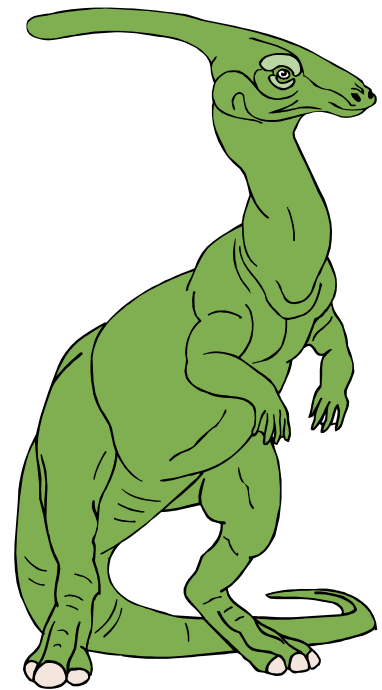


Dinosaur Curriculum
Created for Dinosaur Quest
by Robert Burleson, MEd.
2010



Lesson Sequence

Pre-Visit Activities

Engage	9
What's In a Name?	
Explore	10
Get "Hip" to Dinosaur Classification (Saurischia vs. Ornithischia)	
Explain	11
Geologic Time Line	
Elaborate	12
Plate Tectonics Over Time	
Evaluate	14
Pre-Test. Give to students before beginning any activities.	

Visit Activities

Engage	16
Fossil Kits	
Explore	17
Walk This Way	
Explain	18
What's for Lunch?	
Elaborate	19
Adopt a Dinosaur	
Evaluate	21
Debrief Your Dinosaur Quest Experience	

Post-Visit Activities

Engage	22
Texas State Dinosaur	
Explore	24
Can You Dig It? Dinosaur Web Quest	
Explain	25
Let's Make a Fossil	
Elaborate	27
Geologic Map of Texas	
Evaluate	29
Post-Test. Give after completing all activities.	

Glossary

Adaptation	a structure or ability of an organism that allows it to survive in a particular environment.
Carnivore	an animal that eats the flesh (meat) of other animals.
Cast	a fossil formed in the mold of a once living animal or footprint. Usually formed when mud fills the area occupied by the animal when it died.
Dinosaur	one of a group of extinct animals. All dinosaurs lived on land. The first kinds of dinosaurs developed over two hundred million years ago. The last kinds became extinct about sixty-five million years ago.
Environment	everything that surrounds a particular type of living thing and affects its growth and health.
Epoch	a subdivision of a geological period.
Era	a long period of geologic time such as Paleozoic, Mesozoic, or Cenozoic. An era often begins or ends with an important event.
Excavate	to uncover by digging.
Extinct	no longer living or existing.
Family	a group of closely related plants or animals.
Formation	a division of the historical record of the layers of rocks.
Fossil	the remains or trace of a living animal or plant from a long time ago. Fossils are usually found embedded in earth or rock.
Geologic time	the relative age of various geological periods and the absolute time intervals.
Herbivore	an animal that feeds only on plants.

Mold	an impression left from a plant or animal. Footprints are an example of a fossil mold.
Omnivore	animal that eats both plants and animals
Ornithischian	bird-hipped dinosaur.
Paleontology	the study of prehistoric life.
Period	a division of a geological time, such as Triassic, Jurassic, and Cretaceous that is sometimes divided into epochs.
Plate tectonics	the geologic theory that the earth's crust consists of several independent plates floating on semiliquid magma, whose constant motion is the cause of continental drift, volcanic eruption, and the like.
Saurischian	lizard-hipped dinosaur.
Stride	one long walking step, or the distance it covers.

Texas Essential Knowledge and Skills (TEKS)

Grade3:

§112.14

(2) Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and outdoor investigations. The student is expected to:

(C) construct maps, graphic organizers, simple tables, charts, and bar graphs using tools and current technology to organize, examine, and evaluate measured data;

(F) communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion.

(3) Scientific investigation and reasoning. The student knows that information, critical thinking, scientific problem solving, and the contributions of scientists are used in making decisions. The student is expected to:

(C) represent the natural world using models such as volcanoes or Sun, Earth, and Moon system and identify their limitations, including size, properties, and materials; and

(D) connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.

(4) Scientific investigation and reasoning. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to:

(A) collect, record, and analyze information using tools, including microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, wind vanes, rain gauges, pan balances, graduated cylinders, beakers, spring scales, hot plates, meter sticks, compasses, magnets, collecting nets, notebooks, sound recorders, and Sun, Earth, and Moon system models; timing devices, including clocks and stopwatches; and materials to support observation of habitats of organisms such as terrariums and aquariums; and

(B) use safety equipment as appropriate, including safety goggles and gloves.

(10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environments. The student is expected to:

(A) Explore how structures and functions of plants and animals allow them to survive in a particular environment

Grade 4:
§112.15

(2) Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and outdoor investigations. The student is expected to:

(C) construct simple tables, charts, bar graphs, and maps using tools and current technology to organize, examine, and evaluate data;

(F) communicate valid, oral, and written results supported by data.

(3) Scientific investigation and reasoning. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(C) represent the natural world using models such as rivers, stream tables, or fossils and identify their limitations, including accuracy and size; and

(D) connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.

(4) Scientific investigation and reasoning. The student knows how to use a variety of tools, materials, equipment, and models to conduct science inquiry. The student is expected to:

(A) collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, mirrors, spring scales, pan balances, triple beam balances, graduated cylinders, beakers, hot plates, meter sticks, compasses, magnets, collecting nets, and notebooks; timing devices, including clocks and stopwatches; and materials to support observation of habitats of organisms such as terrariums and aquariums; and

(B) use safety equipment as appropriate, including safety goggles and gloves.

