

Dinosaurs

Prior Knowledge

The student has

1. counted from one to 10
2. measured using string or ruler
3. sorted and sequenced by size
4. participated in whole group discussion/activities
5. become familiar with conventional print.

Mathematics, Science and Language Objectives

Mathematics

The student will

1. classify objects on the basis of one variable and summarize information on a graph
2. sequence sets of objects from smallest to largest and vice versa
3. count from one to as many as she/he can
4. measure objects using non-standard units
5. arrange pictures to show the relative size of a human, a two-story house, and a dinosaur
6. associate a numeral with "how many" in a given set including zero
7. use geometric shapes to form new shapes
8. explore concepts of time
9. explore addition and subtraction using counters.

Science

The student will

1. say that fossils are evidence that dinosaurs, and other plant and animal life, existed on earth many years ago, even though we cannot see them today
2. list at least three conditions that will cause a species to become extinct
3. describe dinosaurs as giant lizards and classify them as either plant eaters or meat eaters
4. say that dinosaurs hatched from eggs and had a life cycle
5. draw, in sequence, the life cycle of a dinosaur and of a reptile
6. say that dinosaurs' bones and other objects (fossils) are found buried in the earth
7. list at least three characteristics of a reptile
8. list dinosaur weapons and describe how dinosaurs defended themselves
9. describe how nature changes in at least two ways and at least two ways in which nature remains the same.

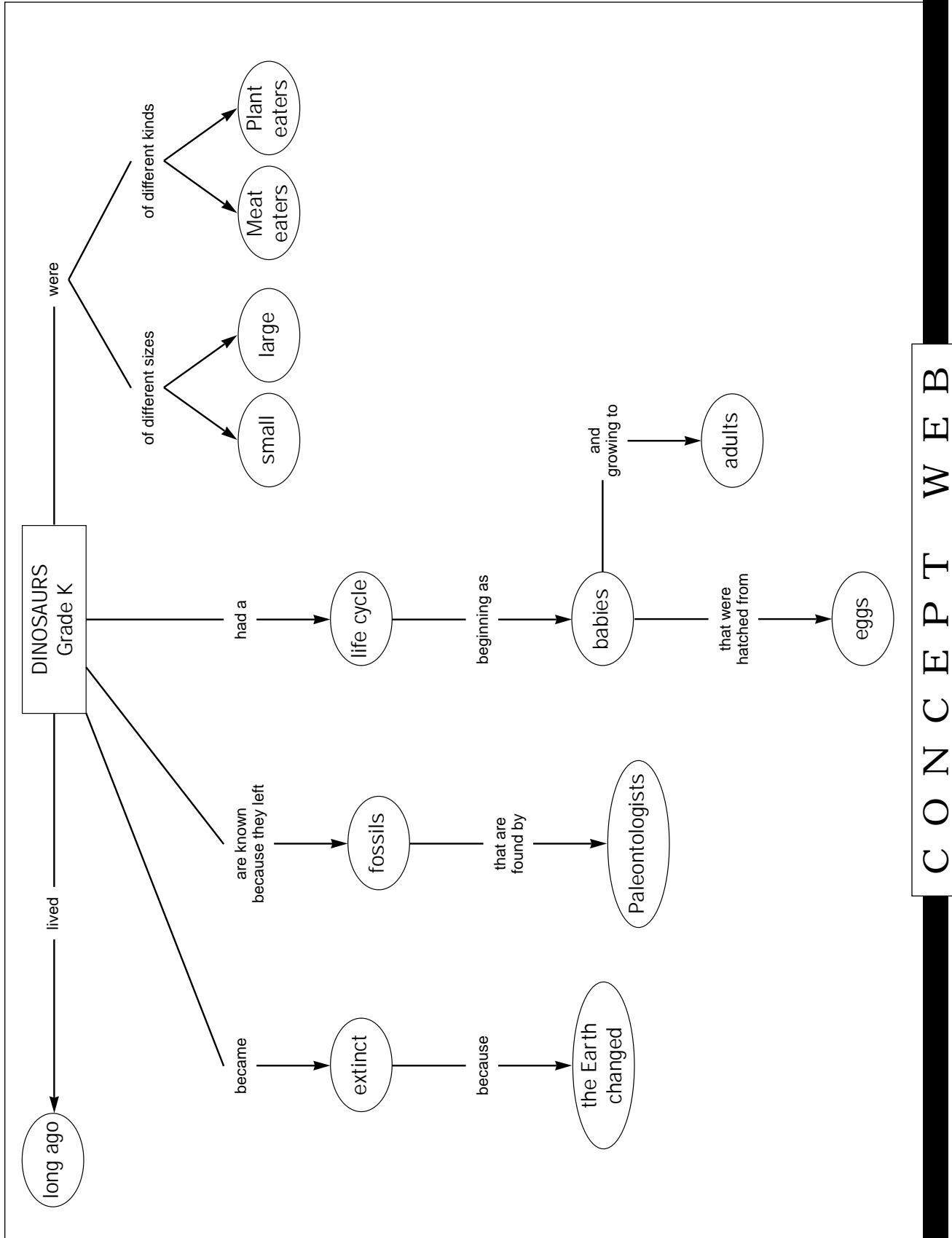
Language

The student will

1. acquire English sounds and intonation patterns
2. develop and share ideas by engaging in conversation
3. participate in role playing and choral speaking
4. develop and use appropriate, relevant vocabulary
5. demonstrate emerging writing by keeping a journal
6. make inferences by predicting story outcomes
7. demonstrate independent writing and dictation.

V O C A B U L A R Y

dinosaur dinosaurio	claws garras	horn cuerno	armor blindaje	beak pico
extinct extinto	evidence evidencia	life cycle ciclo de vida	diplodocus diplodoco	brontosaurus brontosaurio
tyrannosaurus tiranosaurio	specie especie	fossil fósil	theory teoría	carnivore carnívoro
erupt hacer erupción	footprint huella	herbivore herbívoro	iguanodon iguanodón	large grande
order poner en orden	paleontologist paleontólogo	palm tree palma	pteranodon pteranodón	reptile reptíl
sequence poner en susceción	skeleton esqueleto	small pequeño	stegosaurus estegosauruo	triceratops (triceratops)
volcano volcán	baby dinosaur dinosaurito or dinosauricillo		long ago hace mucho tiempo, en tiempo pasado	



C O N C E P T W E B

Teacher Background Information ● ● ●

Dinosaurs, or giant lizards, existed millions of years ago. These giant reptiles lived on earth 200 million years ago, and they became extinct about 64 million years ago, according to fossil finds. Scientists can only guess what they looked like, what they ate, where they lived and how they died. There are several theories of how dinosaurs became extinct: egg-eating mammals ate all the dinosaurs' eggs; a continental shift caused the weather to change, and shallow areas where animals could graze and drink began to disappear; a large star close to earth exploded, emitting deadly cosmic rays that destroyed the dinosaurs; or a meteorite storm on earth caused huge clouds and steam to block the rays of the sun, causing an ice age, during which the warm-blooded mammals that were prey for the dinosaurs could not survive.

Initiate the unit by having students make a list on the bulletin-board-size dinosaur poster of all the things they would like to know about dinosaurs. After making the list, the students make guesses, or suggest hypotheses, about the answers. During the implementation of the unit, whenever a student finds an answer, she/he puts it on the board next to the corresponding question, **after it has been agreed to by the rest of the class**. The student supports the answer by telling where it is found in a book, why a calculation is made, or where there is other evidence to support the claim.

The suggested teaching strategies are role playing and problem solving. As the students pretend they are paleontologists, they travel in a time capsule to the world of the dinosaurs where they can study them in their habitat and make guesses about why they became extinct. The role playing suggests a prehistoric time. The students begin working on a mural, coloring a large dinosaur cutout of butcher paper, on which students will display their work, as they complete it. As the students learn more about the dinosaurs and their time, the students add these details to the mural.

The word "dinosaur" means terrible lizard. Dinosaurs lived in the Mesozoic Era, before people populated earth. The earth was warm and covered with plants at the time dinosaurs lived. All dinosaurs lived on land or were amphibians; none had wings or paddles. Dinosaurs' eggs were not huge, but they were hard shelled, and dinosaurs were meat eaters (carnivores) and/or plant eaters (herbivores).

All dinosaurs walked fully erect. Modern reptiles like lizards and crocodiles walk with their legs sprawling out from their sides. Dinosaurs are the only reptiles that walked like mammals, some walking on two legs, some on four. All four-legged dinosaurs were herbivores. All carnivores were two-legged, although some herbivores were two-legged as well. All dinosaurs had special skeletal features: unique skull openings, hip arrangements that permitted them to walk erect, and straight thigh bones.

LESSON FOCUS**■ LESSON 1*****BIG IDEAS******Long Ago***

Dinosaurs existed many years ago; we have found their bones. Zero is the number that tells how many dinosaurs exist today.

■ LESSON 2***BIG IDEAS******Extinction***

Life can cease to exist because the conditions on earth that support it change and no longer meet a life form's needs. Dinosaurs' needs were very large.

■ LESSON 3***BIG IDEAS******Fossils***

Paleontologists dig for fossils to help us learn about the kinds of animals that lived long ago. Good guesses can be made from careful observations.

■ LESSON 4***BIG IDEAS******Types of Dinosaurs***

There were many different kinds of dinosaurs: some walked on land, others flew in the air and others lived both on land and in water. We can use geometric shapes to draw their pictures.

■ LESSON 5***BIG IDEAS******Meat and Plant Eaters***

Dinosaurs existed by eating large quantities of plants like ferns or by eating other animals. We can classify dinosaurs in many different ways.

■ LESSON 6***BIG IDEAS******The Dinosaur's Life Cycle***

Dinosaurs hatched from eggs laid by the female dinosaur; the baby dinosaurs grew to be adults. Mathematics also tells us about patterns in the lives of dinosaurs.

■ LESSON 7***BIG IDEAS******Nature and Change***

The story of the existence and extinction of dinosaurs tells us that change is a part of nature. Change can be observed by making comparisons and by using mathematics.

O B J E C T I V E S G R I D

Lessons

1 2 3 4 5 6 7

Mathematics Objectives

- | | | | | | | | |
|---------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|
| 1. classify objects on the basis of one variable and summarize information on a graph | • | • | • | • | • | • | |
| 2. sequence sets of objects from smallest to largest and vice versa | • | • | • | • | • | • | • |
| 3. count from one to as many as she/he can | | | • | • | • | • | |
| 4. measure objects using non-standard units | • | | • | • | • | | • |
| 5. arrange pictures to show the relative size of a human, a two-story house, and a dinosaur | | | | | | | • |
| 6. associate a numeral with “how many” in a given set, including zero | • | | | • | • | | |
| 7. use geometric shapes to form new shapes | • | | | • | | • | |
| 8. explore concepts of time | • | | | | | | |
| 9. explore addition and subtraction using counters | • | • | • | | • | • | • |
| 10. draw and use concept webs | • | | | | | | • |
| 11. explore large numbers | • | • | | | | | • |
| 12. make inferences from information | | | | | • | • | • |

Science Objectives

- | | | | | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|
| 1. say that fossils are evidence that dinosaurs, and other plant and animal life existed on earth many years ago, even though we cannot see them today | • | | • | • | | | |
| 2. list at least three conditions that will cause a species to become extinct | | • | | | | • | • |
| 3. describe dinosaurs as giant lizards and classify them as either plant eaters or meat eaters | | | | • | • | | |
| 4. say that dinosaurs hatched from eggs and had a life cycle | | | | | | | • |
| 5. draw, in sequence, the life cycle of a dinosaur and of a reptile | | | | | | • | • |
| 6. say that dinosaurs’ bones and other objects (fossils) are found buried in the earth | • | • | • | | | | |
| 7. list at least three characteristics of a reptile | | | • | • | • | • | |

Lessons	1	2	3	4	5	6	7
8. list dinosaur weapons and describe how dinosaurs defended themselves					•	•	
9. describe how nature changes in at least two ways and at least two ways in which nature remains the same	•						•
10. state beliefs based on observation and “evidence”		•	•	•			•
11. describe tools used to make observations			•				•
<i>Language Objectives</i>							
1. acquire English sounds and intonation patterns	•	•	•	•	•	•	•
2. develop and share ideas by engaging in conversation	•	•	•	•	•	•	•
3. participate in role playing and choral speaking	•	•	•	•	•	•	•
4. develop and use appropriate, relevant vocabulary	•	•	•	•	•	•	•
5. demonstrate emerging writing by keeping a journal	•	•	•	•	•	•	•
6. make inferences by predicting story outcomes	•	•	•	•	•	•	•
7. demonstrate independent writing and dictation	•	•	•	•	•	•	•

LESSON

1

Long Ago

BIG IDEAS Dinosaurs existed many years ago; we have found their bones. Zero is the number that tells how many dinosaurs exist today.

