- 🦖 Dinosaurs belong to a group of reptiles known as archosaurs in which there are two lineages, one leading to crocodiles and one leading to birds. Archosaur means “ruling reptile.” Archosaurs are defined by their antorbital fenestra. The antorbital fenestra is merely an extra hole in the skull. This hole is located in front of the eye (ant = before; orbit = eye; fenestra = window).
 - 🦖 Dinosaurs are technically defined by their “perforated acetabulum.” Which simply means that they had a hole in the middle of their pelvis. No other animal on Earth has ever exhibited this feature.
 - 🦖 The evolution of a hole in the pelvis allowed dinosaurs to walk with their legs directly beneath them, as opposed to the sprawling condition of other reptiles.
 - 🦖 Crocodilians, pterosaurs, and their extinct relatives are also classified as archosaurs – however they are not dinosaurs.
 - 🦖 Emerging during the Late Triassic Period (28 million years ago), dinosaurs ruled the Earth for over 160 million years.
 - 🦖 At the end of the Cretaceous Period (65 million years ago), dinosaurs vanish from the fossil record (with the exception of birds).
 - 🦖 Theories abound as to why dinosaurs became extinct, however, very solid evidence points to the consequences of an asteroid impact causing the mass extinction of the dinosaurs.



Dinosaur Classification

On the most basic level, dinosaurs are classified into two orders according to the general structure of their hip.

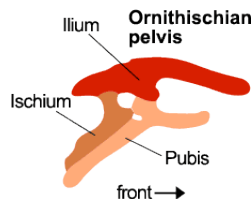
Saurischians (lizard hipped)



Suborders:

- 1) Therapods (carnivorous, intelligent, bipedal) Examples: Tyrannosaurus rex, Coelophysis bauri, Deinonychus antirhopus
- 2) Sauropods (giant herbivores, quadrupedal, herders) Examples: Camarasaurus grandis, Apatosaurus, Diplodocus
- 3) Prosauropods (early Sauropod relatives, herbivores, some bipedal) Examples: Plateosaurus, Massopondylus, Mussaurus patagonicus

Ornithischians (bird hipped)



Suborders

- 1) Ornithopods (herbivores, some bipedal, included duckbills) Examples: Iguanodon, Maisaura peeblesorum, Tenontosaurus tilletti
- 2) Thyreophora (armored, quadrupedal, herbivores) Examples: Stegosaurus, Ankylosaurus, Minmi
- 3) Marginocephalia (horned or thick skulled, quadrupedal, herbivores) Examples: Triceratops horridus, Pachycephalosaurus, Styracosaurus

All About Paleontology – the study of ancient life

Today you can see dinosaurs at the Museum of Texas Tech University. After a dinosaur skeleton has been dug up, it is taken to a laboratory where it is carefully cleaned. Then the work of a paleontologist begins. Paleontologists are people who study the remains of ancient plants and animals. They compare any new specimens they find with the skeletons of dinosaurs that have already been examined and classified. Once the paleontologists have classified the specimen, they lay out all its bones like a giant puzzle. The bones are attached to a metal frame that holds them in

place. If some of the bones are missing, replicas of the missing bones are made out of plastic or plaster. Then all the bones are coated with a chemical to protect them from the atmosphere. Then the skeleton is ready to display in the museum.¹

Paleontologists have found evidence of dinosaurs on all continents.

Through the study of fossils, paleontology tells us about “the ecologies of the past, about evolution, and about our own place, as humans in the world.”

(www.umcp.berkeley.edu)

Paleontology is a multi-disciplined science incorporating aspects of biology, geology, ecology, computer science, museum science, mathematics, and many other academic disciplines.

All About Fossils

A fossil is the remains or evidence of a prehistoric plant or animal preserved in a geological structure. Most of the time when a plant or animal dies it is completely destroyed. Sometimes, however, the remains of an animal are buried before they can be destroyed, and if the conditions are just right the remains are preserved as fossils.

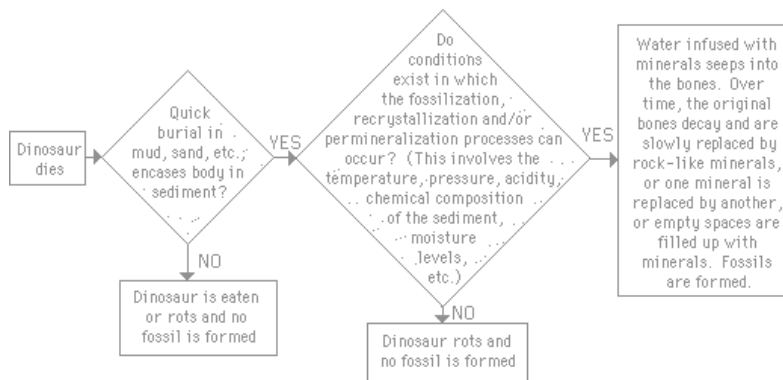
Here is one way fossils are made:

- a. An animal dies and sinks to the sea floor.
- b. The body begins to decay and is buried under layers of sediment such as mud or sand.
- c. These layers become rock.
- d. The hard parts of the animal are replaced with minerals such as iron pyrites or silica. These minerals form the fossil.
- e. The overlaying rock is eroded, exposing the fossilized remains.

Most fossils are found in **sedimentary** rocks. Usually fossils show the hard parts of the animal or plant, like bones or shells. This is because the soft parts are destroyed quickly after death.²

¹ World of Knowledge Dinosaurs

² Our Dynamic Earth – Museum of TTU



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Activity 1

Make Your Own Fossils

When you visit the Museum of Texas Tech University you will see many replicas of fossilized remains. Why do we use replicas? The original is too fragile to handle so a copy is used for study and research. In order to understand how to care for fossils and reproductions, students should make their own fossils.

Scientists search for and study fossils in order to learn about prehistoric life on earth. Fossils are the remains of animals and plants preserved within the rocks that make up the earth's crust. Here's a hands-on activity that will teach your kids more about how these fossil treasures are created by letting them "fossilize" natural objects such as shells, leaves, or acorns.

Items you will need include:

- Small objects to fossilize
- Modeling clay
- Waxed paper
- Plaster of Paris
- Small amount of vegetable oil
- Container for mixing

Procedure:

- a. For each item you'd like to fossilize, place a large ball of clay on a piece of waxed paper and flatten it into a thick circle.
- b. Now make an impression in the clay by gently pressing in the object and then removing it.
- c. Apply a small amount of vegetable oil to the impression surface to make it non-stick.
- d. Prepare some plaster of Paris according to the package directions so that it has a smooth but thick consistency.
- e. Spoon plaster of Paris into each impression thoroughly filling it in.
- f. Let the plaster dry completely (about 30-60 minutes), then peel away the "clay" to reveal your fossil.⁴

³ Enchantedlearning.com

⁴ www.geology.siu.edu/outreach/making_fossils.htm

The History of Stamps

The birth of the postage stamp dates back to May 6, 1840, when Britain issued its first stamp, the "Penny Black." But, how did people receive mail before this time, and what led to the idea of using stamps?

Primitive message systems have been in place as long as man has been in existence. Until 1840, however, regardless of how primitive or how elaborate, all these systems operated without the benefit of a postage stamp.