(10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environment. The student is expected to:

(A) Explore how adaptations enable organisms to survive in their environment such as birds' beaks and leaves on plants

Grade 5:
§112.16

(2) Scientific investigation and reasoning. The student uses scientific methods during laboratory and outdoor investigations. The student is expected to:

(C) collect information by detailed observations and accurate measuring;

(F) communicate valid conclusions in both written and verbal forms; and

(G) construct appropriate simple graphs, tables, maps, and charts using technology, including computers, to organize, examine, and evaluate information.

(3) Scientific investigation and reasoning. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(C) draw or develop a model that represents how something works or looks that cannot be seen such as how a soda dispensing machine works; and

(D) connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.

(4) Scientific investigation and reasoning. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to:

(A) collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, prisms, mirrors, pan balances, triple beam balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, and notebooks; timing devices, including clocks and stopwatches; and materials to support observations of habitats or organisms such as terrariums and aquariums; and

(B) use safety equipment, including safety goggles and gloves.

(7) Earth and space. The student knows Earth's surface is constantly changing and consists of useful resources. The student is expected to:

(D) Identify fossils as evidence of past living organisms and the nature of the environments at the time using models.

(10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environments. The student is expected to:

(A) compare the structures and functions of different species that help them live and survive such as hooves on prairie animals or webbed feet in aquatic animals;

§126.3. Technology Applications, Grades 3-5

(3) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:

(A) follow acceptable use policies when using computers; and

(B) model respect of intellectual property by not illegally copying software or another individual's electronic work.

(5) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to:

(A) acquire information including text, audio, video, and graphics;

Engage – Pre-Visit

What’s In a Name?

Objective: Students will be able to identify dinosaur root names and analyze what a dinosaur’s name means.

TEKS: 3.3 D; 4.3 D; 5.3 D

Materials: Copy of handout **Pre-Visit Engage 1** (What’s in a Name?) for each student

Procedure:

1. Put some pictures of dinosaurs on the board. You may also use a document camera (Elmo) to show some pictures out of a book.
2. Ask students “Have you ever wondered how a dinosaur got its name?” “Does anyone know what dinosaur means?”
3. Give each student a copy of **Pre-Visit Engage 1** (What’s in a Name?). Explain that dinosaurs are usually given a name based on their characteristics.
4. Ask students if they can use the chart to decipher what the name “dinosaur” means. They should be able to find that it means “terrible lizard”.
5. Have student complete Part 1 using the chart to discover dinosaur name meanings.
6. On Part 2, students may create their own dinosaur names by referring to the root names listed in the chart.

Answers to Pre-Visit Engage 1 (What’s in a Name?)

1. tyrant lizard
2. different lizard
3. arm lizard
4. three horn face
5. fish lizard
6. teeth like a lizard
7. good mother lizard
8. fast grabbing (swift grabbing)
9. thick headed lizard
10. bird robber

Extension: Part 3 of What’s in a Name may be completed following your visit to Dinosaur Quest. Students may pretend they have discovered a new dinosaur species and must give their new dinosaur a name based on its characteristics as well as describe characteristics of their new dinosaur.

Explore – Pre-Visit

Get Hip to Dinosaur Classification

Objective: Students will be able to classify dinosaurs as either Saurischia (lizard-hipped) or Ornithischia (bird-hipped) based on the structure of the pelvis.

TEKS: 3.2 F; 4.2 F; 5.2 F

Materials: 1 copy of Pre-Visit Explore 1 (How Dinosaurs are Classified) for each student, 1 copy of Pre-Visit Explore 2 (Dinosaurs ‘Terrible Lizards’), and 1 copy of Pre-Visit Explore 3 (Get Hip to Dinosaur Classification)

Procedure:

1. Give each student a handout of “How Dinosaurs are Classified”. Discuss.
2. Show students examples of different dinosaurs that are classified as Saurischia and examples of dinosaurs classified as Ornithischia.
3. Have students practice classifying mystery dinosaurs as either Saurischian or Ornithischian.

Answers to Pre-Visit Explore 3 (Get Hip to Dinosaur Classification)

1. Ornithischian
2. Saurischian
3. Saurischian
4. Ornithischian
5. Ornithischian
6. Saurischian
7. Saurischian
8. Saurischian
9. Ornithischian
10. Ornithischian

Extension: Have students use the internet to find additional dinosaur skeletons. Using their knowledge of Sauricians and Ornithiscian, have them identify what type of dinosaur they found. Students should record their findings in their science journals.

Explain – Pre-Visit

Geologic Time Line

Objective: Students will create a visual model of the geologic time line.

TEKS: 3.2 C; 3.2 F; 4.2 C; 4.2 F; 5.2 F; 5.2 G; 5.7 D

Materials: 1 toilet paper roll with at least 480 sheets per group of students, 1 copy of time period cards for each group of students, 1 copy of geologic time line handout for each student.

Pre-Lab considerations:

You will need a lot of space in order to have students unroll their toilet paper rolls. I would recommend doing this activity in a hall or cafeteria so each group will have enough space. The geologic time period cards should be pre-cut before giving them to the student groups. The estimated time to complete this lab is 1 - 1.5 hours.

Procedure:

1. Divide students into groups of 3-4. Give each group of students 1 toilet paper roll and 1 set of color coded time period cards.

Each group will have six major Era division cards: Present, Cenozoic, Mesozoic, Paleozoic, Precambrian, and Formation. These cards are also subdivided into Periods and Epochs.