Whole Group Work**Materials**

Book: **The Day of the Dinosaur** by S. & J. Berenstain

Dinosaur shapes of different kinds and sizes for the **Mathematics Center**

Various books on dinosaurs and prehistoric times for the **Library Center**

Playdough, colors, markers, paints at the **Art Center**

Dinosaur books that have been taped at the **Listening Center**

Plastic dinosaurs, two of each kind, and sorting trays for the **Science Center**

Large cardboard or poster board to make a wall mural of prehistoric times

Word tags to show during shared reading and then placed in the **Writing Center**:

long ago; small; large; smallest; largest; zero, and numeral card with 0

Encountering the Idea

With the children seated on the floor so that all can see the illustrations and print, talk about the book, **The Day of the Dinosaur**. Ask the children if they can tell what the story is about. Read the story and show the illustrations to the children, sharing your reactions. Talk about time and size concepts.

Place a large drawing of a dinosaur (see **Appendix A — Dinosaur**) on a bulletin board or hang from the ceiling. Tell students: You will be learning about dinosaurs for the next two weeks, and some of the things you will be doing in this unit are: digging for dinosaur bones, making fossils, eating dinosaur “food,” eating dinosaur eggs, and writing and illustrating a class **Big Book** on dinosaurs.

Before sending the students to the centers, explain what each center contains and model the activities, if necessary. Assign or allow children to choose a center. Tell the children that all of them will complete the activities in the **Mathematics, Writing and Science Centers**.

Exploring the Idea

At the **Art Center** the students complete three activities.

1. **Activity** — A Picture of Long Ago. Tell the students that in order to understand about dinosaurs, and what they were like, we need to know about the time when they lived. What was the earth like? What kinds of food were available for the giant lizards? We will discover all of this as we read our books.

To learn about the conditions that existed on earth at the time of the dinosaurs the students make a wall mural, A Picture of Long Ago, showing the earth during prehistoric times. They make drawings and cutouts of dinosaur types and shapes to include in the mural. The students make a bulletin board next to the mural to

write questions about dinosaurs they would like to explore and their hypothesized answers. As they find the answers to their questions, they include them on the bulletin board.

2. **Activity** — Thumbprint Dinosaurs

3. Students make large and small dinosaur shapes with geometric shapes.

At the **Mathematics** and **Science Centers**, the children complete a **sequencing** and **classifying** activity. They sequence cutouts of various sizes of dinosaur shapes and/or egg shapes, in different ways, such as smallest to largest. They also sort the plastic dinosaurs in a sorting tray in as many ways as they can think of.

Getting the Idea

When we say “It was long ago,” what do we mean? Does it mean yesterday? Does it mean many years ago, before you were born? Before your parents were born? It could mean all of these things, but in this unit, when we say “long ago” we are going to mean **a very long time ago**. We will be talking about the time when there were only animals and plants on the land. There were no people. We are talking about a time that we know very little about, because there were no people around to remember it and tell stories about it to their children. The only way we know about what went on at that time is that we can dig in the earth and find the remains of the plants and animals that have not decayed or rotted.

Paleontologists have found fossils, not only of dinosaurs and of plants like ferns and mosses, but of other kinds of animals. (Show pictures of dinosaurs and other animals.) There were huge bears, and mastodons that were like our present-day elephants, and giant tigers called sabertooths because their teeth were sharp like sabers or knives. Most of these animals and plants are now extinct, but there are some animals and plants that still resemble these prehistoric animals. Lizards of today, crocodiles, turtles and whales look in many ways similar to animals that lived on earth at the time of the dinosaurs.

When we say that something is “big”, or that something is “little”, what do we mean? (Pause for student responses.) Yes, we compare things to see which is taller or longer. What do we mean when we say that something is “the biggest”? Yes, that means that there is nothing that we’re talking about that is bigger. We will discover more about “big” things and “little” things by studying the dinosaurs.

When we say that zero is the number that tells us how many dinosaurs there are in existence today, what do we mean? Yes, zero tells us that the set of all dinosaurs on earth today is empty. There are no dinosaurs today. What does the number zero look like? Yes, it is a big circle with nothing in it — like the empty set. Show students a card with the numeral zero.

Organizing the Idea

The students participate in the following activity:

Choral Speaking and Role Playing

Dinosaurs of Long Ago

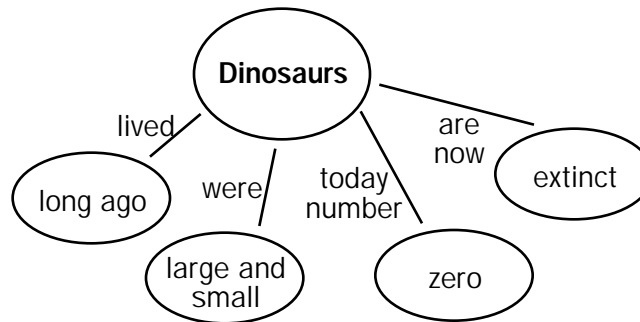
The dinosaurs lived long ago,
and walked like this, and that. (Slow, heavy walk movement.)
Some were large (Stretch hands upwards.)
and some were small. (Crouch down.)
Some liked water (Swimming motions.)
and some just walked on land. (Stomp feet.)
Some had wings, that flapped and flapped. (Flap arms.)
Some had long necks, that stretched and stretched. (Hand on neck stretching upward.)
The meanest, rudest one of all was ferocious Tyrannosaurus Rex.
(Feet apart, hands clawlike, scowl and growl.)
These were the dinosaurs of long ago.
Goodness gracious, where did they go?
Author Unknown
Modified by Maria E. Torres

Closure and Assessment

Reconvening the whole class for closure, engage them in repeating the choral speaking and role playing.

Use the dinosaur drawing to make a concept web to review the Big Ideas, as suggested below. A concept web is a graphic organizer for information that is similar to an outline.

To increase student interest, use shapes and colors to highlight the central figure, a dinosaur in this case.



Oral Interviews

1. What interesting animal did we read about today?
2. What were some of the words we used today when we talked about dinosaurs? (Use words cards from the Writing Center to remind students about the new words learned during shared reading.)
3. How large (how small) were dinosaurs?
4. How long ago did they live?
5. Let's make a list of other things you would like to know about dinosaurs. (Refer to the bulletin board that students started earlier in the lesson.)

Performance

Assess student participation in drawing the wall mural, in sequencing and classifying the plastic models in the **Mathematics** and **Science Centers**, in the choral speaking and role playing and in the level of completion of the thumbprint dinosaurs.

List of Appendices and Activities for this Lesson

- ▲ Appendix A — Dinosaur
- ▲ Thumbprint Dinosaurs

**ACTIVITY***Thumbprint Dinosaurs****Objective***

Students imagine and make dinosaur shapes and color them.

Materials

One package of uncooked rice

Blue, purple and yellow food coloring

Heavy cardboard

Three containers with lids, for rice

One sheet of construction paper per student

Procedures

1. Make blue, purple and yellow-colored rice with food coloring: Put rice into three separate containers; put several drops of each of the different food colors into separate containers; mix the contents in each container separately to get the desired color.
2. Use heavy cardboard to make the dinosaur templates. Use any one of the dinosaur patterns in **Appendix A** — Dinosaur to make a template.
3. Make the dinosaurs thumbprints:
 - Lay the template on construction paper
 - Brush glue on the construction paper, inside the template
 - Choose colored rice for dinosaur's color
 - Pour rice within the template and let dry
 - Pour excess rice back into the appropriate rice container.
4. Students design different-colored patterns to give texture and color to the dinosaurs.

LESSON

2

Extinction

BIG IDEAS Life can cease to exist because the conditions on earth that support it change and no longer meet a life form's needs. Dinosaurs' needs were very great.

Whole Group Work**Materials**

Book: **What Ever Happened to the Dinosaurs?** by B. Most
 Measuring tape to measure at least 50 feet or a 50-foot paper chain
 Paint brushes, a jar with water, lap chalkboard or similar writing surface
 Sorting trays with numerals zero to five written on the appropriate tray

Appendix A — Dinosaur

Word tags: extinction; disappear; evidence; diplodocus; theory

Encountering the Idea

Have you seen a real dinosaur? Do you know how many dinosaurs exist today? Yes, zero is the number that tells us how many dinosaurs are alive today. We will be working with the number zero in the **Mathematics** and **Science Centers** again.

Read the story, **What Ever Happened to the Dinosaurs?** After reading, ask the students if they think some of the author's ideas about dinosaurs could be true. Tell students that they will be writing their stories about extinction at the **Writing Center**.

Exploring the Idea

In our first activity we will discover more about dinosaurs. Students complete **Activity** — Measure a Dinosaur! as shown below.

Materials

50 feet of string; scratch paper, cut and strung into a chain at least 50 feet long
 Paper chains of various lengths (heights of several of the students) to compare to the dinosaur chain

Procedures

Children go outdoors, if weather permits, otherwise use a hallway.

1. Children hypothesize as to the size of dinosaurs.
2. They measure 50 feet on a sidewalk or a hallway with the string; make a 50-foot paper chain to represent the length of a dinosaur.
3. Students compare the chain to their own heights.
4. They estimate how much food a dinosaur like the one they measured would need to eat every day. If they compare their height to the height of the dinosaur, can they get a better estimate?

Discussion

When you measured the dinosaur's size and then your own, who was bigger? Who was smaller? If you put some of your chains together, were they **all together** longer or shorter than the dinosaur? How do you know? Yes, you put them side by side to compare.

At the **Mathematics Center**, the students, working in small groups or in pairs,

1. classify the dinosaur models by color, size, and shape, after describing them to their partners
2. count a given number of dinosaurs to place under the correct numeral written on the sorting trays
3. say how many dinosaurs are alive now and point to the numeral that tells that number, and continue sequencing the dinosaur shapes.

At the **Library Center**, the children continue to read and look at the new book that was read for this lesson. Tapes of the book are available for the children to listen to, as they "read" the new book.

Getting the Idea

None of us has seen a dinosaur. If that is true, how do we know that they even existed? (Pause for student responses.) Yes, we may have never seen a dinosaur, but we have seen parts of dinosaurs that have survived over millions of years. These parts, which are mostly bones, that have survived suggest to us that such things as dinosaurs existed.

We know that many of the animals such as the dinosaurs living on earth at the time were very large. That means that they needed a lot of food, whether it was plant or animal food. How much food did you estimate that dinosaurs the size of the one we measured would eat every day? Yes, if we compare our size to theirs and then estimate how much food we eat every day, we can get an idea of how much **more** food they would need.

What would happen if the dinosaurs could not get enough food? Yes, they would die. What else did they need? Air and water. If any of these needs were not met, what would happen to the dinosaurs? Yes, they would die. What would happen if they had many natural enemies and could not protect themselves? Yes, their enemies would kill them.

Introduce the word "evidence"; show it on a word card. Tell the children that there is "evidence", such as that found in fossils, that makes us believe that dinosaurs existed many years ago even though we have never seen one alive. We know how big or how small they were because we have measured their fossils. Tell the students that there are several theories about what happened to the dinosaurs. A theory is like a guess, but it is a guess based on information or on the evidence that is available. In our lesson we will study some of these theories.

Theories about the extinction of the dinosaurs suggest that:

1. maybe their eggs were eaten by the dinosaurs' natural enemies, or by other dinosaurs;
2. maybe the land moved and caused the weather to change; when the weather changed the plants living at that time were not able to thrive and produce the amount of food needed to feed the dinosaurs, and the dinosaurs could not continue;
3. maybe a large star caused an explosion of cosmic rays that killed them all; or,

4. maybe a storm of meteors caused clouds to block the sun, which again affected the plants because they could not produce the amounts of food the dinosaurs required.

All of these suggestions are possible. Scientists, however, still do not know for certain why the dinosaurs ceased to exist. What do you think? What is your theory?

Organizing the Idea

1. Students illustrate and write about the size of the dinosaur they measured, and how it compares to their own height.
2. At the **Writing Center**, students dictate reasons (which the teacher writes on a chart) for why dinosaurs disappeared. Then the students write and illustrate their reasons for why the dinosaurs became extinct. They trace and write the word “extinct.”
3. Students complete **Activity** — If I Were A Diplodocus. Students discuss what a diplodocus is and then write or tell about:

If I were as long as a diplodocus, I would live _____, sleep _____,

go out to eat _____, be careful of my _____. (The students can add to

these ideas.)