Mail, consisting mostly of government dispatches, was carried from place to place by horse or horse-drawn wagons in ancient Egypt and Persia. Most mail was still being transported the same way in the middle of the 19th century, when stagecoaches carried letters and packages to the West coast.

Historical references to postal systems in Egypt date from about 2000 BC. The Persian Empire under Cyrus the Great (6th century BC) used a system of mounted relay messengers. The riders would stop at regularly placed posthouses to get a fresh horse or to pass on their packets of dispatches to another messenger for the remainder of the distance.

On the other side of the world, in China, a posthouse service had been started early in the Chou Dynasty (ruled 1122-221 BC). It was used mostly to convey official documents. The far-reaching system consisted of relays of couriers who changed horses at relay posts 9 miles (14.5 kilometers) apart. The system was enlarged under the Han Empire (202 BC-AD 220), when the Chinese came in contact with the Romans and their postal system.

The Roman Empire built the most advanced postal delivery system known until that time except for the service in China. Its area was the whole Mediterranean world. Reliable communication from Rome to governors and military officials in faraway provinces was a necessity. Rome met the need by developing the *cursus publicus* literally, "public course" a state-sponsored series of post roads with relay stations at intervals. The speed with which government dispatches and other mail could be carried about the empire was not equaled again in Europe until the 19th century. Using the relay stations, riders could cover about 170 miles (270 kilometers) in a 24-hour period.

The collapse of the empire in the West did not immediately destroy the postal system. Vestiges of it endured until at least the 9th century before it became fragmented and fell into disuse. In the Eastern, or Byzantine, Empire the system lasted longer because it was eventually absorbed into the Islamic kingdom based in Baghdad.

With the growth of international commerce during the Renaissance, there was a need for business correspondence. Corporations and guilds set up their own messenger services. The great merchant and banking houses of the Italian city-states provided the

most extensive and dependable postal service of the time. By the 13th century links were maintained between the commercial centers of Florence, Genoa, and Siena and several communities in northern France that held annual fairs. These fairs attracted merchants from all parts of Europe. The postal service to France thus provided a major international link for commerce and news. There was also a postal link between Venice and Constantinople, the Muslim capital. Russia too shared in the postal communications of the day.

The private postal systems created during the later Middle Ages carried personal mail as well as commercial correspondence. The invention of the printing press late in the 15th century increased the amount of mail and made letter carrying a profitable enterprise. Private postal services emerged to carry mail to all parts of Europe.

The best known and most extensive such service was the Thurn and Taxis system. A family, whose Italian name was Tassis, had started operating courier services in the city-states from about 1290. Franz von Taxis served as postmaster for the Holy Roman emperor Maximilian I, beginning in 1489. He obtained the right to carry government as well as private mail throughout the empire. Under a patent from the emperor, branches of the family operated a network of postal routes in Spain, Germany, Austria, Italy, Hungary, and the Low Countries from 1512 to 1867. The system employed about 20,000 messengers to deliver mail and newspapers. The Prussian state nationalized the service in 1867.

By this time strong nation-states had emerged in Europe, and the need for private postal services was passing. In any case, governments were beginning to insist on controlling mail service. In France Louis XI had set up the Royal Postal Service in 1477. In 1516 Henry VIII of England appointed a master of the posts to maintain regular service along the roads leading out of London. Neither of these government systems was intended to serve the public. Carrying private mail was not legalized in France until 1627 or in Britain until 1635. Private mail delivery operations functioned side by side with government services for a while. Then in 1672 France declared all postal services to be a state monopoly. Private services were eventually forced out of business or purchased.

Private carriers did not give up, however. Some of them found a way to stay in business by introducing a new public service the collection and delivery of mail within cities. William Dockwra opened a Penny Post in London in 1680. The novelty of his operation lay in prepayment for sending letters and in stamping them to show when and where they were sent for delivery. Dockwra was so successful that he was prosecuted for infringing on the state monopoly. His enterprise was shut down in 1682 and quickly reopened as a government agency. It was nearly 100 years before a similar city service was started in Paris, and it too was rapidly taken over by the government.

The economic growth in Britain during the 18th century spurred a demand for better mail services. New post roads were built, beginning about 1765. Stagecoaches began carrying mail between cities and towns in 1784. The first route was between London and Bath. Mounted postboys also rode on the main routes. Next-day mail delivery became possible in towns throughout a good part of England by the 1830s.

Between 1775 and 1815 Britain was at war almost constantly, either with the United States or with France. To help finance the wars postage rates were increased, and the higher rates remained in force for 25 years after the defeat of Napoleon in 1815. Spurred by popular discontent over postal rates, the English educator and tax reformer Rowland Hill formulated proposals on reforming the postal system between 1835 and 1837. His pamphlet, "Post Office Reform: Its Importance and Practicability," is now regarded as a milestone in the development of the modern postal system.

Hill proved that carrying charges were an insignificant factor in the total cost of handling mail. He further proved that the complex series of rates based on distance were needless. Most of the total cost came from administrative expenses. He also noted that the collection of payment for mail on delivery could be avoided. His solution to postal problems was a uniform rate of postage regardless of distance and prepayment of postage through the use of adhesive stamps sold by the post office. He proposed that payments be based on weight and suggested a penny for each half-ounce.

A postmark is a postal marking made on a letter, package, postcard or the like indicating the (more or less precise) date and time that the item was delivered into the care of the postal service. The first postmark was introduced by English Postmaster General Henry Bishop in 1661 and showed only the day and month of mailing in order to prevent the delay of the mail by carriers. In the 19th century and early 1900s it was common for letters to receive multiple postmarks indicating the time, date, and location of each post office delivering or transporting the letter, and this is still occasionally true, though to a lesser extent.

Before the use of adhesive paper stamps, letters were hand stamped or postmarked with ink. A postmark is a postal marking made on a letter, package, postcard or the like indicating the precise date and time that the item was delivered into the care of the postal service. Postmarks were the invention of Henry Bishop and were at first called 'Bishop marks' after the inventor. Bishop marks were first used in 1661 at the London General Post Office. They marked the day and month the letter was mailed.

The First Modern Postage Stamp - Penny Black

The first issued postage stamp began with Great Britain's Penny Post. On May 6, 1840, the British Penny Black stamp was released. The Penny Black was engraved with the profile of Queen Victoria's head, which remained on all British stamps for the next sixty years.



Penny Black – United Kingdom
1840

In the United States

Congress provided for the issuance of stamps by passing an act on March 3, 1847, and the Postmaster-General immediately let a contract to the New York City engraving firm of Rawdon, Wright, Hatch, and Edson. The first stamp issue of the U.S. was offered for sale on July 1, 1847, in NYC, with Boston receiving stamps the following day and other cities thereafter. They consisted of an engraved 5-cent red brown stamp depicting Benjamin Franklin (the first postmaster of the US), and a 10-cent value in black with George Washington. As for all U.S. stamps until 1857, they were imperforate (lacking the perforations that usually separate stamps).



1847 5¢; the first US stamp



1847 10¢,

Stamp Collecting – How It Began

With the birth of stamps came the birth of stamp collectors or philatelists, as they have become known. Shortly after adhesive postage stamps were introduced by Great Britain in 1840, people began collecting them. In 1841, a woman even placed an advertisement in the London Times in which she requested help in collecting stamps so that she could paper a bedroom wall.