2. Have students measure out the length on one toilet paper roll (480 sheets). Tell them that each sheet on the toilet paper roll equals 10,000,000 years.
3. Students should place the time period cards where they believe they should go.
4. After all the groups have placed their cards, discuss why each group chose to place their cards where they did.
5. Give each group the actual location for each card. Have them move their cards to the correct location on the toilet paper roll.
6. In their journals, students should record how different the actual time period locations were from their predictions, what animals appeared during each time period, and glue a copy of the geologic time line to keep for future reference and for their visit to Dinosaur Quest.

Extension: Use register tape instead of toilet paper. Have the class make only one model and have students draw what animals/plants were alive or appeared during each time period.

Elaborate – Pre-Visit

Plate Tectonics

Objective: Students will be able to identify the Earth’s major tectonic plates and analyze the movement of the tectonic plates throughout geologic time

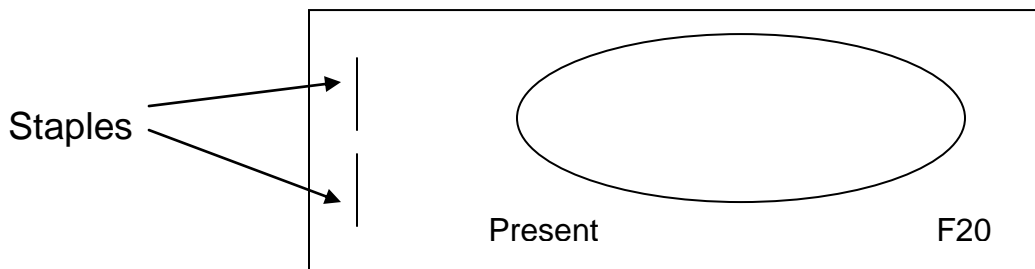
TEKS: 3.2 C; 3.2 F; 4.2 C; 4.3 C; 5.2 F; 5.2 G

Materials: 1 copy of Pre-Visit Elaborate 1 for each student, 1 copy of Pre-Visit Elaborate 2 for each student. You may substitute Pre-Visit Elaborate 1b (see Teacher note).

Teacher Note: You may use copy Pre-Visit Elaborate 1b instead of Pre-Visit Elaborate 1. Pre-Visit Elaborate 1b shows the location of the equator on some of the time benchmarks. You would have students use the map showing the equator for present, 20 mya, 40 mya, 60 mya, 80 mya, 100 mya, and 120 mya. Also, with Pre-Visit Elaborate 1b, you would have students use the Latitude Scale and horizontal scale on the “Present” map.

Procedure:

1. Review geologic time line from previous lesson (Pre-Visit Explain). Ask students, “Do you think the location of the continents has changed over time?”
2. Give each student a copy of Pre-Visit Elaborate 1 (or Pre-Visit Elaborate 1b – see Teacher Note above). Have students carefully cut out each map around the dashed lines.
3. Have students stack their maps one on top of the other with the oldest time on the bottom (190 mya will be on the bottom, then 180 mya on top of 190 mya). The “Present” time location of the continents should be on top.
4. Once all the maps are in the correct order with the oldest on the bottom and the present on top, staple the flip book together as shown:

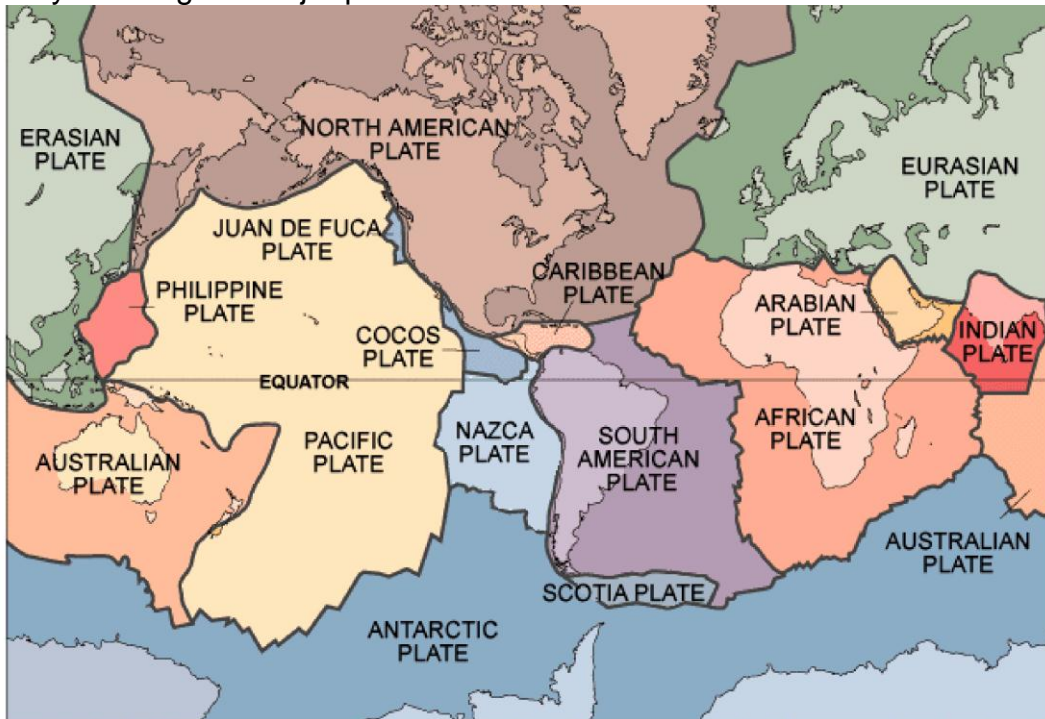


5. Next, give each student a copy of Pre-Visit Elaborate 2. This is a map of the current location of all of Earth’s major geologic plates. Have each student color each plate a different color.