Closure and Assessment

Complete the lesson with the recitation:

One Friendly Dinosaur

One friendly dinosaur wanted to play peek-a-boo.
She found another, then there were two.

Two friendly dinosaurs looked behind a tree.
They found another, then there were three.

Three friendly dinosaurs went to find some more.
They found another, and then there were four.

Four friendly dinosaurs in the water did dive.
They found another, and then there were five.

Five friendly dinosaurs played in the sun.
They all ran to hide; now there are none.

Oral Interviews

1. How many of you made the dinosaurs “disappear” at the **Science Center**?
Let’s count.
2. What expression did you use that means the same as “disappear”? (Become extinct.)
3. How many dinosaurs exist today?
4. Teacher: I am going to hold up my hand and show zero, one, two, three, four, or five fingers. As soon as I hold up my hand and you know how many fingers I have up, raise your hand and tell me the number.

5. How do we know that dinosaurs existed many years ago?
6. What do **you** think happened to the dinosaurs?

Performance Assessment

Assess students' participation in the activities and the level of completion of their individual work. For example, assess a student's own explanation for the disappearance of the dinosaurs and work on **Activity** — If I Were a Diplodocus.

LESSON

3

Fossils

BIG IDEAS Paleontologists dig for fossils to help us learn about the kinds of animals that lived long ago. Good guesses can be made from careful observations.

Whole Group Work*Materials*

Book: **Bones, Bones, Dinosaur Bones** by B. Barton.

Baby paraphernalia: pacifier; clean diaper; jar of baby food; article of clothing such as a shoe; and, any other objects that would suggest a baby's presence.

Arrange these articles on a table where students can easily see and study them.

Chart tablet with sample chart from **Activity** — Fossil Hunting

Hats/caps for the paleontologists

At the **Mathematics Center**: dinosaur crackers and/or cookies for counting and sorting

Word tags: paleontologist; fossils; imprints

Encountering the Idea

Students, guess what happened today before school! We had a visitor, but the visitor could not stay and left before I got here. I don't know who the visitor was, but there are some things that were left here that were not here before. Can you help me guess who this visitor was? Let's look at all of these things and see what kind of detectives we are. Can you list some of these things? Yes, diaper, baby food, pacifier. The shoe is very small. Who do you think our visitor was? A baby! Tell me some more about this baby. Is it big? Oh, the diaper is not the smallest, but medium. Okay, so our baby is a medium-size baby. Do you think it is one year old? What about five years old? Ok, since it's wearing a diaper, it's probably **not!** It's probably younger. Is it a girl? The diaper has pink elephants on it, so you think it was a girl? But, are you certain? Well, it's probably a good guess. What color hair does the baby have? You don't want to guess? Is there a clue that can tell us the color of her hair? Well, I guess our class is full of good detectives. You never saw the baby girl, but you think that she was our visitor.

How do you think our guesses about who our visitor was have anything to do with the dinosaurs we are studying about? Yes, we can make good guesses when we have clues or evidence that helps us guess. That is one of the things that we will learn about today — the evidence that we use to help us learn about dinosaurs!

Exploring the Idea

At the **Science Center** the students, working in pairs, dig for fossils. Bury the models for the bones (chicken) and fossils in the cornmeal or sand. The students

role play that they are paleontologists looking for dinosaur bones. The students dig them up using the small brushes and **one hand only** to make sure they do not destroy the fossils. The teacher models how to dig for fossils. Some of the children model also.

Students also complete **Activity** — Fossil Matching, wearing the hats/caps.

At the **Mathematics Center**, the students continue sequencing and counting the dinosaurs, and complete **Activity** — Two Legs or Four Legs? While the students work at the center, they can count and crackers and/or cookies.

At the **Art Center**, the students make fossils by making imprints of hands, leaves, and other objects on playdough. Students complete **Activity** — Fossil Prints.

Getting the Idea

Ask: Who has seen a real dinosaur? Ask students to predict what the book **Bones, Bones, Dinosaur Bones** is about, then read aloud. Point to familiar words. None of us have seen dinosaurs, but we have seen some evidence that they existed. Some of the most important pieces of evidence scientists have to suggest that dinosaurs lived on earth millions of years ago are the fossils or remains of these giant lizards that have survived for millions of years. In our **Science Center**, we are going to discover how scientists who have discovered these fossils take them out of the earth and then study them. From those observations, the scientists make guesses about the dinosaurs.

Talk about a paleontologist as you show the word tag. The teacher shows the chart, Fossil Hunting, with its columns: Where to Look for Fossils; Type of Fossil; Tools to Use; Things to Use for Records. Ask for students' suggestions to put under each column. Record children's comments/ responses on a large piece of paper or a chart to be used later.

What evidence do the paleontologists look for when they hunt for fossils? Are bones the only thing they want to find? What other things are important? (Leaves, to tell us what kinds of plants existed at the time; sea shells, to tell us if that part of the land had been under water; humans' remains such as pottery or human bones to tell us if people lived on earth at that time.) Human bones that are as old as dinosaur bones have never been found, so scientists believe that no human beings lived on earth at the same time that the dinosaurs lived on earth.

The fossils that have been found appear to be of three kinds: actual bones or teeth of animals, prints (impressions) such as footprints or spaces or casts left in stone after the object has decayed away. Which kind of fossils did you make? When you role played that you were paleontologists, what kinds of fossils did you find?

Organizing the Idea

At the **Listening Center**, the children "read" **Bones, Bones, Dinosaur Bones** by listening to a tape.

At the **Writing Center**, the children complete **Activity** — Fossil Hunting, including the chart from that activity; they trace and write the word "paleontologist" on a chalkboard.

Applying the Idea

Working in groups, one student group challenges another to guess about an event from the evidence the group supplies. Students may draw clues, or they may act them out as they would in Charades.

Closure and Assessment

Reconvene the class, using the same role playing activities as in **Lesson 1**.

Oral Interviews

1. What is a paleontologist? What do they do? Do they make guesses about the past? What things do they do to make certain that their guesses are as accurate as possible?
2. What are some other words we use to talk about dinosaurs? Use word tags to remind students.
3. What did we learn about dinosaurs today?
4. Who can count from one to five? Show me three fingers. Show me two. Show me one. Show zero fingers.
5. What other things have been found as fossils besides the actual dinosaur bones? (Imprints of leaves, and casts of footprints left on earth that have hardened over time.)
6. What else would you like to know about dinosaurs?

List of Activities for this Lesson

- ▲ Two Legs or Four Legs
- ▲ Fossil Prints
- ▲ Fossil Hunting
- ▲ Fossil Matching

ACTIVITY *Two Legs or Four Legs?*

Objective

Students construct sets of two, four and five objects.

Materials

Dinosaur models of two- and four-legged dinosaurs

Sorting trays

Discussion

Tell students that all dinosaurs walked fully erect, unlike modern reptiles like lizards and crocodiles that walk on their bellies with their legs sprawling out from their sides. Dinosaurs are the only reptiles that walked like mammals.

Some dinosaurs walked on two legs, some on four. All four-legged dinosaurs were

herbivores. All carnivores were two-legged, although some herbivores were two-legged as well.

Procedures

1. Students sort the dinosaur models into those that have two legs and those that have four legs. They count the legs and say that one plus one is the same as two; two plus two is the same as four.
2. Students draw pictures of the four-legged dinosaurs and give reasons why these would be herbivores (plant eaters).
3. Students draw pictures of the two-legged dinosaurs and give reasons why these would be carnivores (meat eaters).
4. Students draw a set of three dinosaurs and say that three is one more than two, or two more than one.
5. Students draw a set of five dinosaurs and say that five is one more than four, or four more than one, or three plus two.

ACTIVITY *Fossil Prints*

Objective

The students simulate fossil prints using clay to explore the concept of a fossil and to make inferences from given information, i.e., humans believe that dinosaurs existed because we have found their fossil remains.

Materials

Various small bones, leaves (ferns, preferred), shells, buttons or coins
A piece of modeling clay the size of an adult fist for each student or student-pair

Discussion

Fossils appear buried in the earth as either actual bones or teeth, or as impressions or prints, or as spaces or casts left in stone after the object has decayed away.

Procedures

1. Press one half of the clay flat and smooth.
2. Place the bone and leaf or other items onto the clay. Make a few impressions in the clay with a button, coin or twig.
3. Roll out the other half of the clay and place it over the objects on the first half. Press the two pieces of clay together gently to keep the clay from breaking. Take care that the clay molds the bone or other objects.
4. After the clay has dried, somewhat, carefully separate the pieces of clay. The prints of the leaves and a cast of the bone can be seen.

▲ **ACTIVITY**

Fossil Hunting

Objective

The students use new terminology to describe remains of dinosaurs and other prehistoric life.

Materials

Each student group makes a chart to record where to look for fossils. The types of fossils may be actual bones, fossilized plants, and casts or prints of animals. The students make drawings of any of the fossils or tools they want to list.

Fossil Hunting

Where to Look for Fossils	Type of Fossil	Tools to Use	Things to Use for Records

ACTIVITY *Fossil Matching*

The students will collect pictures of dinosaur skeletons and their correlating fleshed-out versions. Students will then label each dinosaur picture with the dinosaur's appropriate name. The teacher will provide a wide variety of dinosaur shapes and names for the students to choose from when labeling.

LESSON

4

Types of Dinosaurs

BIG IDEAS There were many different kinds of dinosaurs: some walked on land, others flew in the air and others lived both on land and in water. We can use geometric shapes to draw their pictures.

Whole Group Work**Materials**

Illustrations of at least five dinosaur types, see **Appendix A** — Dinosaur
Copies of these illustrations made on heavy paper, cut into three to five jigsaw parts, depending on the number of children who are going to be “fossils”; color code each of the dinosaurs to help keep the parts together and place in baggies

Hats/caps for the paleontologists

Tapes of new dinosaur books for students to listen to and “read” for the **Listening** or **Reading Centers**

Encountering the Idea

If you went to the zoo, what would you expect to find? (Students give responses.) Yes, that would be a good zoo if it had all those different kinds of animals. What would you think of a zoo that had only monkeys? Well, it wouldn't be very exciting. What if it had only tigers? The same thing. In the time of the dinosaurs, the earth was like a zoo — many animals were living on it. There were many dinosaurs and there were different kinds — many different shapes and sizes. They not only looked different from each other, but they also ate different food. But there is one thing that was the same for all of them, and that is one of the things we will discover today.

Exploring the Idea

The children study pictures of at least five dinosaur types, noting features that suggest that dinosaurs may have lived on land, been able to fly or lived in the water. Discuss the features that suggest that they were able to fly or live in the water.

At the **Science Center**, students

1. review and can repeat **Activity** — Fossil Matching; students observe the features of the fossil to match with the imagined picture of the corresponding dinosaur.
2. complete **Activity** — Looking for Fossils, as below.

Materials

Make jigsaw puzzles out of different dinosaur shapes; color-code each of the dinosaurs to help keep the parts together and place in baggies

Hats/caps for the paleontologists

Procedures

- Assign students to be either “fossils” (jigsaw dinosaur body parts) or “paleontologists”.
- Each student is given a hat to wear if he or she is a paleontologist; other students are given fossil parts.
- Those holding the fossil parts hide while the paleontologists look for them. The paleontologists work in small groups to “fit the fossil parts.”
- Students take turns in the different roles. They report their “findings” to the class.

At the **Mathematics Center**, the students

1. name and identify geometric shapes such as: circle, square, rectangle, diamond, and triangle. They use the shapes to draw several dinosaurs. See **Appendix C— Geometric Dinosaurs**.
2. complete **Activity** — Dinosaur Math Links, as below.

Materials

Pictures of different-size dinosaurs — See **Appendix A** — Dinosaur
Several linking counters or paper clips to measure the pictures

Procedures

- Working in pairs, the students make link chains (using paper clips or any of the commercially made linking counters) to the length of the dinosaurs in the pictures given to the students.
 - Each student measures his/her dinosaur with the counters.
 - The paired students say which chain, and which dinosaur, is longer by comparing the chains side-by-side, i.e., matching them one-to-one.
 - The paired students say how much longer or how much shorter each dinosaur is by counting the unmatched links.
3. complete **Activity** — Class Favorite Dinosaur.