The two terms philately and philatelist, which refer to the collection and study of postage stamps, were derived from the Greek word *phileo*, meaning "I love" and *ateleia*, meaning "free of charges", in the sense that postage stamps replaced a cash postal charge. As people began to collect these interesting pieces of paper, no one realized how valuable stamps could become.

The advent of special commemorative stamps greatly increased the popularity of the hobby. The first U.S. stamps issued to specifically commemorate (remember and honor) our history were issued in 1893 to celebrate Christopher Columbus' discovery of the New World. A few of those 1893 Columbian stamps are now worth thousands of dollars!



Stamps of the Cape of Good Hope

During the late 1800s many of those collectors, as adults, began to systematically study the available postage stamps and published research works on their production, plate flaws, etc.

Some stamps such as the triangular issues of the Cape of Good Hope, *the first triangular stamp ever issued*, became legendary.

It was not until the 1920s that publicity about valuable stamps encouraged a large increase in the number of stamp collectors. This rapid increase in postage stamp values was largely because very few of the older stamps were being saved in good condition. Especially difficult to find were pairs, triples, and large blocks of older stamps. Because many U.S. stamp issues of the 1920s rose rapidly in value, during the 1930s many American collectors stockpiled mint U.S. stamps with the hopes of selling them for a sizeable profit in a few years' time. This never materialized. Even today, more than 60 years later, one can find many 1930s U.S. issues in mint condition for close to face value, and many stamp dealers and collectors still use stamps issued as far back as the 1930s for postage when mailing letters.

Most U.S. postage stamps issued since the 1930s are easy to obtain and have minimal value. Some high face value stamps, such as the \$2.60 United States Graf Zeppelin issued in 1930, are worth substantial amounts of money. Other stamps issued since 1930 that are usually worth something are souvenir sheets from popular countries, hard to find plate number coils, (a United States postage stamp with the number of the printing plate or plates printed on it) and errors in printing.



U.S. Graf Zeppelin 1930

The series of three airmail stamps in denominations of 65 cents, \$1.30 and \$2.60 were issued to be used on mail carried on the first Europe - Pan American round-trip flight of the Graf Zeppelin in May of 1930. For mail traveling one-way, the postage for postcards was 65 cents and letters \$1.30, whereas round-trip mail was \$1.30 for postcards and \$2.60 for letters. The series made its appearance on April 19, 1930, at which time 1,000,000 of each denomination were issued. They remained on sale for 50 days, after which the remaining unsold stamps were destroyed.

The green 65-cent airmail stamp (above) portrays the Graf Zeppelin on route across the Atlantic Ocean, apparently heading east towards the European Continent.

Stamp Collecting Supplies

When you start out you don't need a lot of stamp supplies, but you will need tongs, envelopes and a storage box. The tongs you'll have to buy from a stamp shop or at a stamp show.

You can use clean, plain white envelopes when you start. Write the name of the type of stamps on the envelope to help you organize your stamp collection.

When you're starting a stamp collection it's best to keep it simple and just sort your stamps and label your envelopes by country, unless you've already decided you want to focus on certain stamps, like motorcycle stamps or air mails.

When you're done working with your stamps for the day, it's good practice to put your stamps into a clean and sturdy container or box. If you have an empty drawer that you can use, that's fine too. Stamp collectors use just about every type of container imaginable.

No matter what else you learn about stamp collecting, learn to always use stamp tongs. They may look like household tweezers, but stamp tongs do not have sharp edges. Tweezers will harm your stamps.

Do not pick up your stamps with your fingers or even lay them out on a bare table. The natural oils from your skin and the dust on the table will dirty the stamp over time.

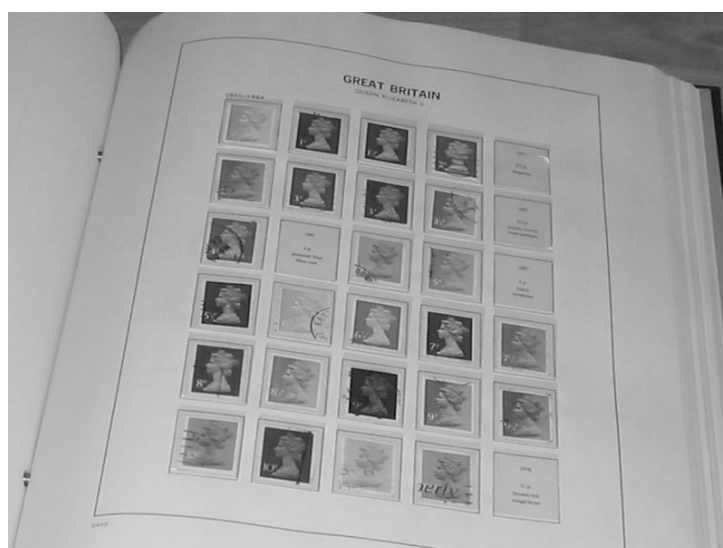
When looking at your stamps, pour them out of their envelope onto a clean piece of white paper or something similar such as a pad of paper or a clipboard.

The clipboard allows you to pick up all your stamps and move them out of the way if needed.

After a while, you should try to get a package of glassine envelopes for your stamps. These are semi-transparent envelopes made especially for stamp collecting. They're made out of glassine, a material that has no harmful chemicals in it that would harm the stamps inside.

Many types of paper have high levels of acidity or other properties that over time can harm the stamps inside. It's perfectly okay to temporarily store your stamps in these regular envelopes for a few weeks or so.

http://www.glassinesurfer.com/stamp_collecting/gsbeginnera.shtml



Dinosaur Stamps

Dinosaur stamps are a great learning tool for all ages. They inspire and spark interest in the prehistoric animals of America and the world. The United States Postal Service has several rules for selecting postage stamp images. A person must be dead for at least ten years before he/she can appear on a stamp. However, U.S. President's may be honored on a postage stamp on the first anniversary after their death. Also, postage stamp subjects must stand the test of time and should have widespread national appeal. Dinosaurs have been dead for 65 million years and are very popular, so they certainly qualify! Although stamp collecting has been a major hobby since the 1880s, dinosaur stamp collecting has become popular in only the last 25 – 30 years.

The first dinosaur to appear on a postage stamp was *Lufengosaurus* in 1958, issued by the People's Republic of China.



In the 200-year history of the US Postal Service, dinosaurs have been featured only three times: 1970, 1989, and 1997.

In 1970, a 6-cent stamp was issued with a first day cover, titled *The Age of Reptiles*, depicting the Jurassic scene of dinosaurs from the Yale Peabody Museum mural by Ralph Zalinger. <http://www.peabody.yale.edu/collections/ip/>

In 1989, four 25-cent stamps were issued showing *Tyrannosaurus*, *Pteranodon*, *Stegosaurus*, and *Brontosaurus*. Unfortunately, there was a postal goof – the correct name for *Brontosaurus* should be *Apatosaurus*. The Post Office was accused of “fostering scientific illiteracy,” and the recall of the stamp was demanded. The media enjoyed the scandal. Imagine not checking for scientific accuracy before issuing thousands of stamps. The second-day cover celebration of this series was held at the Museum of Texas Tech University.