6. After students have colored each plate a different color. Have them label the direction(s) that each plate is moving. You may want to show the Answer key for Pre-Visit Elaborate 2 below on either an Elmo or on an overhead projector.

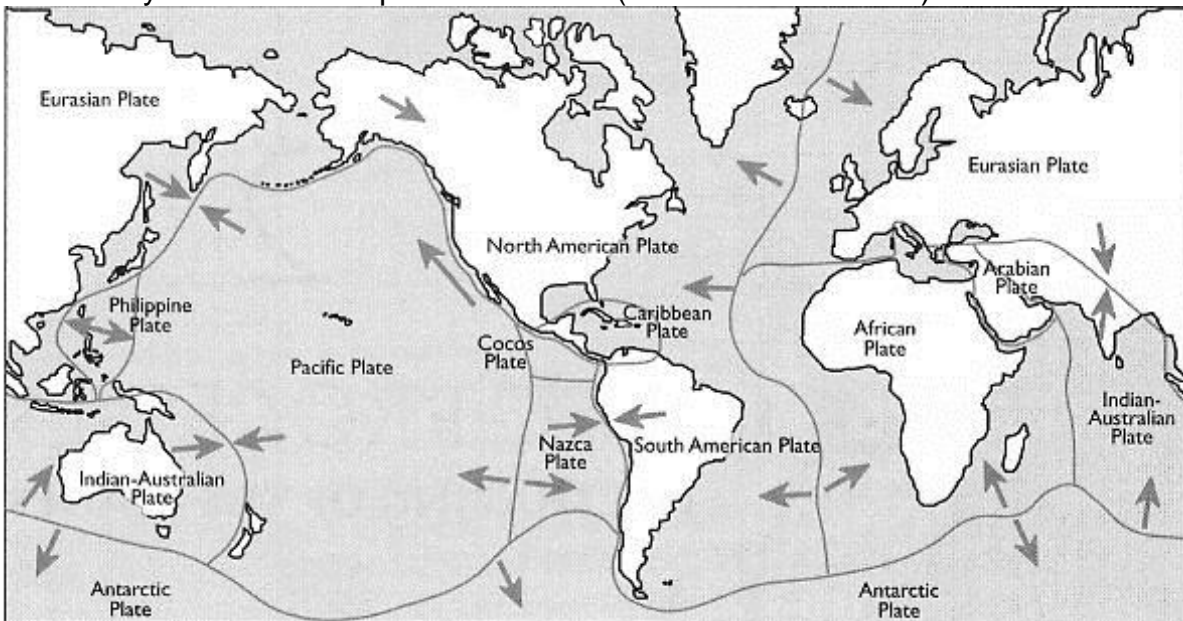
Extension: Students could use Geoblox models to show a side view of what is happening at the different types of plate boundaries.

Answer key showing the major plates in different colors.



<http://www.msnuceus.org/membership/html/k-6/pt/pdf/ptkpt.pdf>

Answer Key for direction of plate movement (Pre-Visit Elaborate 2)



<http://www.greenibis.com/edu/geo/images/tectonic-plates.jpg>

Evaluate – Pre-Visit

Pre-Test over Dinosaur Curriculum

The pre-test should be given to all students before beginning activities.

After completion of the Dinosaur Curriculum and the visit to Dinosaur Quest, students should be able to master the questions on the Post-Test and have shown significant gains in comprehension.

Answers to the Pre-Test:

1. Terrible Lizard
2. Dinosaurs are given their names based on a certain body part or characteristic.
3. Ornithischian
4. Saurischian
5. It is divided by significant events in Earth's history.
6. There is a mass extinction or new animals appear in the fossil record.
7. Today the continents are farther from the equator (in polar regions) and more evenly distributed across the Earth.
8. Near the equator and closer together
9. Cretaceous

10. A marine environment
11. It can tell us the direction the dinosaur was traveling as well as if the dinosaur was walking or running.
12. An herbivore's teeth are flat for grinding plant material, while a carnivore's teeth would be sharp, pointed, or serrated for tearing and holding prey.
13. Dinosaurs who were carnivores were bipedal (walked on two legs). They had powerful jaws, sharp/serrated teeth, and could run fast to catch their prey.
14. *Paluxysaurus Jonesi*
15. The original bones found were identified as the brachiosaur sauropod, *Pleurocoelus*. In 2007, paleontologists re-identified the bones and footprints as *Paluxysaurus Jonesi*, named after the town of Paluxy in Hood County.
16. The internet can help you find a great deal of information from a variety of sources.
17. cast
18. mold
19. The most recent lava flows are located in west Texas near the Big Bend area.
20. The oldest rocks in Texas are found in the central part of the state. This area is also called the Llano Uplift.

Engage – Visit

Fossil Kit

Objective: Students will be able to identify, compare, and contrast Texas fossils.

TEKS: 3.2 F; 3.4 A; 4.2 F; 4.3 C; 4.4 A; 5.2 F; 5.4 A; 5.7 D

Materials: 1 fossil kit for every 4 students, science journal

Procedure:

1. Divide students into groups of 4. Give each group a fossil kit to examine. Have students use hand lenses to examine details about each fossil.

Note: Hand lenses are included to help students examine details about the fossils.