Getting the Idea

How many **different** types of dinosaurs have we studied? Yes, there were many different kinds on earth before they became extinct. Were they all the same size? No, some were small and some were very large. How do we know that some were small and some were large? Yes, paleontologists have found bones of different shapes and different sizes. The shapes of the bones tell scientists many things. For example, if the bones were large, then the animals had to be large. If the footprints were small, then the animals were small.

Where did we have to go to find fossils? Fossils have been found in swamps, in mountains, and in many other places. What tools have to be used to find them?

Ask the students to repeat the names of the different dinosaur types. Which ones were the small ones? The large ones? The carnivores? The herbivores?

When you used your geometric shapes to construct the dinosaurs, which shapes were easy to use? Yes, the ones with straight lines are easy to use because you can fit them together. What about the circular shapes? Yes, if you fit the circles together, there are some spaces left over. You can combine the different geometric shapes to make new shapes.

At the **Listening Center**, the students listen to tapes and “read” tapes of one or two of the new books.

Organizing the Idea

1. Make a language chart to record the students' report from **Activity** — Looking for Fossils, with headings: **Name of Dinosaur, Eats, and Lives on (Land, Sea, Air)**
2. At the **Writing Center**, the children use illustrations from their whole group work to write about their favorite dinosaurs, other prehistoric animals, and/or plants. This work goes into their journals. See **Appendix B** — Dinosaur Shape Book.

Closure and Assessment

Class sings to the tune of “I’m a Little Teapot.” Repeat the chorus after each verse.

	Chorus
I’m a Brontosaurus with four feet. I eat plants, but don’t eat meat. Known as Thunder Lizard, that is true. 'Cause when I walked, the earth just shook.	Dinosaurs, Dinosaurs, that we know. Some were large, some were small. Fossils tell us this is so, 'Cause I’ve not seen one after all.
Tyrannosaurus Rex’s my name. King of the dinosaurs, that I am. I make many run and hide. 'Cause I’m mean and like to fight.	I’m Triceratops, with three horns. A big, big head, and frilly bones. I’m a fierce fighter, on four feet. But I eat plants, 'cause they are neat.

At the **Drama Center** the students develop and act out a play with the title: **A Day in the Life of DINO, the Tyrannosaurus**, or a dinosaur of their choice.

Oral Interview

1. What is the name of your favorite dinosaur? Why did you pick that one as your favorite?
2. Which of the dinosaurs that we have studied was the largest? The smallest? How do you know?
3. How are the different kinds of dinosaurs alike? How are they different?
4. How many different dinosaurs have we studied?

Performance

Assess for mastery of the Big Ideas students' work on **Appendix B** — Dinosaur Shape Book and participation in and level of completion of **Activity** — Class Favorite Dinosaur.

List of Appendices and Activities for this Lesson

- ▲ **Appendix A** — Dinosaur
- ▲ **Appendix B** — Dinosaur Shape Book
- ▲ **Appendix C** — Geometric Dinosaurs
- ▲ Fossil Matching
- ▲ Dinosaur Math Links
- ▲ Looking for Fossils
- ▲ Class Favorite Dinosaur

▲ ACTIVITY *Class Favorite Dinosaur*

Objective

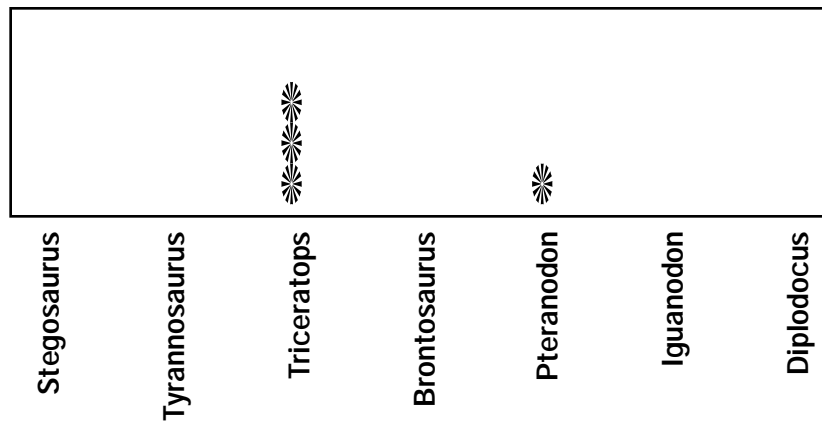
Students take a survey of the favorite dinosaur, summarize the information on a bar-graph and count the votes in each category to identify the class favorite.

Materials

Chart, as below — names may be replaced by illustrations of the dinosaurs
A small, piece of self-adhesive paper to place on the graph, one per child, with the child's name written on it

Procedures

1. Each student places his/her piece of paper on the bar-graph chart to register a vote.
2. Count the votes for each type of dinosaur.
3. Students count the total number of votes to ensure that everyone voted and that no one voted more than once.
4. The students identify the class favorite dinosaur and the one least liked.



LESSON

5

Meat and Plant Eaters

BIG IDEAS Dinosaurs existed by eating large quantities of plants like ferns or by eating other animals. We can classify dinosaurs in many different ways.

Whole Group Work**Materials**

Illustrations of meat eating and plant eating dinosaurs (pp. 12-27 of D. Dixon's **Be a Dinosaur Detective**)

Snack for each child: Two pieces of a hot dog or lunch meat, a lettuce leaf, carrot sticks or other raw vegetable, two pieces of fruit (apples, grapes, bananas, etc.)

Paper plates, napkins, forks for the snack

Chart, similar to the one in **Activity** — Fossil Hunting, with new headings: **Name of Dinosaur, Kind of Food, How Can We Tell?**

A hole punch; one sheet of construction paper per student

A large, hand-held mirror for the **Science Center**

Encountering the Idea

In a whole class discussion the children hypothesize about the food dinosaurs ate. The students' responses are written on a rebus chart. They talk about the differences in the characteristics of the meat-eating dinosaurs and the plant-eating dinosaurs. Show the pictures at this time. If a dinosaur was an herbivore, ate plants only, what kind of teeth did it have? Did it have claws? Did it have a large mouth or a small mouth? What if the dinosaur was a carnivore and ate meat only, what kind of teeth would it have? Would it have claws? We will discover the answers to these questions in this lesson and in the next.

Exploring the Idea

At the **Science Center**, the students examine their own teeth with a large, hand-held mirror to see the varying shapes and the uses of the different kinds of teeth.

- Using the hand-held mirror to see her teeth, the teacher demonstrates to the students what they are to look for when examining their teeth. Tell them that some of them may not have all of their new teeth, but since they are working in small groups, they can share the information they have about each other.
- Say: the front teeth are long, wide and flat; there are four of these. The next ones are long, round and have a point; there is only one of these longer ones on each side of my mouth. The molars are next and are round and short but are rough on the top; we have two or three of the molars on each side of our mouths.
- The same type of teeth are on my upper jaw as on my lower jaw.
- Ask the students to make other observations about their teeth: the size, number, any other characteristics they notice. They report their observations to the class.

Students then complete **Activity** — Dinosaur Teeth.

At the **Mathematics Center**, the children

1. use the counters placed in the center to count and/or sort according to color and kind of dinosaur.
2. may sort the food into meat, vegetables (or leaves) and fruit. The teacher motivates counting by asking: Which of these sets has more? Which has less? How do you know? Do you match them like this? Which set has some dinosaurs that are not matched? Is it the one that has more?
3. Which sets have the same number of dinosaurs? How do you know? Is it because when you match the sets, there are no dinosaurs left over in either set?
4. Students complete **Activity** — Name Matching.

Getting the Idea

We know that there were many different kinds of dinosaurs living on earth many millions of years ago. How do we know that there were many different kinds? How do we know that there was not just **one** kind of animal? The fossils that have been found tell us that there were many different kinds because the fossils that have been found are of different shapes, types and sizes. From this evidence paleontologists can conclude that the dinosaurs were different. We can also conclude that there were many different kinds of plants because of the different plant fossils that have been found.

Each child is given a snack and, while they eat, they count the pieces of food left on their plate. Begin a discussion of the importance of finding different types of dinosaurs' and other animals' teeth, as the students munch on "meat" and on "plants". Scientists have found fossilized teeth that tell us what these different animals ate. In the **Science Center**, you, yourselves, have looked at your teeth and you can see that they are different.

Each type of tooth has a special job. Some teeth are for biting. Which are those? (The student think about which teeth they are using to eat the snack of "meat" and "plants" — the front teeth.) Since many of you are getting your new front teeth, let's describe them. The new front teeth have sharp ridges on them still. But mine (the teacher's front teeth) don't have these sharp points on them. Why do you think that is? Yes, in time the ridges wear off.

Which teeth are for tearing off pieces of meat? (The incisors, which have sharp points on them. These are for biting also.) What are the back teeth for? (For grinding and smashing into smaller pieces so that we can swallow our food.) These teeth are also called **molars**. In Spanish, the word **moler** means "to grind," which is what these teeth do to the food before we swallow.

Which teeth are we using to eat our "plants"? (We bite first, and then we chew; but we don't have to tear the fruit or vegetables.) Humans have both kinds of teeth because humans eat meat, and humans eat plants also.

What do we think if a dinosaur skull is found and all its teeth, but a few front ones, are flat? (That they were plant eaters.) What do we think if a dinosaur skull is found and all its teeth, but a few front ones, have sharp points? (That they were meat eaters.)

What do crocodiles eat? (Fish and large mammals, and they've been known to attack and eat humans.) What do lizards eat? What do turtles eat? (Many turtles are toothless; they eat mostly insects, slugs or other small animals; they can eat plants but only the soft parts, because they do not have teeth that can grind the food.)

What observations did we make that helped us guess what the dinosaurs ate? What observations do we use to say whether a dinosaur is a meat eater or a plant eater? Remember, observations help us to make good guesses. These observations helps us sort the dinosaurs in many different ways.

Organizing the Idea

At the **Art Center**, children make dot dinosaurs. Using a hole punch and construction paper, they cut out as many dots as they need to outline a dinosaur pattern. These patterns may be used later for a wall mural.

The students make a chart illustrating the different types of dinosaurs that they have studied and they categorize dinosaurs by what they eat — plants or meat.

Applying the Idea

Show students a picture of three or four small molars that are placed in a row, as if in a mouth. See **Activity** — Dinosaur Teeth. The molars are flat, broad teeth but have very sharp ridges. Ask the students what they think they can tell about the creature that was the owner of these teeth from looking at them. (If the teeth are small, the creature was small also. Since they are molars and broad and flat, and there are several, maybe the creature was a plant eater. Also, since the ridges are still sharp, maybe it was still very young.)

Closure and Assessment

The children reconvene; use fingerplays and other closing activities from the previous lessons.

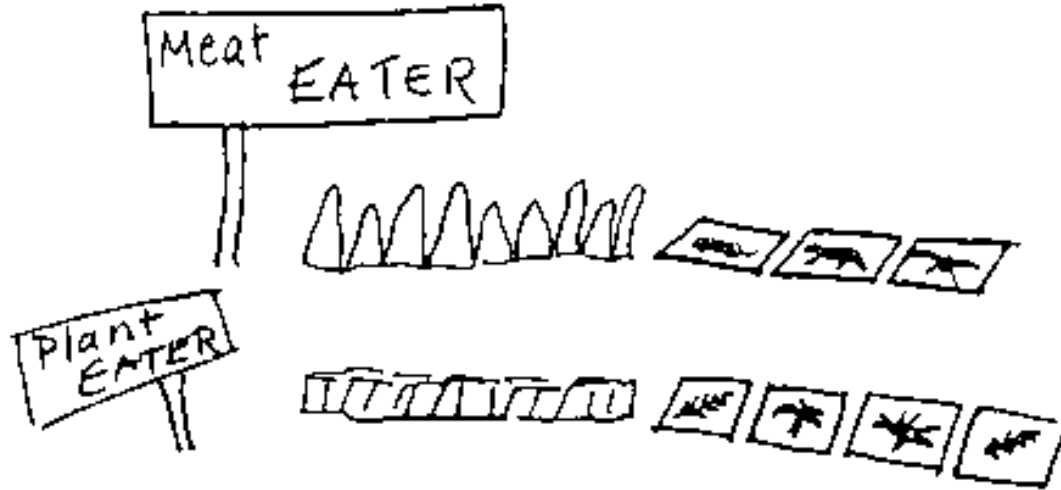
Oral Interviews

1. Today we learned that some dinosaurs ate plants and others ate meat. How can we tell which dinosaurs ate meat and which ones ate plants?
2. What are some new words we learned today?
3. Pointing to dinosaur counters: Count these dinosaurs. How many yellow dinosaurs do we have? How many red? Which set has more? Which set has less? How do you know?
4. What are two different ways you can use to tell which set has more? Yes, you can match the members of the set one by one, or you can count to see which number is greater.
5. What else would you like to know about dinosaurs?