The 1997 issue of dinosaur stamps was even more dramatic, consisting of 16 colorful 32-cent stamps of dinosaurs in natural environments. The first series of eight stamps depicted Late Jurassic dinosaurs of Colorado; the second series of eight showed Late Cretaceous dinosaurs of Montana. Artist James Gurney of *Dinotopia* (<http://www.dinotopia.com/>) fame designed these stamps in consultation with

paleontologists to avoid any controversy. Again, the Museum of Texas Tech hosted the second-day cover celebration of these stamps.



Lesson 1 - Activity 2 Meet the Artist: James Gurney



Location: Classroom

Time: 45 minutes

Procedure: The following pages contain background information and activities that should be reviewed prior to visiting the Museum of Texas Tech University

DIRECTIONS FOR THIS ACTIVITY:

Invite students to listen carefully as you read aloud the story below that tells how the U.S. Postal Service's [The World of Dinosaurs stamps \(1997\)](#) came to be. After reading aloud the story, ask students the questions that follow to learn how well they listened.

(NOTE: For younger students, you might divide the story into two parts. The follow-up listening questions are divided to reflect a two-part reading of the story.)

PART 1: SETTING THE SCENE

"The United States Postal Service has a rule: A person must be dead for at least ten years before they can appear on a stamp," says artist James Gurney. "Dinosaurs have been dead for 65 million years, so they definitely qualify!"

In the 150-year history of the U.S. postage stamp, dinosaurs have been featured only twice. So you can imagine how thrilled James Gurney was to be selected to create the art for the dinosaur stamps--"The World of Dinosaurs"--released May 1, 1997, by the U.S. Postal Service.

Gurney was chosen to create "The World of Dinosaurs" stamps by members of a special U.S. Postal Service committee. The committee asked Gurney to produce a scene that would include four dinosaur stamps. Gurney chose four dinosaurs that actually would have lived at the same time in North America. In September 1995, he quickly sketched a design that included the head of a *T. rex* and the bodies of three other dinosaurs.

Members of the stamp committee loved Gurney's sketch, so they asked him to do a new sketch that would include more dinosaur stamps. In January 1996, Gurney drew up a new design that included two scenes, each with five dinosaurs. One scene showed dinosaurs of North America during the Cretaceous period; the other showed dinosaurs of the Jurassic period.

At this point, Gurney's stamp project was still top secret. *He wasn't allowed to tell anyone one about it!* But Gurney wanted to be sure that his artwork was scientifically correct. He wanted to be allowed to talk with a few dinosaur experts to be certain that the dinosaurs and their habitats were accurate. The Postal Service gave Gurney the OK to talk to the experts---but to no one else!

"The scientists provided me with lots of information about other creatures and plants

that would have shared the world with dinosaurs," Gurney says. "Those creatures included frogs, turtles, insects, crocodiles, mammals, and birds." In addition, the experts provided information about plants that would have been part of the dinosaurs' world.

PART 2: THE FINAL SKETCH

Next, Gurney was ready to begin his final sketch. His goal was to show the rich and diverse ecosystem in which the dinosaurs lived. "There were plenty of plants and animals that looked a lot like what you would find today in Florida," he says.

"I wanted the picture to tell a variety of stories," Gurney continues. "Not only predators looking for a meal, but also babies hatching from eggs and mammals hiding in trees. To show a fossil in the making, I placed a skull of one dinosaur in the mud at the edge of a pond."

The stamp committee gave the OK to Gurney's final sketch, so he went to work on the painting. As he was completing his work, one member of the stamp committee happened to suggest that some of the creatures in the art of the scene's margins might make nice stamps too.

"He was right," Gurney says. "It was a great idea. There were indeed at least five more stamp designs hidden away!"

So Gurney touched up his painting to make the five new stamps. At one point we even thought of having yet another extra stamp of the nest full of hatchlings," Gurney says. "Take a close look at the scene and you can see the white egg is set up as a space for the 'USA 32.'"



Only one problem remained: *Where would the perforation holes be placed that divided the stamps from each other?*

"It was very important that a person could tear up the sheet easily to get at the stamps without being confused about what were stamps and what were scraps," Gurney explains, noting that the scraps might be fun to use as decoration stickers once the

stamps were torn away.

"Of course, everyone at the Postal Service hoped that people will get a couple sheets, one to use for stamps and another to keep untouched in a drawer or a stamp album," says Gurney.

"As for me, I'd like to stick the whole sheet on my T-shirt and mail myself to the Mesozoic era via Priority Mail," he added.

Lesson 1 - Activity 3 FOLLOW UP ACTIVITIES

Listening -- When you've finished reading the story aloud, ask students the following questions to see how well they listened. **Part 1: Setting the Scene**

1. How many years must a person be dead before that person can be featured on a U.S. stamp?
2. Before James Gurney's dinosaur stamps were issued, how many times had dinosaurs been featured on U.S. stamps?
3. How many dinosaurs were included in the first design that Gurney sketched?
4. Why did the stamp committee ask Gurney to do a new design?
5. Why did Gurney want to talk with dinosaur experts before he did his final stamp?
6. What are two of the other creatures that dinosaur experts said lived at the same time as the dinosaurs?

Part 2: The Final Sketch

1. What suggestion did a member of the stamp committee make as Gurney was working on his final painting?
2. What scene that Gurney thought might make a good stamp ended up not being used?
3. Why, do you think Gurney was thrilled to be chosen to design the new dinosaur stamps?
4. In the story, what does the word *perforation* mean?

Sequencing -- Write the following statements on a board or chart, or on individual strips of paper or oak tag. Invite students to arrange the statements in order so they tell the story of James Gurney and his "The World of Dinosaur" stamps.

(Note: For younger students, you might edit the activity to include only the first five statements shown below.)

*Gurney sketched a scene that included the head of a **T. rex** and the bodies of three other dinosaurs*

James Gurney was chosen to design new dinosaur stamps for the United States Postal Service.

Gurney talked to dinosaur experts before he started his final painting.

Gurney sketched two new scenes that included ten dinosaurs.

"The World of Dinosaurs" stamps were printed so they could go on sale May 1, 1997.

Gurney decided where perforation holes would be placed on his dinosaur stamp scene.

Gurney went to work painting a scene that included predators, dinosaur hatchlings, and a dinosaur fossil.

Members of the stamp committee asked Gurney to create a scene that would include four dinosaurs.

One stamp committee member asked Gurney to find five other stamps in the scene he painted.

Gurney was asked to do a sketch that included more dinosaurs.