2. Ask students, “What do you notice about the fossils in this kit?” Have students write their observations in their science journals. Discuss answers from observations.
3. Tell students that every fossil in this kit is found somewhere in Texas.
4. Have students in each group select one fossil from the fossil kit and sketch their fossil in their science journals. Each group member should select a different fossil. Remind students to show as much detail as they can on their sketch.
5. Students should record the fossil’s name, what geologic time period it is from, and other important details or information they find about their fossil.

Note: Make sure students return each fossil to its correct location in the fossil kit.

Extension: When you return to school, have each group compare/contrast the fossils that they chose.

Explore - Visit

Walk This Way

Objective: Students will be able to use tools to examine and evaluate a dinosaur's footprint and stride.

TEKS: 3.2 F; 3.4 A; 4.2 F; 4.4A; 5.2 C; 5.2 F; 5.4 A

Materials: 1 copy of Visit Explore 1 (t and 1 copy of Visit Explore 2 (Dinos for each student, 1 tape measure (50 ft) for each pair of students.

Teacher Background Information (Please access *before* your visit):

<http://education.ollusa.edu/~science/dinosaur/measure.htm>

Procedure:

1. Divide students into groups of 3-4.
2. Each group should select a different dinosaur. Note: make sure they select a dinosaur and not a prehistoric mammal.
3. Using the tape measure, measure the length of your dinosaur's footprint (foot).
4. After you have recorded the length of the foot, use the formulas on the handout to calculate the hip height and head to tail length of your dinosaur.
5. Using the tape measure, measure the actual length of the hip and head to tail length.

Extension: When you return to school, students may try to answer dinosaur footprint math problems at:

http://www.drscavanaugh.org/dino/activities_track_math.htm

You may also want to have students measure their own footprint and stride to see if the formula (ratio) is true for humans.

Explain – Visit

What's for Lunch?

Objective: Students will compare and contrast herbivore and carnivore dinosaurs.

TEKS: 3.10 A; 4.10 A; 5.10 A

Materials: 1 copy of Visit Explain 1 for each student (may be glued in their science journal prior to visit), digital camera (optional)

Procedure:

1. Have students work in pairs.
2. Each team should select one carnivore and one herbivore to compare and contrast. They should record their animals' names on their worksheet.

Note: Make sure the students are comparing/contrasting either prehistoric animals from the same time period or dinosaurs from the same geologic time period. You may solve this issue by assigning each group specific skulls.

3. Using Visit Explain 1 worksheet, students should begin by comparing the two skulls or finding similarities and recording their findings in the center of the Venn diagram.
4. Next, students should observe differences (contrast) the two skulls. Record the herbivore characteristics that are different from the carnivore on the left side of the Venn diagram and record the carnivore characteristics that are different from the herbivore on the right side of the Venn diagram.
5. Finally, students should sketch a picture of each skull on the respective side of the Venn diagram.

Extension: Have students take pictures of the different skulls so they can share with peers or compare/contrast when back at school. Students may also use the internet to see a picture of what their prehistoric animal or dinosaur may have looked like when alive.

Elaborate – Visit

Adopt a Dinosaur

Objective: Students will analyze information and record their findings.

TEKS: 3.2 F; 3.3 D; 4.2 F; 5.2 C; 5.2 F; 5.2 G; 5.3 D

Materials: 1 copy of Visit Elaborate 2 for each student (may be glued in their science journal prior to visit), digital camera (optional)

Pre-Lab considerations:

Depending on the demographics of your class, you may want to have students work in pairs or groups of 3-4 students. You may want to have GT students work independently on this task.

A “Project Requirements” (Visit Elaborate 1) and “Adopt a Dinosaur Grade Rubric” (Visit Elaborate 3) are available if you wish to evaluate this task or assign a task.

Procedure:

1. Assign each group of students a dinosaur to examine.

Note: make sure you assign each group a dinosaur and not a prehistoric mammal or reptile.

The full size skeletons at Dinosaur Quest are:

Yangchuanosaurus
Allosaurus
Camptosaurus
Thescelosaurus
Monolophosaurus
Stegosaurus
Dilophosaurus
Saurophaganax
Chasmosaurus
Mamenchisaurus
Plateosaurus
Tuojiagosaurus

2. Students should look at the information about the dinosaur and watch the video about the dinosaur (if a video is available).
3. As they examine the skeleton, students should record their findings on their Adopt a Dinosaur sheet (Visit Elaborate 2) in their science journals. Students should use their Adopt a Dinosaur sheet to guide them as they look for facts about their dinosaur:

What is the dinosaur's name? What does it mean? What is correct pronunciation?

Is it a Saurischian (lizard-hipped) or Ornithischian (bird-hipped)?

What family of dinosaurs did this one belong to?

What is its size?

What geologic time period is it from?

What location was it found?

Was it a carnivore, herbivore, or omnivore?

Who discovered this dinosaur and in what year?

What are three amazing facts about this dinosaur?.

4. On the back of their Adopt a Dinosaur Sheet or another page in their science journal, students should sketch their dinosaur skeleton. Remind students to show as many details as possible on their sketch.
5. Have students share what they learned about their dinosaur either before you leave Dinosaur Quest or back at school.

Extension: Students can use the internet to see a picture of what their dinosaur may have looked like when it was alive. Students may also use the internet or school library to locate additional information about their dinosaur that they were unable to find at Dinosaur Quest.

Evaluate – Visit

Debrief your Dinosaur Quest Experience

Objective: Students will evaluate their experiences at Dinosaur Quest.