List of Activities for this Lesson

- ▲ Dinosaur Teeth
- ▲ Name Matching

▲ **ACTIVITY**
Dinosaur Teeth



▲ ACTIVITY

Name Matching

Objective

The students form a chain of linking cubes — one link for each letter of a dinosaur word and/or the student's name — to compare the length of different words.



Carnivore

Same

Herbivore



pteranodon one longer
iguanodon

stegosaurus two longer
tyrannosaurus

diplodocus one longer
triceratops

reptile one longer
fossil

claw same
horn

and other comparisons.

LESSON

6

The Dinosaur's Life Cycle

BIG IDEAS Baby dinosaurs hatched from eggs laid by the female dinosaur; the baby dinosaurs grew to be adults. Mathematics also tells us about patterns in the lives of dinosaurs.

Whole Group Work**Materials**

Books: **Chickens Aren't the Only Ones** by R. Heller and **Eyewitness Book: Dinosaur** by D. Norman and A. Milner

Chart table or heavy poster board for dictated story about the life cycle of the dinosaurs

Prepared deviled "dinosaur" eggs for closing activity (Any deviled egg recipe will do.)

For the **Mathematics Center**: game — Egg-matching activity. Construction paper to make a nest and dinosaur eggs

For the **Art Center**: silhouettes of a baby dinosaur for stuffing. Wads of paper or cotton to stuff the baby dinosaurs. Yarn or string to lace the dinosaurs together

For the **Science Center** a set of laminated, magazine pictures of animals and reptiles; two trays labeled: **Reptile** and **Not Reptile**

Word tags: reptile; life cycle; pattern; lizard; crocodile; turtle

Encountering the Idea

We have been learning many new things about dinosaurs. One thing we have not talked about is how new dinosaurs were born. What would you guess? How do you think dinosaurs were born? Do you think that they were born live from their mother, like kittens or puppies? Or do you think they hatched from eggs? (Pause for student responses and suggestions.) What does the name "dinosaur" mean? Yes, we said that it means "terrible lizard." So, how do you think lizards are born? We will discover more things about these dinosaurs in our lesson.

Exploring the Idea

Read the title of **Chickens Aren't the Only Ones**. Ask students what they think the story is about. After they give their suggestions, read the book aloud. After reading, ask: What do you think happens when the dinosaur baby hatches from an egg? Let's write our predictions. Write the students' predictions on a chart to use at the **Writing Center** at a later time.

At the **Science Center** the students complete **Activity** -- Dinosaur Weapons.

At the **Mathematics Center** the students

1. complete **Activity** — Dinosaur Eggs and **Activity** — Shake and Spill
2. sort and count the laminated pictures that show reptiles and those that do not.
3. complete **Activity** — Dinosaur Patterns, as below.

Procedures

- Place plastic models or picture cutouts of different dinosaurs in the **Science Center**.
- Students use the models to make different patterns. They describe the patterns to their partners.
At the **Art Center** the students complete **Activity** — Baby Dinosaur.
At the **Listening Center** or the **Library Center**, students listen to new tapes of dinosaur books and “read” them.

Getting the Idea

What have we learned about how dinosaurs were born? Yes, like present-day reptiles, dinosaurs hatched. Show the word “reptile” using a word tag. Show a picture of a reptile and describe it saying that reptiles: crawl, have four legs, have a cover of scales and lay eggs. Use the set of laminated, magazine pictures of animals and reptiles for students to classify, again, when they continue work in the **Mathematics Center**.

What do you suppose happened to the baby dinosaurs after they were born? Yes, they had to learn to find food and water. If they were plant eaters, they had to look for the plants they liked. If they were meat eaters, they had to learn to look for prey and catch it. Since they were babies and smaller than the adults, they had to be careful that their natural enemies did not find them and eat them. Soon, they grew to be adults. These young adult dinosaurs mated then, and the female dinosaur laid new eggs in a nest. The eggs hatched, and more dinosaurs were born. This is called a **life cycle**. New members of a group are born; they grow to mature creatures; they mate and have babies; then they get old and die. A life cycle is like a pattern. What is the life cycle pattern of the dinosaurs? (Hatch, grow from babies to adults, mate and make new creatures, grow old and die; and then repeat the pattern with the new babies.)

Did all the dinosaurs die of old age, or do you think the dinosaurs had natural enemies? Sometimes some of the larger dinosaurs attacked the smaller ones. Other animals often raided the dinosaurs’ nests and ate the eggs. There were also other animals that lived during the time of the dinosaurs, for example, the saber-toothed tigers, the huge bears, and the mastodons that looked like present-day elephants. Those that were herbivores had plenty of plants to eat, and the carnivores preyed on the herbivores.

You made some dinosaur patterns in the **Mathematics Center**. What did your patterns look like? Did you repeat the same groups of dinosaurs over and over? Some of you may share your patterns with the class.

Students and teacher discuss the birth of dinosaurs and make hypotheses about the eggs — the size, color, texture, and length of time to hatch.

Organizing the Idea

1. Using the rebus story dictated previously, students sequence the sentences to describe the life cycle of the dinosaur. Tell the students that the sentences will be placed in the **Science Center** for them to continue to sequence.
2. Students draw in their journals the patterns they made with the dinosaur shapes. The students also illustrate the life cycle of the dinosaur in their journals, using the words written on the life cycle chart.

3. At the **Drama Center**, the students compose and illustrate a play about a baby dinosaur. Then the students act out the story.

Closure and Assessment

Regroup students; use one of the closing activity songs/verses from before.

Oral Interviews

While students eat their deviled eggs, ask:

1. Besides chickens, what else lays eggs?
2. Describe how a dinosaur is born.
3. How big were the baby dinosaurs? Were they as big as you are now?
4. Were they as big as this room? How do we know how big they were?
5. What evidence do we have about their size?
6. What are two characteristics of reptiles that are the same as characteristics of dinosaurs?

Performance

1. Students show the four legs of a dinosaur in different combinations such as two and two; one and three; three and one.
2. Students sequence the pictures of a dinosaur's life cycle correctly.
3. Students sort the pictures of reptiles and those that are not reptiles correctly.

List of Activities for this Lesson

- ▲ Dinosaur Eggs
- ▲ Baby Dinosaur
- ▲ Dinosaur Weapons
- ▲ Shake and Spill



ACTIVITY

Dinosaur Eggs

Objective

Students complete the jigsaw puzzles they make themselves; students can say that an egg shape is also called an “oval”; students count eggs through the number eight, or other.

Materials

Manila folder stapled at the sides to keep contents from spilling

Label folder “Dinosaur Eggs” and/or “Dinosaurs Laid Eggs”

Construction paper for children to make “dinosaur eggs”

Scissors and glue

Crayons to color the nest and eggs

“Egg” jigsaw puzzles for children to match (two, three per child)

Cards with one numeral: zero, one, two, three, four, five, six, seven, or eight written on each

Procedures

1. Using the jigsaw puzzle pieces, children match them to make the eggs.
2. Students place and glue the completed puzzles on a nest that has been drawn on a piece of paper.
3. Using one of the completed eggs as a pattern, the students trace the egg shape until they have eight eggs (or any other number selected) drawn on a sheet of paper; they color, write names, etc., on the eggs. They draw an imagined baby dinosaur after it has hatched.
4. Students trace and cut out their own egg shapes into puzzle parts and have other students complete the puzzle.
5. After the students have completed the egg puzzles, they draw a container, simulating a nest, to place the eggs in and make sets of one through 10 (or any number selected) eggs.
6. The students place the correct numeral card on each set, and a student’s partner checks.
7. They also place the numeral card with 0 on the empty nest.

ACTIVITY *Baby Dinosaur*

Objective

Students make a baby dinosaur shape.

Materials

Brown paper bags or pieces of brown butcher paper, one per child

Dinosaur shape for students to trace

Hole punch, scissors (if students are able to use them) and/or stapler

Newspaper or facial tissues

Procedures

1. The teacher or the students trace two dinosaur shapes on the paper bag or butcher paper and cut them out.
2. The teacher or students staple the two shapes together to make the stuffed animal, leaving an opening large enough to insert the stuffing.
3. The students decorate their animals.
4. Stuff pieces of crumpled newspaper or facial tissue into the shapes.
5. When the dinosaur is stuffed, staple the opening.

*Variation: After using several staples to keep the shapes in place, punch holes around the shapes for the children to loop together with yarn. They can make mobiles or hang the shapes from the ceiling or on a wall.

▲ ACTIVITY
Dinosaur Weapons

Objective

The students learn which body parts of the dinosaur were used for defense.



CLAWS



TEETH



HORNS



BODY HEADS

DRAW others (i.e. tail spikes and clubs)

▲ ACTIVITY *Shake and Spill*

Objective

Students practice adding to five and subtracting from five.

Materials

Five two-color counters that represent dinosaur eggs; one color is female, the other color is male

Container to represent the dinosaur nest

Paper and pencil to record the results (this is optional, if students have been introduced to writing number sentences)

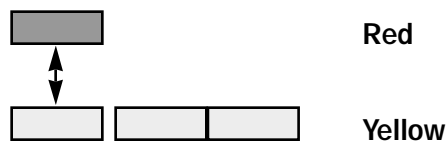
Procedure

Part One

1. Students put three, four or five two-color counters in the container representing the dinosaur nest.
2. They cover the container with one hand and shake it.
3. They spill the counters on the desk and count how many of one color and how many of the other.
4. They say which set (counters of one color) has more.
5. They say the number sentence the counters represent, e.g., two plus one equals three; three plus one equals four; two plus three equals five, etc., depending on the number of counters they put into the container.

Part Two

1. Students put three, four or five two-color counters in the container.
2. They cover the container with one hand and shake it.
3. They spill the counters on the desk and count how many of one color and how many of the other.
4. The students compare the two sets to say which set (counters of one color) has more.
5. For example, the students put four counters in the container. When they spill the counters there are three yellow and one red. One student says that set yellow has two more than set red, because set yellow has two not matched.



LESSON

7

Nature and Change

BIG IDEAS The story of the existence and extinction of dinosaurs tells us that change is a part of nature. Change can be observed by making comparisons and by using mathematics.

Whole Group Work*Materials*

Books: **If the Dinosaurs Came Back** by B. Most and **The Dinosaur Family Reunion** by C. Allen.

Taped music: for example, Saint Saenz' **The Carnival of Animals** for the Dinosaur Parade and for the **Listening Center**

Chart tablet with at least one page per child at the **Writing Center**

Markers, paints, patterns, scraps of fabrics, etc. at the **Art Center**

A four-foot long drawing of the head of Tyrannosaurus Rex for the **Mathematics Center**. See **Appendix B**— Dinosaur Shape Book. A picture can be enlarged to four feet.

Pattern for a six-inch tooth to be measured and drawn by each child and placed in

Tyrannosaurus Rex's mouth. Use tooth in **Appendix D** — Tyrannosaurus Rex's Tooth.

Big paper clips for measuring, and an additional chart tablet

Illustrations of prehistoric conditions on earth depicting the climate, the vegetation, the surface features on earth and the other types of animal life besides the dinosaurs

Encountering the Idea

We have studied many things about dinosaurs, and we have been fascinated with them. It is very exciting to think that no one has seen one of these creatures, and yet we think that we know a lot about them because we have been able to study their remains in the form of fossils. We have learned that these animals existed many millions of years ago, that they were able to live on earth because there was plenty of food for them in the form of plants and animals. Something happened. Scientists cannot say with certainty what caused the dinosaurs to become extinct; nevertheless, they did. But that is not all that changed on earth. That is one of the fascinating and important things that we can study in science — that some things change, and some things stay the same. That is what we are going to be exploring today — change — and one way that it can be observed — by comparing measurements.

Exploring the Idea

Read the book, **If the Dinosaurs Came Back** aloud to the students. Ask them what they think would have to happen for the dinosaurs to be able to come back. What would they need?

They would need a place to live. Where would that be? They would also need a lot of food. Where would they get it? What kind of food would they need? PLANTS AND MEAT. Do you think that people and dinosaurs could live together today? Do you think we could build a zoo large enough for these dinosaurs? How could we protect ourselves from them? Yes, the earth has changed a lot since the time of the dinosaurs. In our centers, we are going to see in what ways the earth has changed.