Gary Hopkins, Education World® Editor-in-Chief

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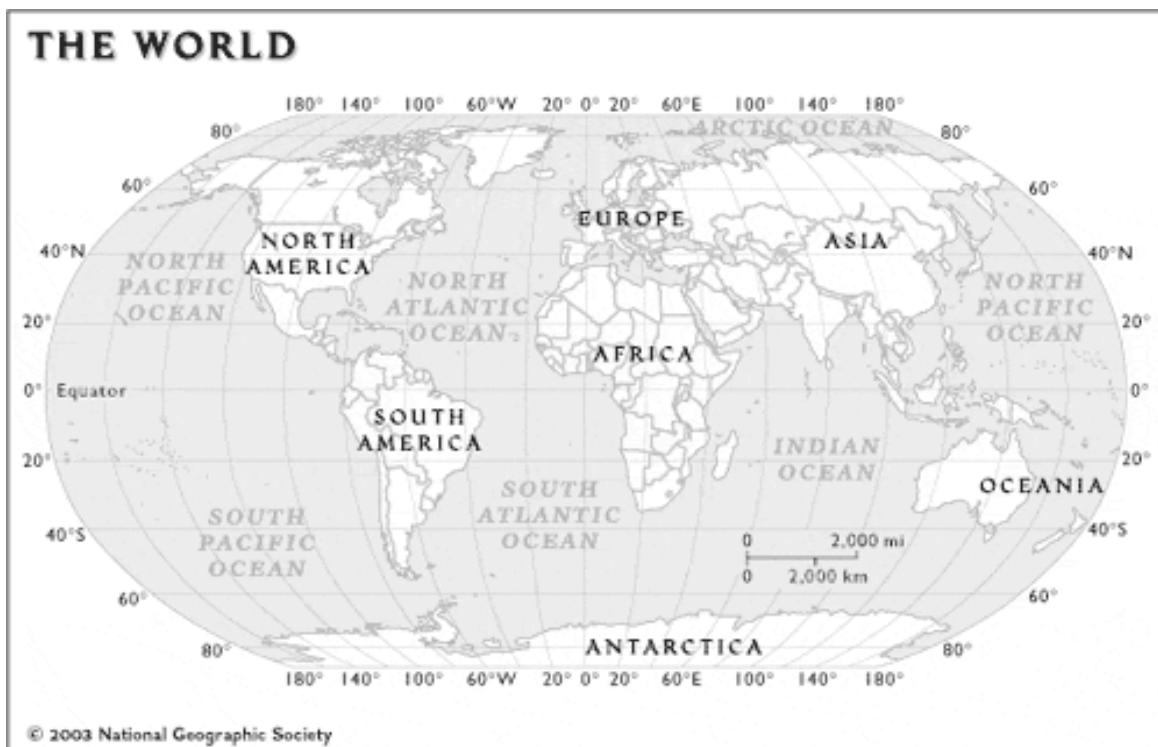
Links last updated 09/21/2004 http://www.educationworld.com/a_lesson/lesson/lesson006.shtml

Lesson 2 – Dinosaur Stamps from Around the World

- Location: Dino Stamp Board at the Museum of Texas Tech University
- Time: 30 minutes
- Procedure: The following pages contain activities that should be completed while visiting the dinosaur stamp board at the Museum.
- Materials: clipboards, pencils (available from the museum when you book your tour).

Activity 1 WORLD MAP/COUNTRY IDENTIFICATION

Use the map below to help you locate the country of origin for the stamps in the museum.



How many stamps from each country did you find? _____

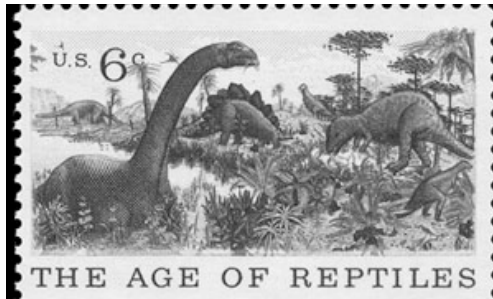
How many carnivores are visible? _____

How many herbivores are visible? _____

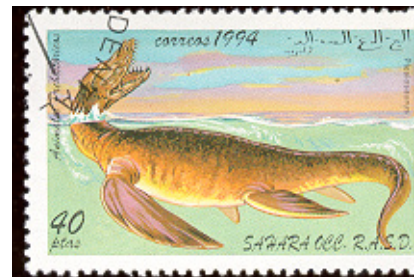
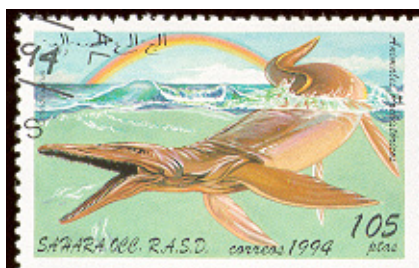
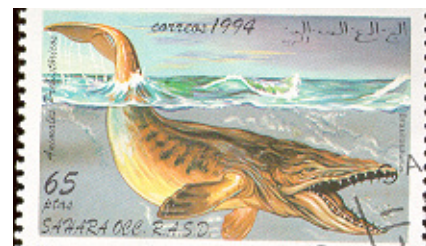
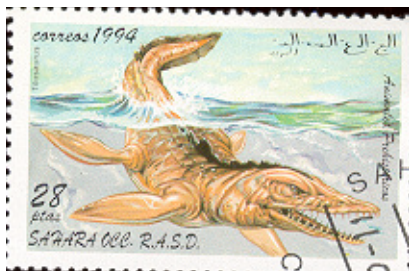
Lesson 2 - Activity 2

Dinosaur Scavenger Hunt

See how many of the stamps below you can find on the stamp board outside the Moody Planetarium. Check them off as you find them.

☐☐☐☐☐

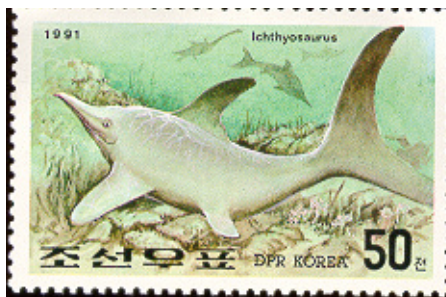
Stamps of Africa



Stamps of Africa



Stamps of Asia



Stamps of Asia



Stamps of Europe



Lesson 3 The Dinosaur Hall

- Location: Vertebrate Paleontology Gallery at the Museum of Texas Tech University.
- Time: 30 minutes
- Procedure: The following information and activities are for use while visiting the Vertebrate Paleontology Gallery at the Museum.
- Materials: clipboards, pencils, copies of pages 33 and 34 for students.

Fascinating Facts

As you tour the gallery discuss the following:

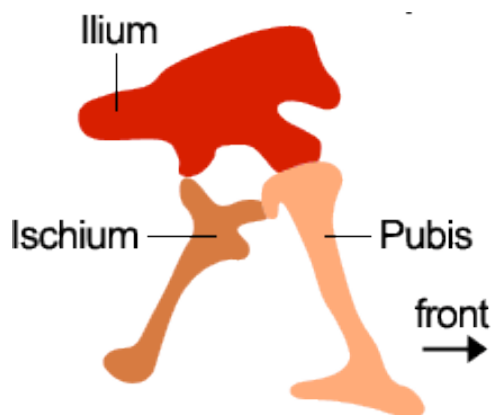
Dinosaurs were:

Land dwelling reptiles

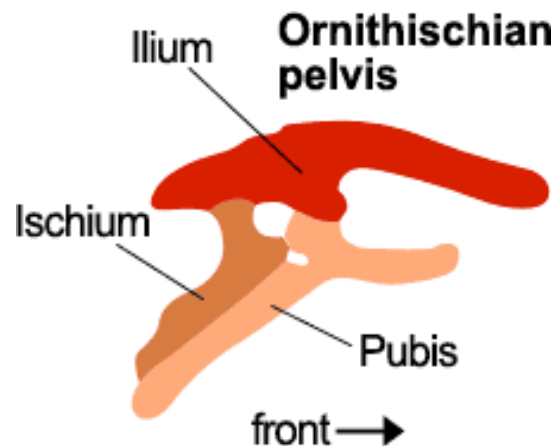
Possessed a special hip structure so that their legs go directly beneath them

Lived over 65 million years ago

Classified by their hip structures:



"Lizard" hipped
Saurischian hipped



"bird" hipped
Ornithischian hipped

Lesson 3 - Activity 1

Gallery Quiz

As you tour the exhibit *A Changing World: Dinosaurs, Diversity and Drifting Continents* at the Museum of Texas Tech University, ask students to look for the answers to the following questions.