TEKS: 3.2 F; 4.2 F; 5.2 F

Materials: 1 copy of Visit Evaluate 1 for each student.

Procedure:

1. Gather students in the separate room at Dinosaur Quest.
2. Have students share their findings and what they have learned during their visit to Dinosaur Quest. You may have either individuals or groups take turns sharing what they learned.
3. Give each student a copy of Visit Evaluate 1 (Dinosaur Quest Evaluation) for each student. Students should complete the evaluations independently.

Note to teacher: You may turn in the evaluations to Dinosaur Quest before you leave.

4. If there are any students who still had questions or were not able to complete a task, you may have them return to the main room with a partner or group who has mastered that task or concept.

Extension: For an additional field trip, make arrangements to visit the Hill Country Heritage Museum. <http://www.theheritagemuseum.com>
At the museum, you will have the opportunity to see actual dinosaur tracks that were made by several different dinosaurs and dinosaur species. Also, the museum has numerous Texas fossils that have been found in the area as well as across the state of Texas.

Engage – Post -Visit

State Dinosaur of Texas *Paluxysaurus Jonesi*

Objective: Students will be able to identify the State Dinosaur of Texas and explain why it was renamed by the State Legislature.

TEKS: 3.3 D; 4.3 D; 5.3 D

Materials: 1 Copy of Texas Dinosaurs; student copies of pp. 14-15 (see link below): http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_p4502_0094n.pdf
1 copy of Post-Visit Engage 1 (Resolution to Change Texas State Dinosaur from *Pleurocoelus* to *Paluxysaurus jonesi*) for each student; 1 copy of Post-Visit 2 (Texas State Dinosaur Questions) for each student. Copies may be glued into their science journals.

Teacher Background Information:

Texas designated *Brachiosaur sauropod, Pleurocoelus* as the official state dinosaur in 1997. But in 2007, paleontologists re-identified the bones and footprints (left in the north and central parts of Texas about 95 to 112 million years ago) as *Paluxysaurus Jonesi*. The dinosaur is named for the town of Paluxy in Hood County and for the Paluxy River, both of which are near the Jones Ranch site where the fossils of this species were discovered.

In 2009 a resolution was passed to amend the name of the Lone Star state dinosaur to *Paluxysaurus Jonesi*. It is estimated that this dinosaur measured 70 feet long and 12 feet high at the shoulder, and weighed as much as 20 tons.
http://www.statesymbolsusa.org/Texas/Dinosaur_Brachiosaur.html

Procedure:

1. Ask students, “What are some of the Texas state symbols?” Possible answers include: flower – bluebonnet, tree – pecan, bird – mockingbird, etc. After students have shared various answers, ask them, “Did you know that there is a Texas State dinosaur?”
2. Hand out copies of pp. 14-15 (*Pleurocoelus*) from Texas Dinosaurs. Lead a class discussion about its appearance, what it ate, where it lived, etc. (Students may save these handouts to color later.)
3. Now explain to the students, “In science, as we learn more, we sometimes have to change our conclusions that we previously thought were correct. This is what happened to the Texas State Dinosaur. Today we are going to read about a discovery that led Texas scientists to correct a misidentification of the Texas State Dinosaur.”

4. Hand out copies of the Resolution and questions. Have students read the Resolution and answer questions, either individually or in pairs.

Extension: Have students (using Texas Dinosaurs as a reference) create a class mural of Texas dinosaurs, showing their habitat and environment during the time they lived.

Explore– Post -Visit

Can You Dig It? Dinosaur Web Quest

Objective: Students will use technology to investigate different dinosaurs.

TEKS: Science 3.2 F; 3.4 A; 4.2 F; 4.4 A; 5.2 F; 5.4 A
(Technology 3-5) 3A; 3B; 5A

Materials: 1 computer with internet access for each group of 4 students, science journals. Access to a computer lab might be the best option for this assignment.

Procedure:

1. Divide students into groups of 4. Each group member will have a specific task: worker, paleontologist, draftsman, and photographer. You may modify the role of each task as needed.
2. Assign 4 dinosaurs for each group to research. You may find a list of available dinosaurs at this web page:

<http://www.enchantedlearning.com/subjects/dinosaurs/dinos>

Be sure to assign only dinosaurs and not prehistoric animals (ex. Eryops or Trilobite).

3. Using a computer with internet access, have each group of students access this website:

<http://home.comcast.net/~saponaro/dino/dinowebquest.html>

4. All students should complete the report (from #8 on the web quest process) in their science journals.
5. A grading rubric is provided for this web quest.

Extension: Have each group present their findings through a display that will be located in the library. Students could also invite students from a lower grade to come to your classroom to hear a presentation on each group's findings.

Explain – Post-Visit

Let's Make a Fossil

Objective: Students will create a mold and a cast to replicate fossil formation.