At the **Science Center**, the students will draw and color two maps of the continents on earth. They will complete **Activity** — The Continents Divide.

At the **Mathematics Center** the students

1. complete **Activity** — Making a Pictograph. Before the students go to the center, explain to the students what a pictograph is.
2. complete **Activity** —Dino Math.
3. measure Tyrannosaurus Rex's teeth. See **Appendix D** — Ty Rex's Tooth.
4. collect information to observe change. See **Appendix E** — A Blue Whale.

Getting the Idea

How has the earthed changed since the time of the dinosaurs? We know that there were many animals that existed then, but they do not exist on earth now. Some of these were the dinosaurs, the mastodons, the giant bears, the saber-toothed tigers, and the giant panthers whose fossils have been found in California. Are there any animals that are the size of the giant dinosaurs living today? The largest animal on earth is the blue whale. Is it as large as the Seismosaurus was? How do you know?

We know that some places that had been underwater are now deserts, and that the continents have divided. How do we know that? Fossils of fish and other aquatic animals have been found where desert is now.

The climate is different because it is less warm and humid than before; there are fewer plants; the continents have separated, forming great oceans between them; the surface has changed, creating new mountains and valleys; and there are people that live on all parts of the earth. Things that have not changed are that: plants need the sun to make food; plants make food for themselves and for all the animals on earth; if the earth can no longer produce plants, then **all life will become extinct**.

Organizing the Idea

At the **Writing Center** the student will work in groups of four children. Each student group may select one of two ideas to write about. Before beginning to write and before going to the centers, all students work together to develop their ideas.

1. The students suggest action words that describe what they think dinosaurs did such as “come”, “waddle”, “skip”, “walk”, “jump”, “run”, “trip”, “leap”, etc. and other things they think dinosaurs would do if dinosaurs came back. Write children's responses on a chart. Ask “Which word best describes what the brontosaurus must have done?” Choose one student at a time to demonstrate the brontosaurus waddle; the stegosaurus trip two by two; the triceratops run five by five; the pteranodons fly six by six; and the Tyrannosaurus Rex comes in alone. Include other suggestions from the students.

- The students list how the earth has changed since the time of the dinosaurs and what things have not changed. The climate has changed; there are fewer plants; the continents have separated; the surface on the earth has changed; and there are now people on earth.

The **Art Center** is to be reserved for the group that has completed their work in the **Writing Center** with the teacher and is ready to begin work on one of the two topics in a group Big Book. Each group chooses an idea to be illustrated and goes to the **Art Center** to begin that group's Big Book. The words suggested will be used to write the group Big Book. There will be as many Big Books as you have groups. Peers edit each other's group books. After they are corrected, these Big Books are placed in the **Library Center** for students to read.

A new book, **The Dinosaur Family Reunion**, is placed in the **Library Center** and in the **Listening Center** where students continue to read and listen to **The Carnival of Animals** or some other music tape about animals.

Applying the Idea

- Do you think that dinosaurs could come back to earth today and survive? Write a story or draw a picture of **The Dinosaur that Came to (your city)**.
- Take the children to a museum with a fossil collection or invite a local paleontologist to visit your class and show a fossil collection.

Closure and Assessment

Reconvene the group. Children share the stories they wrote at the **Writing Center**.

The students then have a **Dinosaur Parade**, marching to the taped music. The students select the dinosaur they want to be and walk in the parade role playing their favorite dinosaur: walk, fly, or crawl.

Oral Interviews

- What did we learn about dinosaurs today?
- How big was Tyrannosaurus Rex's head?
- What can we use to compare to a dinosaur's height? A house? How many houses?
- How do we know that the size of animals has changed from the dinosaurs' time to our time?
- How do we know the dinosaurs we read about in **The Dinosaur Family Reunion** were make-believe?
- What would you do if Tyrannosaurus Rex came into our classroom today?
- What does a pictograph tell us ?
- What was the thing you liked best about our work with the dinosaurs?
- What are some of your favorite words that tell about dinosaurs and their time?

Performance

- Assess level of completion and participation in writing/illustrating one of the two assigned topics and/or on the story in the application phase of the lesson.

Written/Illustrated Completion/Items

- The student places the correct illustration or word on the spaces provided or holds up the item as the teacher reads the following text. (Small groups of children can be assessed at a time.) Illustrations/models needed: Dinosaur, plants, meat, eggs, claws, horns, fossils. Teacher can also ask children to write/illustrate their answers in the spaces provided as the text is read.

Long ago, there lived some terrible lizards, we call _____.

Some of these lizards ate _____ and some ate

_____. They laid _____ in nests on the ground.

They used different things for their protection like _____

and _____. We know that they lived in the world because

we have found _____.

3. Given a set of three (or some other number of items), the child adds two more (or the number needed) to make a set of five. (Teacher may say, "I have three counters. How many more do I need to make a set of five?")

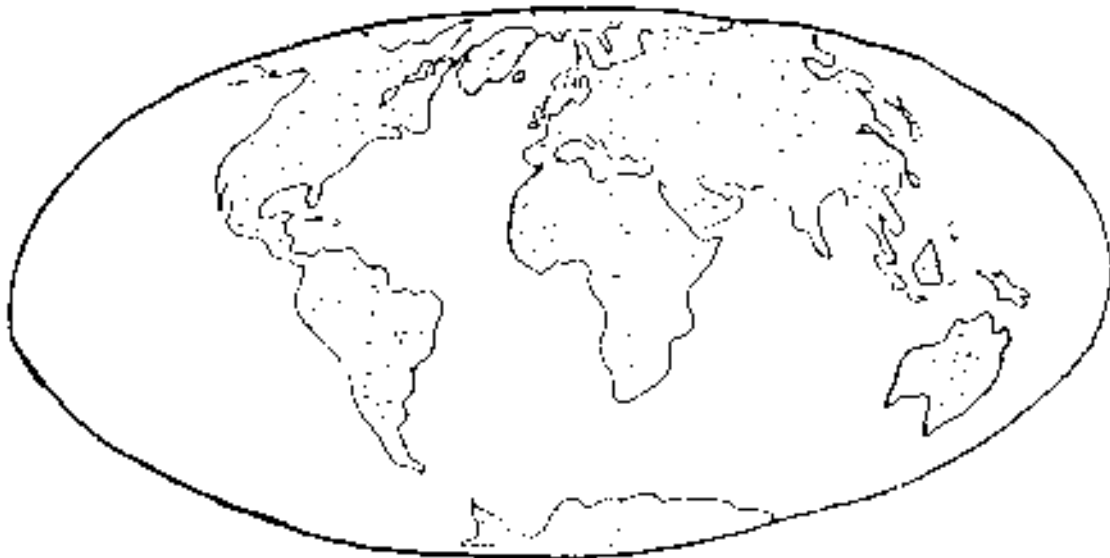
List of Appendices and Activities for This Lesson

- ▲ **Appendix B**—Dinosaur Shape Book
- ▲ **Appendix E** -- Ty Rex's Tooth
- ▲ **Appendix F** -- A Blue Whale
- ▲ The Continents Divide
- ▲ Making a Pictograph
- ▲ Dinosaur Mathematics

▲ ACTIVITY
The Continents Divide



PANGAEA



TODAY

▲ ACTIVITY *Making a Pictograph*

Objective

Students compare lengths to explore ratios and proportion.

Materials

Sets of cutouts for each child to see the relative sizes of a human, a two-story house, and a dinosaur

Paper clips to make chains

Procedures

If the following heights are used as averages: six feet for a human, 18 feet for a two-story house, and 30 feet for the iguanodon, stegosaurus, or triceratops, then the ratios will be 1:3 for a human to a house, and 3:5 as the ratio of a house to an iguanodon.

If the students select a 40-foot tyrannosaurus instead of an iguanodon, the ratio is 1:3:7, of a human to a house, and a house to a tyrannosaurus.

For the 140-foot dinosaur found in New Mexico, seismosaurus (earthshaker), the ratio is 1:3: 23, still using the average for a human and a two-story house.

These chains, below, are in the ratio of 1:3:5:7:23

1	✱	Human
3	✱✱✱	2-story house
5	✱✱✱✱✱	Iguanodon
7	✱✱✱✱✱✱✱	Tyrannosaurus
23	✱✱✱✱✱✱✱✱✱✱✱✱✱✱✱✱ ✱✱✱✱✱✱✱✱✱✱✱✱✱✱	} Seismosaurus (These two, end-to-end)

1. Using these proportions, the students make a pictograph on a chart.
2. The students measure pieces of string to the size of a person, a house, and a dinosaur they select. Then they draw a scene with a house, a dinosaur, and a person to show the three in ratio and perspective.

ACTIVITY *Dinosaur Mathematics*

Objectives

The students count, add and subtract to make dinosaurs.

Materials

Shapes and counters to construct figures for each student pair or student group

Poster board for chart

Cardboard boxes or other materials to make dinosaur cages

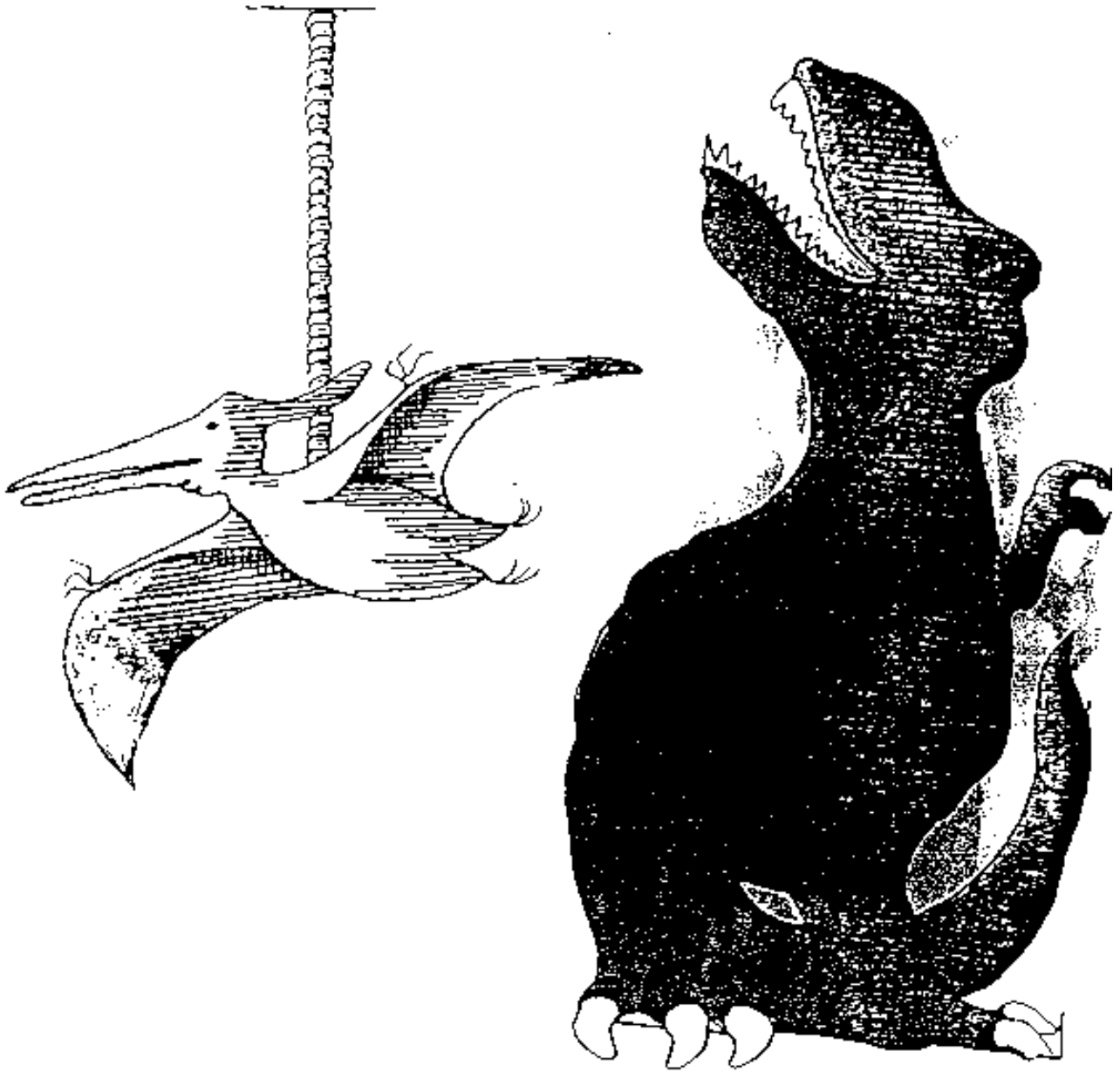
Paper clips or other objects to use as nonstandard units of measure