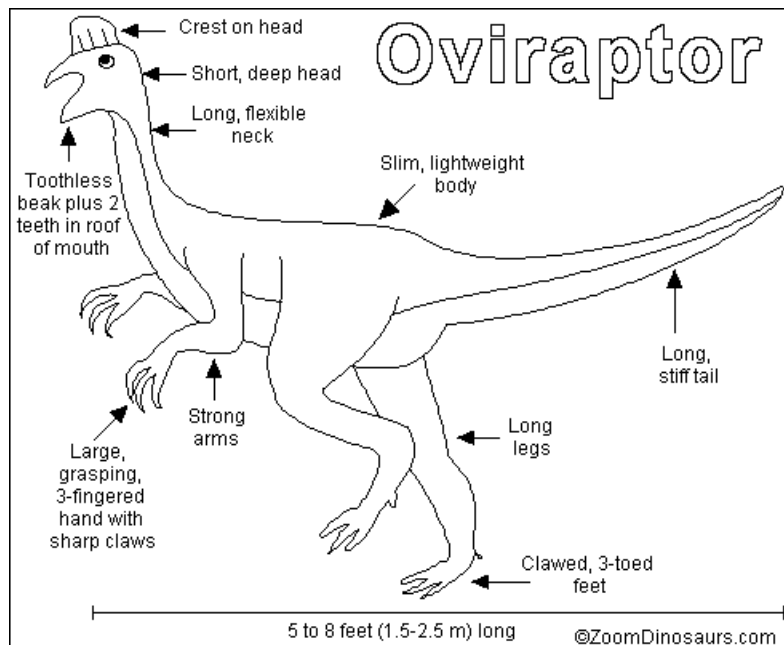
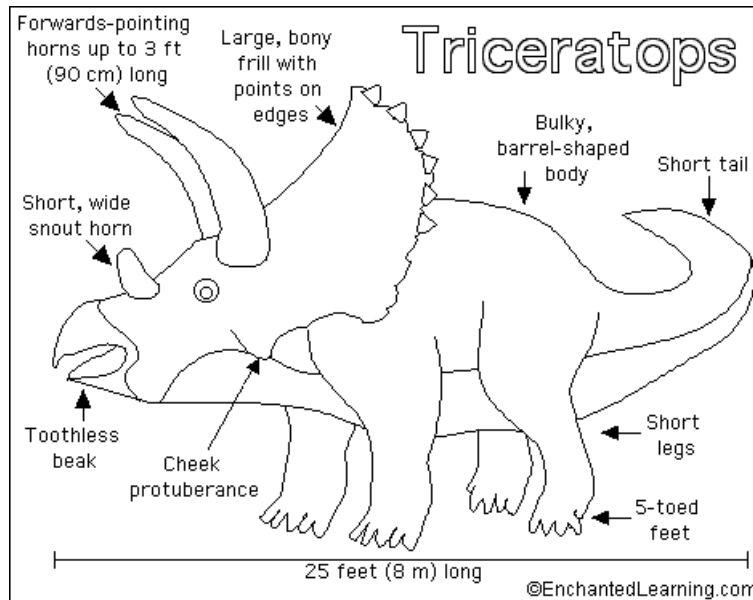
This exhibit covers the Mesozoic Era of geologic history. This era was composed of the Triassic, Jurassic and Cretaceous periods. Watch for these periods as you walk through the exhibit. Also pay attention to the movement of the continents during the period.

1. **Dawn of an Age:** What is the scientific name of the ancestor to all dinosaurs?
2. **Dinosaur Family Tree:** What is the unique feature of dinosaurs? What are two groups into which dinosaurs are classified?
3. **Paleontology: Tracing Clues:** What is the scientific name of the Triassic toothless archosaur found near Post, TX?
4. **Lords of the Triassic:** What was the dominant land predator of the Triassic period?
5. ***Camarasaurus* A Giant of the Jurassic:** Can you determine the sex of *Camarasaurus*?
6. **The Climb to Flight:** What is the oldest bird known from the Triassic of Texas? How did flight evolve in early dinosaurs?
7. **Dinosaurs of the Southern Hemisphere:** What is the dinosaur known from Antarctica?
8. **Masters of the Sky:** What was the wingspan of an adult of the largest flying pterodactyl ever known? What is the name of this pterosaur?
9. **Mesozoic Mammals:** How do the Mesozoic mammals differ from the dinosaurs?

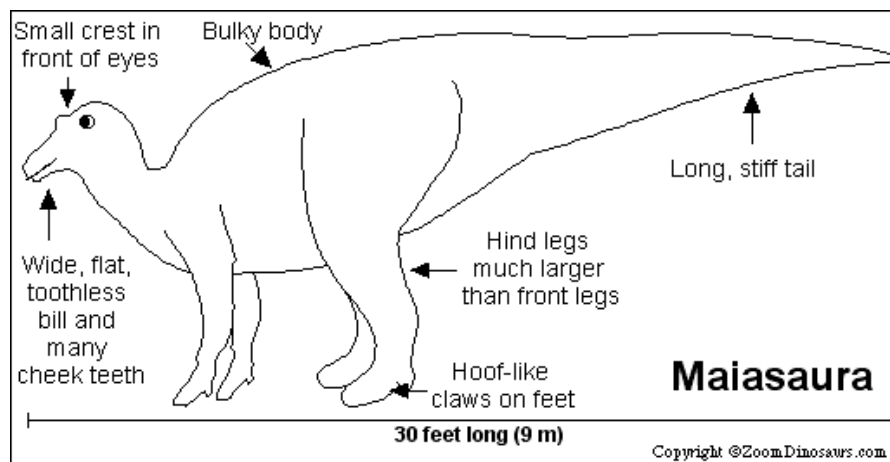
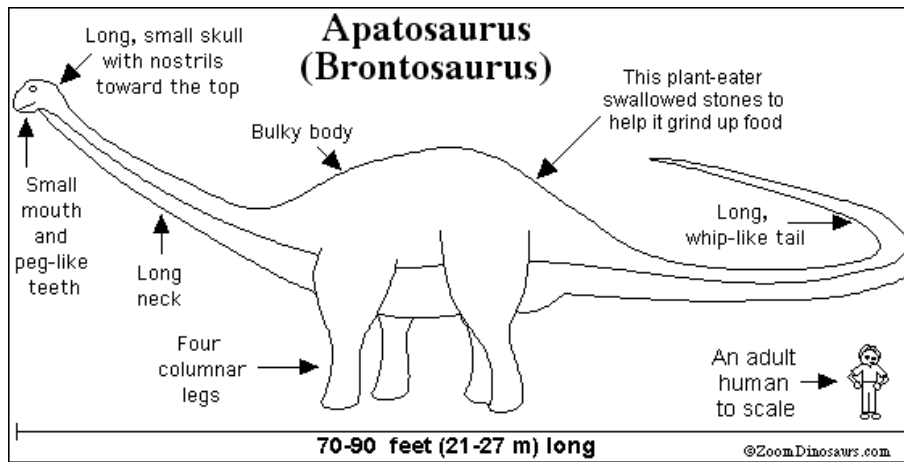
10. **Ancient Sea World:** Name two groups of invertebrates that became extinct along with the dinosaurs at the end of the Cretaceous period?
11. **Eggs, Nests and Babies (What is an egg?)** Name two groups with embryos shown here?
12. **What Killed the Dinosaurs:** An abundance of what metal element is an indication of killer meteorites striking Earth 65 million years ago?
13. How many fingers did *T.rex* possess?