TEKS: 3.4 A-B; 4.3 C; 4.4 A-B; 5.4 A-B; 5.7 D

Materials: one empty milk carton per student, Vaseline, assorted shells, plaster of Paris, plastic bucket to mix plaster of Paris, safety goggles for each student

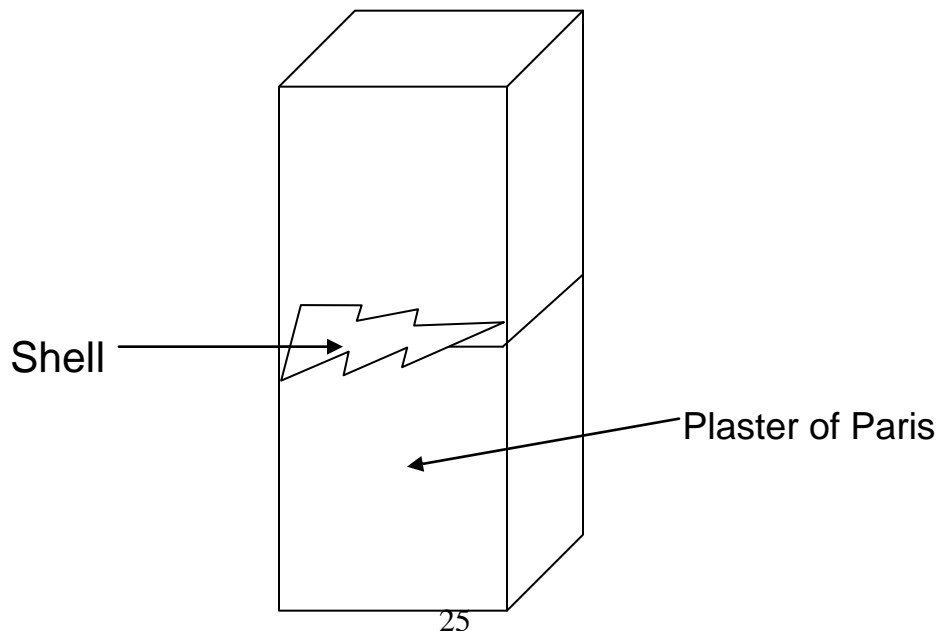
Pre-Lab considerations:

You will want to mix small amounts of plaster of Paris as it dries quickly and is easier to manage in smaller amounts. You will probably have to mix several batches for your class.

You can purchase bags of shells from Hobby Lobby or Michael's.

Procedure:

1. Have each student save their milk carton from lunch. Rinse them thoroughly and allow them to dry overnight.
2. Apply a thin layer of Vaseline to the inside of each milk carton. This will prevent the plaster of Paris from sticking to the sides of your milk carton.
3. The teacher should mix some plaster of Paris and fill each milk carton approximately half full of plaster of Paris.
4. Each student should apply a thin layer of Vaseline to their shell and push it halfway into the top of the plaster of Paris before the plaster of Paris is dry.



Note: For best results, the shell must have a thin coating of Vaseline and have at least half of the shell not pressed into the plaster of Paris.

5. After the plaster of Paris has thoroughly dried (approximately 4-5 days), have students remove their shell from their milk carton. Explain that what they see is now a cast.
6. Have each student draw what their cast looks like in their science journals.
7. Apply a thin layer of Vaseline to the cast and the top of their plaster. **This is very important so that the mold can be easily removed.**
8. The teacher should mix plaster of Paris and fill each students milk carton near full.
9. Allow to thoroughly dry. This should take approximately 4-6 days. If you complete this step on a Friday, the models will be ready by the following Friday. If in doubt, it is better to allow an extra day to dry.
10. To remove their casts and molds, students should peel away their milk cartons and discard. Use a paper towel to wipe away the Vaseline.
11. Using a permanent marker, have the students label the bottom half "Cast" and the top half "Mold". Record what your model looks like in your science journal.

Extension: Show students different examples of fossil molds and fossil casts. You can use either fossils from a fossil kit or images from the internet.

Elaborate – Post-Visit

Geologic Map of Texas

Objective: Students will enhance their knowledge of the Geologic Time Scale by creating a three dimensional model of Texas showing the different time periods and rock layers.

TEKS: 3.3 C; 4.3 C; 5.3 C

Materials: Each student will need a copy of each time period: Precambrian, Cambrian through Mississippian, Pennsylvanian, Early Permian, Middle Permian, Late Permian, Triassic & Jurassic, Cretaceous, Eocene & Paleocene, Oligocene & Miocene, Pleistocene & Pliocene, and Water.

Lesson adapted from *Investigating Texas Through Properties, Patterns, and Models* by Dr. Linda B. Knight

Pre-Lab considerations:

Each time period should be run on card stock, not regular paper. You will run each time period on a different color of card stock. Blue should be reserved for Water. This activity will take you several class periods to complete. A completed sample would be very helpful to guide students through their construction. **I highly recommend you run Precambrian on white card stock and have the students glue each layer in order onto the Precambrian layer.**

Geologic Map Key

Water (newest)
Pleistocene & Pliocene
Oligocene & Miocene
Eocene & Paleocene
Cretaceous
Triassic & Jurassic
Late Permian
Middle Permian
Early Permian
Pennsylvanian
Cambrian through Mississippian
Precambrian (oldest)

Procedure:

1. Give each student a set on time layers. Some time layers (water, Cretaceous, Eocene & Paleocene, Oligocene & Miocene) may be shared with each pair of students. Have each student write their name on the back of the layers.

Idea: Have students keep their pieces in a gallon sized Ziploc baggie until they need that particular layer. This will help avoid lost pieces.

2. Start with the Precambrian layer. Students should not cut out the map of Texas for this layer. This layer will serve as the base for the other layers to be added in order.
3. Have students cut out the Geologic Map Key and glue in the bottom left corner of the Precambrian Layer. As a new layer is added, have the students color the appropriate box in the Geologic Map Key to show the color of that layer (ex. If Cretaceous is on pink card stock, then you would color the box for Cretaceous pink).
4. Have students cut out one layer at a time starting with the oldest. The next layer after Precambrian should be “Cambrian through Mississippian”.

Idea: On some layers, there are small holes that must be removed. The teachers may use small nail scissors to help students remove the small hole. Another idea is to have students use a pen to trace around the hole several times until it is easily removed from that layer.