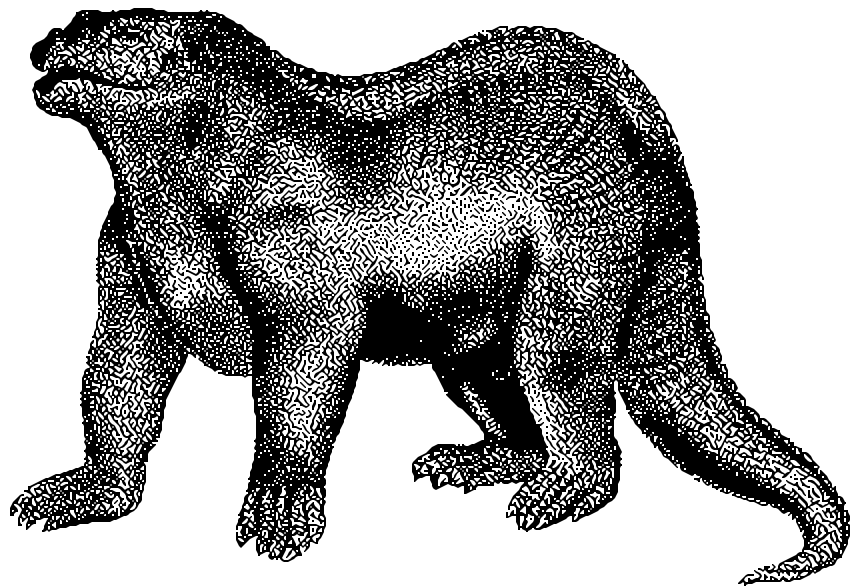
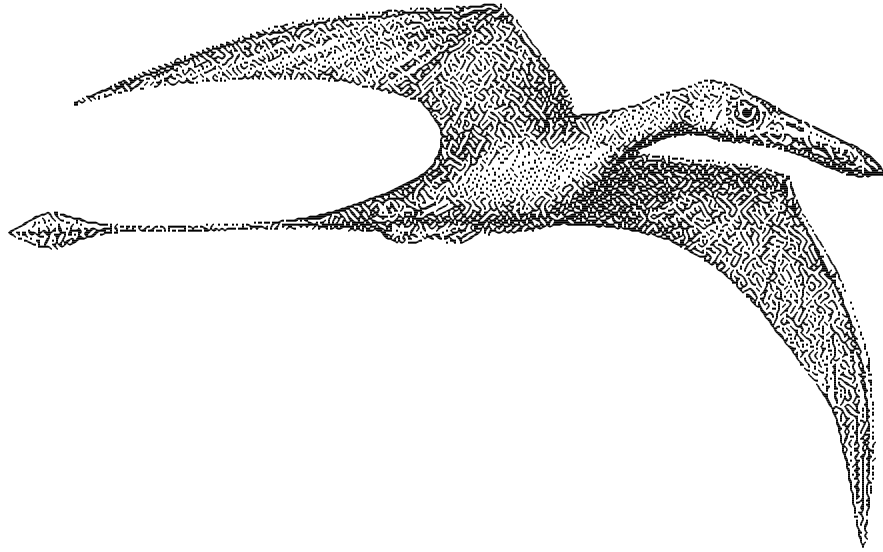
Procedures

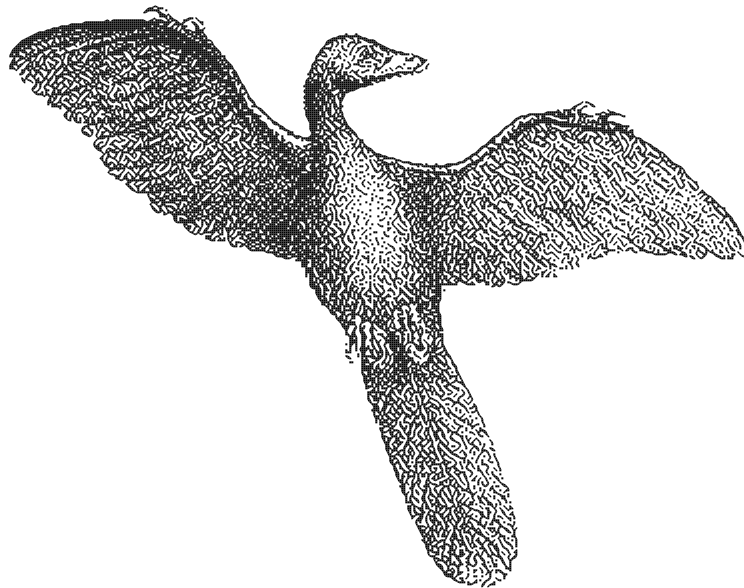
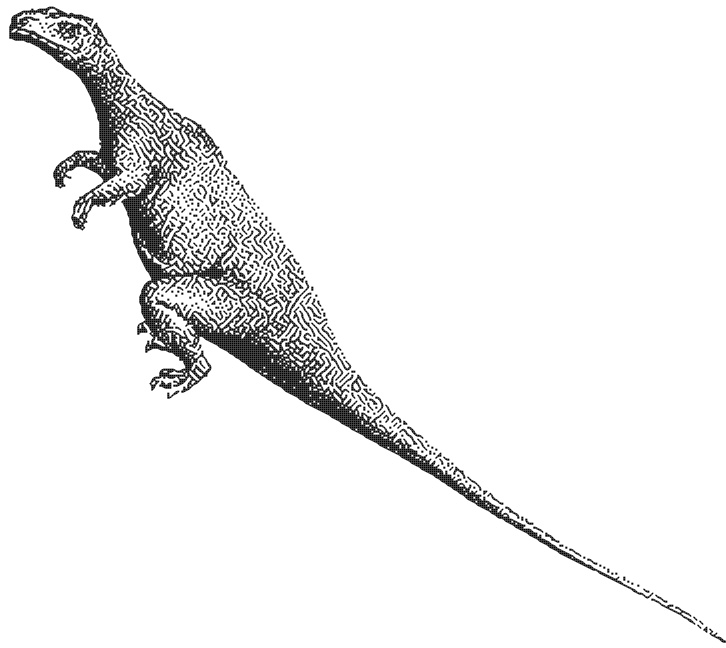
1. Students design dinosaur shapes from various objects such as shapes or counters and other objects available.
2. Students consider the following questions before designing the dinosaur.
 - How much does a dinosaur weigh? (From two to three pounds to between 35 and 50 tons.)
 - How many scales will you draw along the dinosaur's back?
 - Will it have four legs, or two legs and two arms?
 - How long in number of paper clips will your dinosaur be?
 - How tall in number of paper clips will your dinosaur be?
 - How long will your dinosaur's tail be?
 - How long will your dinosaur's legs and/or arms be?
 - If your dinosaur has only two legs and has two arms, how much longer will you make the legs than the arms?
3. Make a cage for the dinosaur. How big will the cage be?
4. After designing and making the dinosaur, decide what food it would need. Make a chart to show how much he/she eats every day and each week.
5. After constructing the dinosaurs, the students sequence them by length, then by height.
6. The students sort the dinosaurs they made into carnivores and herbivores.

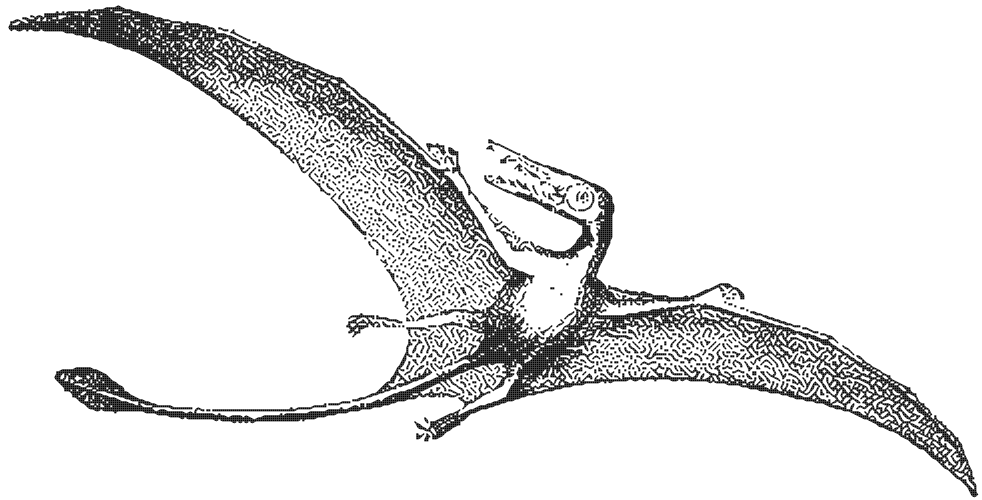
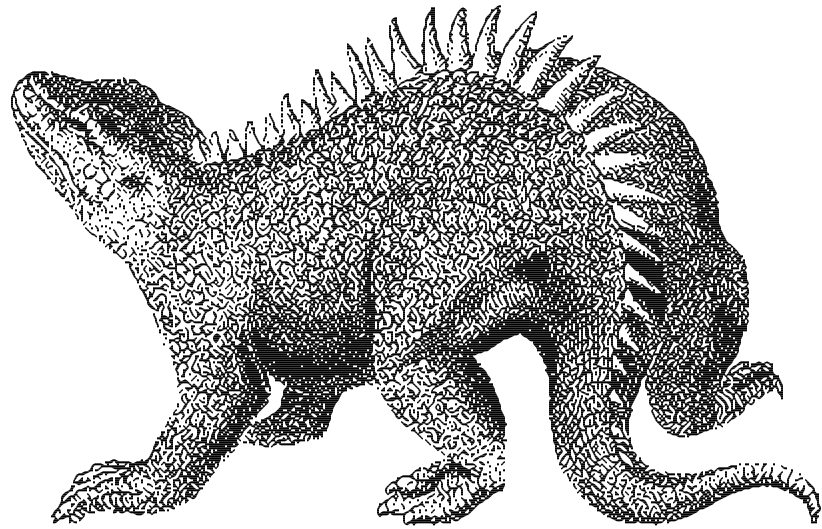
A P P E N D I X A

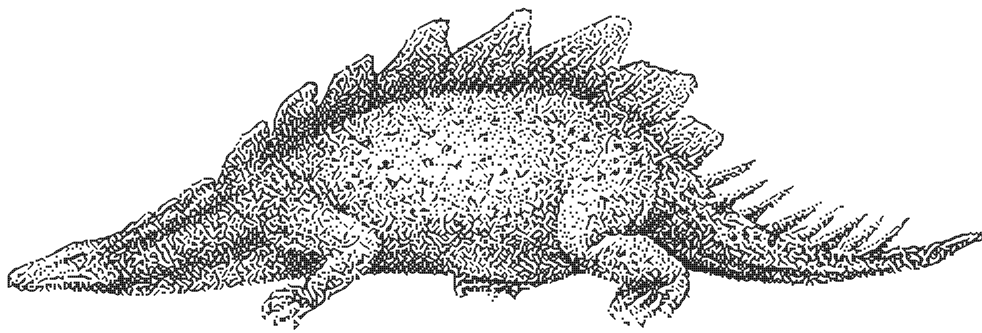
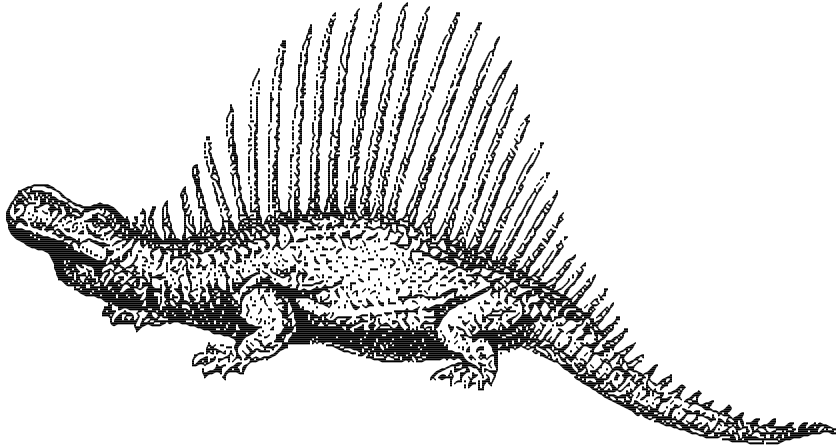
Dinosaur