Meet the Dinosaurs

- 🌈 Make copies of pages 35 and 36. Discuss with students the size of dinosaurs. Have students compare the size of their body parts to those of the dinosaurs.
- 🌈 Color the pictures.



Meet the Dinosaurs - continued



Lesson 4 T-rex and Triceratops

- 🌈 Location: Main Gallery of the Museum of Texas Tech University
- 🌈 Procedure: The following activity should be conducted in the Main Gallery.
- 🌈 Read and ask the questions in bold.

Activity 1 Fascinating Footprints (Main Gallery)

LOOK AT TRICERATOPS AND T-REX

T-rex facts: T-rex stood 15 feet tall, was 40 feet long and weighed between 5-7 tons (10,000-14,000 pounds). T-rex had over 50 teeth that were lost and replaced. T-rex had teeth that were sharp and serrated like a steak knife. The openings in the skull are called fenestrae (Latin for window) and the bigger these were, the stronger the dinosaur could bite. According to scientists, T-rex had 3-dimensional, binocular vision similar to modern predators.

Triceratops facts – Triceratops was usually 25 feet long, and weighed between 5-8 tons (10,000 – 16,000 pounds). Notice the fenestrae in the skull of Triceratops. Triceratops had a sharp bird-like beak and leaf shaped teeth for grinding food.

Why do you think Triceratops had horns? The horns are found on both male and female Triceratops, and were used for protection from predators and for attracting mates.

What did Triceratops have a neck frill for? The neck frill was thought to have been used to help support the lower jaw of the animal.

What types of food did Triceratops eat? Most likely it ate plants.
Was Triceratops a predator? NO

GO TO THE FOOTPRINTS BEHIND T-REX!

Have students stand on the footprints with as many students as possible on each one.

How many kids can stand on one of the footprints?




How big is the dinosaur foot?

How big is the student's foot?

How long is the T-rex step (stride)?

How many steps must you take to get from one T-rex footprint to another?

Lesson 5 Back at Home

-  Location: Back at home or in the classroom Time: 45 minutes
-  Procedure: The following activities should be completed after your visit to the Museum of Texas Tech University.
-  Materials: pencils, copies of pages 38-40

Activity 1 Follow Up Dinosaur/Stamp Quiz

Using information you gained from your tour and information included in this booklet to answer the following questions to determine your Dinosaur and Stamp Collecting Wisdom.

What does archosaur mean?

- Ruling reptile
- Flying reptile
- Large foot

Where was the first postage stamp issued?

- The United States
- Great Britain
- Argentina

Dinosaurs belong to what group of animals?

- Reptiles
- Mammals
- Amphibians

Who is James Gurney?

- A paleontologist
- Creator of dinosaur stamps
- The first postmaster general

What does a paleontologist study?

- Life on Mars
- Ancient Life
- Sea Life

What is the correct name of Brontosaurus?