5. After the “Cambrian through Mississippian” layer is cut out including the two holes, you will glue this layer so it lines up exactly with the outline of Texas from the Precambrian layer. **It is important to make sure the glue is applied evenly and completely to the layer being glued so that each layer will remain secure.** Elmer’s glue seems to work best.
6. Continue adding one layer at a time making sure that you are adding layers in the correct order as well as lining them up with the previous layer. Refer to the Geologic Map Key to ensure that all of the layers are glued in the correct order.
7. After all of the layers up to “Oligocene and Miocene” have been glued, you will add the Pleistocene and Pliocene layer. This layer is only found in a few areas across the state. I recommend that as you cut out each little piece, you glue it immediately onto your map to avoid confusion. Remember to color the lava flow (pieces 8, 9, and 12) red.
8. The last layer that should be added is the water. When you are finished, make sure the students have added the key to their map.

Extension: Have students investigate what types of fossils may be found in different locations around Texas. For example, dinosaur fossils will only be found in Triassic, Jurassic, or Cretaceous rock. Fossils such as horn coral will be found in Pennsylvanian rock usually in north Texas.

Evaluate – Post-Visit

Post-Test

The post-test should be given to students after completing all activities in the Dinosaur Curriculum Unit.

After completion of the Dinosaur Curriculum and the visit to Dinosaur Quest, students should be able to master the questions on the Post-Test and have shown significant gains in comprehension when compared to the Pre-test.

Answers to the Post-Test:

1. Terrible Lizard
2. Dinosaurs are given their names based on a certain body part or characteristic.
3. Ornithischian
4. Saurischian
5. It is divided by significant events in Earth's history.
6. There is a mass extinction or new animals appear in the fossil record.
7. Today the continents are farther from the equator (in polar regions) and more evenly distributed across the Earth.
8. Near the equator and closer together
9. Cretaceous
10. A marine environment
11. It can tell us the direction the dinosaur was traveling as well as if the dinosaur was walking or running.

12. An herbivore's teeth are flat for grinding plant material, while a carnivore's teeth would be sharp, pointed, or serrated for tearing and holding prey.
13. Dinosaurs who were carnivores were bipedal (walked on two legs). They had powerful jaws, sharp/serrated teeth, and could run fast to catch their prey.
14. *Paluxysaurus Jonesi*
15. The original bones found were identified as the brachiosaur sauropod, *Pleurocoelus*. In 2007, paleontologists re-identified the bones and footprints as *Paluxysaurus Jonesi*, named after the town of Paluxy in Hood County.
16. The internet can help you find a great deal of information from a variety of sources.
17. cast
18. mold
19. The most recent lava flows are located in west Texas near the Big Bend area.
20. The oldest rocks in Texas are found in the central part of the state. This area is also called the Llano Uplift.

Works Cited

Books

Aliki. *Digging up Dinosaurs*. New York: HarperCollins, 1988. Print.

Aliki. *Dinosaur Bones*. New York: HarperCollins, 1988. Print.

Beals, Kevin. *Life through Time: Evolutionary Activities for Grades 5-8*. Berkeley: Great Explorations in Math and Science, Lawrence Hall of Science, University of California at Berkeley, 2003. Print.

Benton, M. J. *The Dinosaur Encyclopedia*. New York: Wanderer, 1984. Print.

Cuff, Kevin, and Cary Ivan. Sneider. *Stories in Stone*. Berkeley, CA: LHS GEMS, 2007. Print.

Cuff, Kevin, Ian Carmichael, and Carolyn Willard. *Plate Tectonics: the Way the Earth Works: for Grades 6-8*. Berkeley, CA: Great Explorations in Math and Science, Lawrence Hall of Science, University of California at Berkeley, 2002. Print.

Discover the Prehistoric World of Dinosaurs. Bath, England: North Parade, 2010. Print.

Dixon, Dougal. *Dougal Dixon's Amazing Dinosaurs: the Fiercest, the Tallest, the Toughest, the Smallest*. Honesdale, PA: Boyds Mills, 2000. Print.

New Dinos The Latest Finds! the Coolest Dinosaur Discoveries! Madison, 2009. Print.

Nye, Bill, and Michael Koelsch. *Bill Nye the Science Guy's Great Big Dinosaur Dig*. New York: Hyperion For Children, 2002. Print.

Sloan, Christopher. *Feathered Dinosaurs*. Washington, D.C.: National Geographic Society, 2000. Print.

Sloan, Christopher. *How Dinosaurs Took Flight: the Fossils, the Science, What We Think We Know, and the Mysteries Yet Unsolved*. Washington, D.C.: National Geographic Society, 2005. Print.

Websites

<http://www.zoomdinosaurs.com/subjects/dinosaurs>

Dinosaur Web Quest

<http://education.ollusa.edu/~science/dinosaur/measure.htm>

Analyzing dinosaur footprints and stride

<http://geobytesgcse.blogspot.com/2007/01/plate-boundaries.html>

Tectonic plate boundaries

http://www.ansp.org/education/special_programs/senses/pdf_gwms/time_flipbook.pdf

Plate tectonics flip book

<http://sciencespot.net/Pages/diglessons.html#Anchor-11481>

Adopt a Dinosaur

<http://ritter.tea.state.tx.us/rules/tac/chapter112/ch112a.html>

New science TEKS beginning 2010 school year

http://www.chronos.org/downloads/timetowerparis_highres.png

Geologic Time Line

http://www.ucmp.berkeley.edu/education/dynamic/session3/images_sess3/teacher2.pdf

Dinosaurs and their Tracks