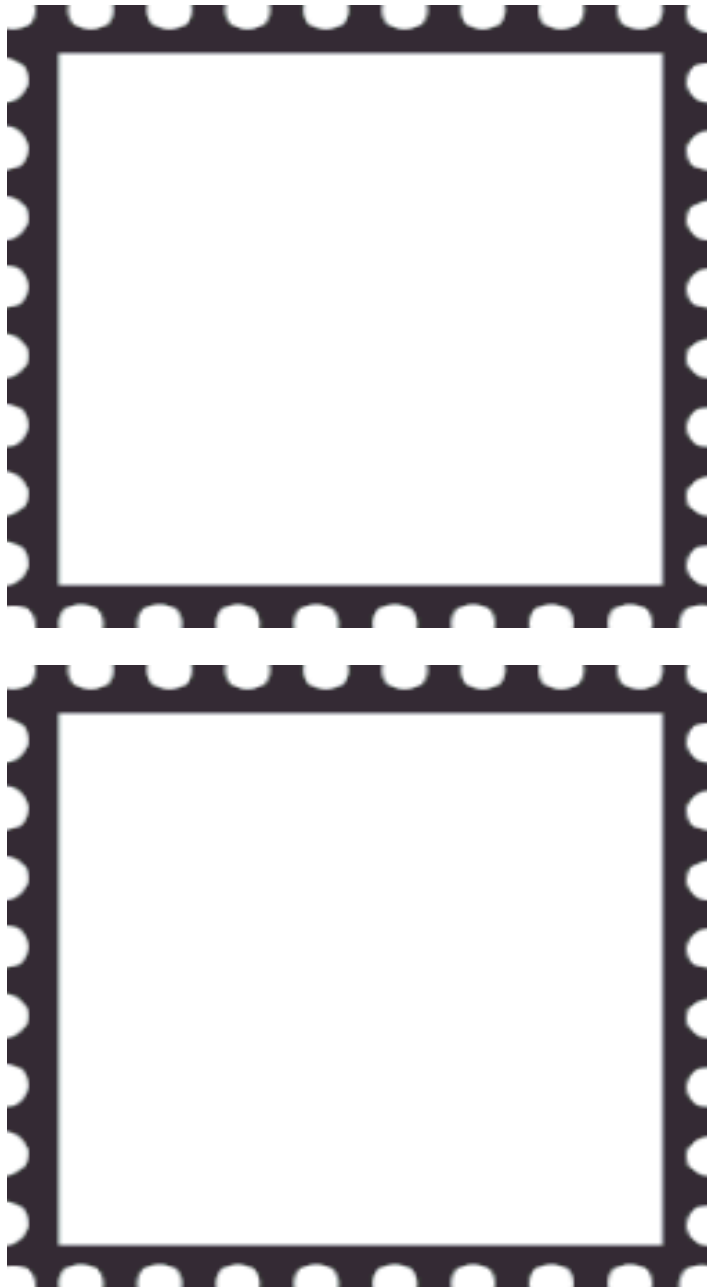
- Apatosaurus
- Allosaurus
- Pteranodon

Lesson 5 - Activity 2

Create Your Own Stamps

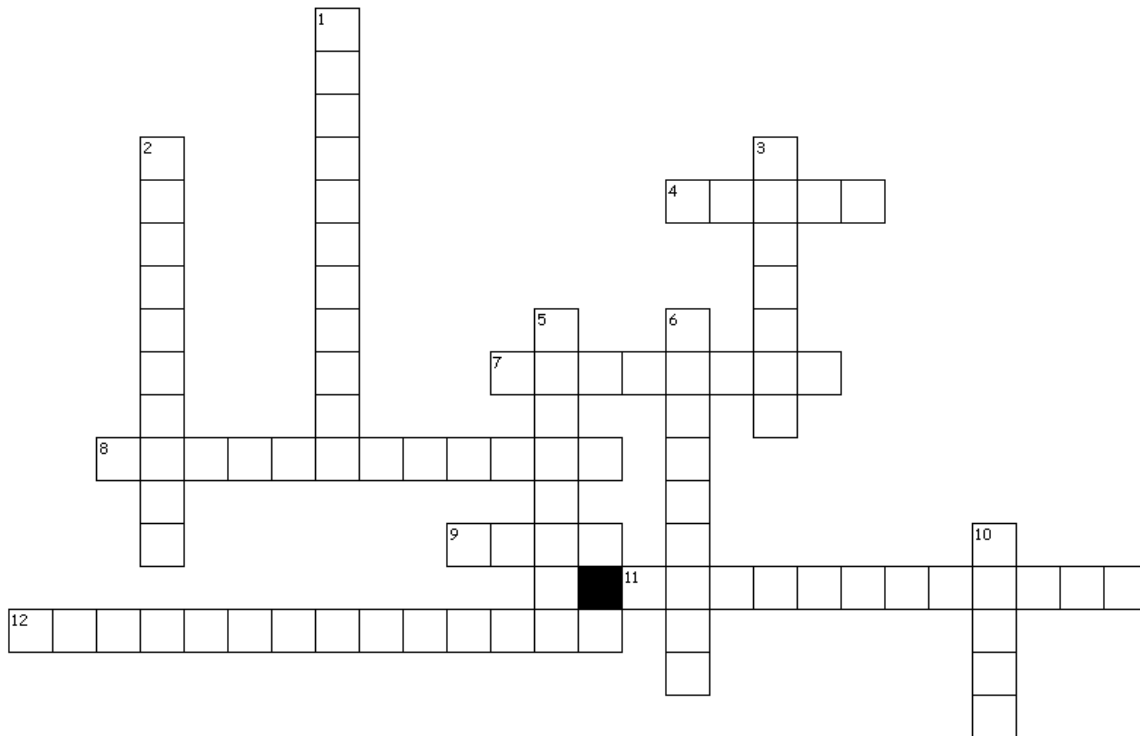
You can create your very own postage stamps using the templates below.

1. Think of a theme for your stamps. Ex: Insects, Animals, Nature
2. Decorate your stamp with crayons, colored pencils, glitter, etc.
3. Cut the stamp out!
4. Put on a Gigantic Envelope.



Lesson 5 - Activity 3

Dinosaur Crossword



Across

- 4. use these to pick up stamps
- 7. to keep or maintain
- 8. lizard hipped
- 9. inventor of adhesive postage stamps
- 11. the study of ancient life
- 12. bird hipped

Down

- 1. flesh eating
- 2. first modern postage stamp
- 3. to carve or cut out
- 5. First postmaster of the U.S.
- 6. very famous
- 10. a place to keep your stamps

ANSWERS

James Gurney Follow Up Activities Setting The Scene

1. 10 years
2. twice
3. four
4. They wanted more dinosaur stamps
5. He wanted to make sure the stamps were scientifically correct
6. frogs, turtles, insects, crocodiles, mammals, birds

James Gurney The Final Sketch

1. (The member of the stamp committee suggested that Gurney might find more stamps in the scenes at the margins of his painting.)
2. (the scene that shows the dinosaur hatchlings)
3. (Answers will vary; accept reasoned responses.)
4. (holes made in a sheet of stamps to make it easier to separate individual stamps from the sheet)

James Gurney – Sequencing

3,1,6,5,10,9,7,2,8,4

Gallery Quiz

1. Archosaur
2. hole in the hip socket, lizard hipped, bird hipped
3. *Shuvosaurus*
4. pseudosuchian (false crocodile)
5. No
6. Protoavis, “grounds up”, “trees down”
7. *cryolophosaurus ellioti*
8. 40 ft, *Questzalcoatlus*
9. they remained small, came out at night, fed on insects
10. ammonites & rudists
11. oviraptor, *maiasaura*
12. *metaliridium*
13. two

Dino/Stamp Quiz Answers

1. Ruling Reptile
2. Great Britain
3. Reptiles
4. Creator of dinosaur stamps
5. Ancient Life
6. Apatosaurus

Dino Puzzle Answers

Across

4. Tongs
7. Preserve
8. Saurischians
9. Hill
11. Paleontology
12. Ornithischians

Down

1. Carnivorous
2. PennyBlack
3. Engrave
5. Franklin
6. Legendary
10. Album

Resources

American Philatelic Organization
1337 Cordell Place, Los Angeles, CA. 90069
<http://www.americanphilatelic.com/>

American Philatelists Society Hall of Fame
100 Match Factory Place, Bellafonte, PA 16823
<http://www.stamps.org/index.htm>

American Stamp Dealers Association
3 School Street, Suite 205, Glen Cove, NY 11542-2548
<http://www.asdaonline.com/index.php?id=1>

Junior Philatelists on the Internet
<http://www.junior-philatelists.com/>

Lookd.com
www.lookd.com

South Plains Stamp Club
P.O. Box 68154, Lubbock TX 79414-8154
<http://www.texasphilatelic.org/chapters/southplains.htm>

Texas Philatelic Association
<http://www.texasphilatelic.org>

U.S Postal Service
www.usps.com

Supplemental Information

Request a free stamp catalog!

<http://www.stamp-co.com/vip/JCAT126CPDB.html>

http://www.kenmorestamp.com/contact_free_catalog.asp?gclid=COqt6b29sJICFQYNswod0jAYRA

Stamp Collecting Supplies

Potomac Supplies <http://www.mdstamp.com/>

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Education Division
Dinosaur Stamps Age of Reptiles www.search4dinosaurs.com
Dinosaur Stamps from the United States – Museum of Texas Tech University
Education Division
Dinotopia <http://dinotopia.com>
George Washington Stamp – www.wikipedia.com
Graf Zeppelin <http://www.studium.com/4/zeppstmp.html>
History of Stamps – www.stamps.org/Kids/January/stamps_history.htm
www.lookd.com/postal/history.html
James Gurney http://www.educationworld.com/a_lesson/lesson006.shtml
Lufengosaurus http://www.dinosaur.net.cn/DinoStamps/stamp_a9.htm
Making Fossils http://www.geology.siu.edu/outreach/making_fossils.htm
Penny Black Stamp – www.wikipedia.com
Stamp Collecting Supplies
www.glassinesurfer.com/stamp_collecting/gsbeginnersa.shtml
Stamps of the Cape of Good Hope – [wikipedia.com](http://www.wikipedia.com)
Stamp supplies – <http://www.glassinesurfer.com>
The History of Stamps -
http://inventors.about.com/od/sstartinventions/a/postage_stamps.htm
U.S. Graf Zeppelin Stamp www.wikipedia.com
World Map – National Geographic Society
World of Dinosaurs <http://www.fossilco.com/dinoeggs/images/dinostamp.JPG>