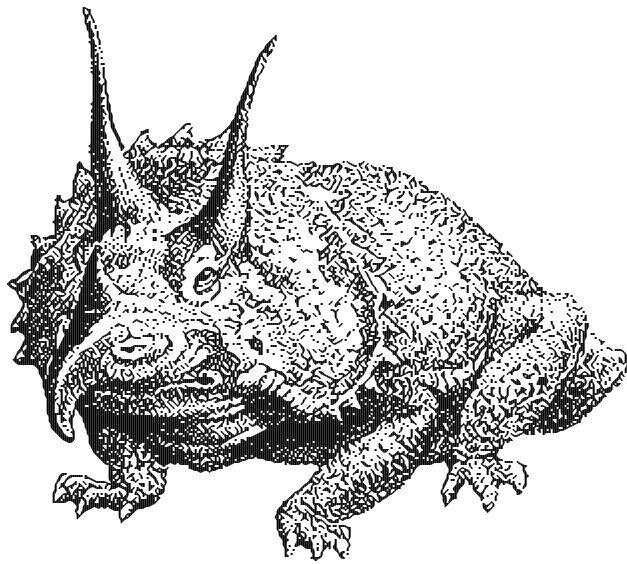
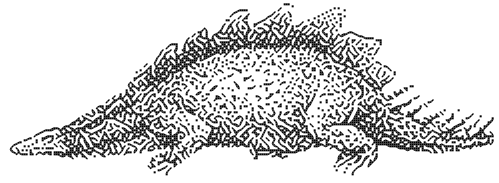














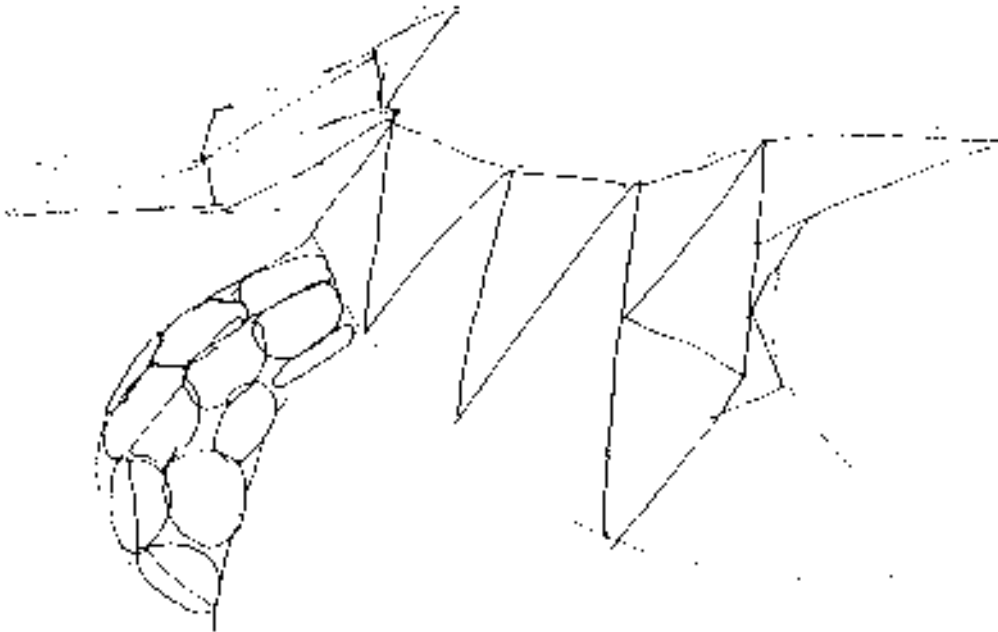
APPENDIX B

Dinosaur Shape Book

Take a picture of one of the dinosaurs' head and enlarge it to approximately $7\frac{1}{2}$ inches in length and about 4 inches in height. Use the picture to make covers for the students' books on dinosaurs. Cut out additional pages in the same shape.

A P P E N D I X C*Geometric Dinosaurs*

After the student make various dinosaur models with the geometric shapes, they sort the geometric shapes by color, size and any other variable they wish and then count the number of geometric shapes they used to make their figures by variables sorted, and then by the total number of shapes they used.



A P P E N D I X D

Ty Rex's Tooth



A P P E N D I X E

A Blue Whale

Materials

Sets of cutouts for each child to see the relative size of a human, a two-story house, and a dinosaur.

Paper clips to make chains, or string

The following heights are used as averages to measure the difference in size of the largest animal in the present-day and the largest animal during the time of the dinosaurs : six feet for a human, 18 feet for a two-story house, and 140- feet for seismosaurus, the ratios will be 1:3: 23.

These chains, below, are in the ratio of 1: 3: 7: 23 : 17

3	***	
		2-story house
7	*****	
		Tyrannosaurus
23	***** *****	} Seismosaurus (These two, end-to-end)
17	***** *****	} A Present-day Blue Whale (These two, end-to-end)

Procedures

1. The students measure pieces of string to the size of a person, a house, a dinosaur they select, and the blue whale.
2. Students draw a scene showing three of the objects shown above, one of which is a blue whale.
3. The students compare the size of the blue whale to seismosaurus and to tyrannosaurus.
Which is the largest animal? When did seismosaurus live?
Was tyrannosaurus bigger than today's blue whale? How do you know?
4. Is the blue whale smaller than seismosaurus? How do you know?
5. If the blue whale is the largest animal on earth today, do you think there are any animals the size of seismosaurus? Tell the class your reasons for what you think.

References

Annotated Children's Books

- Allen, C. (1989). *The dinosaur family reunion*. Allen, TX: DLM Teaching Resources.
This predictable storybook has the dinosaur family coming to a reunion, one by one, two by two, etc. It also highlights verbs that children can act out and say.
- Barton, B. (1989). *Dinosaurs, dinosaurs*. New York: Thomas Y. Crowell.
This is almost a wordless book. It is well illustrated, showing the different kinds of dinosaurs.
- Barton, B. (1990). *Bones, bones, dinosaur bones*. New York: Thomas Y. Crowell.
Large-sized print, an almost wordless book, this shows paleontologist looking for bones.
- Berenstein, S. & J. (1987). *The day of the dinosaur*. New York: Random House.
Labeled a first time reader, this 30-page publication can be used to teach the concepts of "long ago"; different sizes and shapes of dinosaurs and fossils. It contains good illustrations and names of the dinosaurs while the text is written in rhyming manner. It begins with "Long ago, long, long ago, before many things we now know - before cities, towns, and roads, before people, before birds, frogs, and toads - long, long, long before - it was the day of the dinosaur."
- Brandenberg, A. (1989). *Digging up dinosaurs*. New York: Thomas Y. Crowell.
Labeled as a "Let's-Read-and-Find-Out Science Book," this book is good for read-aloud in kindergarten. It is one of the few primary books that includes the paleontologist, geologist and other experts working with fossils. It also emphasizes the caution these experts take when digging up dinosaurs' fossils. This is a sample sentence: "At the museum, scientists unwrap the fossil."
- Carrick, C. (1986). *What happened to Patrick's dinosaurs?* New York: Clarion Books.
Patrick invents his own explanation of why dinosaurs became extinct.
- Dixon, D., & Lings, S. (1988). *Be a dinosaur detective*. Minneapolis: Lerner Publications.
In its question/answer format, this publication has many charts and diagrams. It contains easy-to-follow projects. It is colorful and large enough for children to see during a read-aloud session.
- Donnelly, L. (1987). *Dinosaur day*. New York: Scholastic.
A boy and his dog go hunting for dinosaurs. Almost a wordless book.
- Emberley, M. (1980). *Dinosaurs: A drawing book*. Boston: Little, Brown and Company.
This appears to be a good book for children and teachers, too. It shows how to draw the different dinosaurs; easy to follow steps.
- Heller, R. (1981). *Chickens aren't the only ones*. New York: Grosset & Dunlap.
Chicken aren't the only ones laying eggs. Many others do, including dinosaurs.
- Kindersley. (1991). *Dinosaurs*. New York: Macmillan Books.
Illustrated in beautiful colors, this publication names the dinosaurs.
- Moseley, K. (1984). *Dinosaurs: A lost world*. New York: Putnam Publishing Group.
Presents current information in a "pop-up" format.
- Most, B. (1978). *If the dinosaurs came back*. San Diego: Harcourt, Brace, & Jovanovich.
This fantasy depicts dinosaurs helping build skyscrapers and catching lost kites, if they were to come back. Available in a big book also.
- Most, B. (1984). *Whatever happened to the dinosaurs?* New York: Harcourt, Brace, & Jovanovich.
This is a clever book about extinction possibilities. It is a humorous book, portraying the dinosaurs at large in cities, in jungles, undergrounds, and even in disguise.
- Most, B. (1987). *Dinosaur cousins?* San Diego: Harcourt, Brace, & Jovanovich.
Using clever words and vivid illustrations, the author points out the similarities between animals of today and the dinosaurs of yesterday.
- Most, B. (1990). *Four and twenty dinosaurs*. New York: Harper Collins Children's Books.
Beautifully illustrated, this book combines dinosaurs and nursery rhymes.
- Most, B. (1991). *A dinosaur named after me*. New York: Harcourt, Brace, & Jovanich.
This book encourages creative thinking. Ryan wants Tyrannosaurus Rex to be called Ryanosaurus Rex, etc.
- Norman, D., Milner, A., & Keates, C. (1989). *Eyewitness books: Dinosaurs*. New York: Alfred A. Knopf.
Realistic drawings and photographs make this volume a useful source of information regarding early discoveries, eggs and nests, birth and growth, claws, footprints, and other dinosaur facts.
- Robinson, E. (1987). *The dinosaur ball*. Allen, TX: DLM Teaching Resources.
This is a predictable storybook, using numbers.
- Sattler, H. R., & Zallinger, J. (1984). *Baby dinosaurs*. New York: Lothrop, Lee & Shepard Books.
Based on rare baby dinosaur fossils, this discusses early life of dinosaurs.
- Shapiro, L. (1979). *Dinosaurs*. New York: Simon & Schuster.
This is an entertaining "pop-up" book.

Talbott, H. (1988). *We're back!: A dinosaur's story*. New York: Crown Publishers.

A product testing firm from outer space brings seven dinosaurs to the 20th Century. The seven dinosaurs get into a lot of trouble. Will they stay on earth?

Other Resources

At Possibilitoy, 1206 W. 39th Street, Austin, Texas 78705 (512) 467-9044

- Dino 300 Card Game
For 2-5 players ages 6-12
The object of the game is to form as many sets of dinosaurs as possible. Cards contain a body part of a dinosaur. Color and numerically coded. Sets contains from three to five pieces. 13 different dinosaurs.
- Dinosaurs Jigsaw Puzzle, for ages 3 and over.
International Playthings, Inc.
Riverdale, New Jersey 07457
Has 34 pieces. When puzzle pieces are lifted out, the puzzle board has a natural history museum scene - Hall of Dinosaurs.
- Dino Checkers
Ed Insights
Dominguez Hills, CA 90220
Has board and dinosaur game pieces.
- Dino Kaleidoscope
Gemini Precision Products
Zelienople, PA 16063

Available from Lakeshore Learning Materials, 2695 E. Dominguez St., P.O. Box 6261, Carson, CA 90749

- Dinosaurs Flannel Board Concept Kit—\$13.95
Described as “incredibly realistic, beautifully colored flannel board objects.”
- Dinosaur Counters—\$14.95
Described as “Adorable dinosaurs counters.....”
Set contains 100 plastic stegosauruses in five colors. 1½ inches long.

Unit Bibliography

Allen, R. V., Sampson, M. R., & Teale, W. H. (1989). *Experiences for literacy: Dinosaurs land*. Teacher's Guide. Allen, TX: DLM Teaching Resources.

This is the teacher's guide to a literacy program. A musical tape, dinosaur posters, and a big book are included in the packet.

Begly, S., & Yoffe, E. (October 28, 1991). How dinosaurs lived. *Newsweek*, 52-58.

An article on new theories and old bones that may reveal the lifestyles of the dinosaurs. Dinosaurs appear to be enjoying a renaissance as paleontologists find new species every year. Fossils of the largest dinosaur, *Seismosaurus*, was found in New Mexico.

- Dinosaur Counters - Classroom Pack—\$39.95
Set consists of 300 dinos in three species and five brilliant colors.

- Dino-Sorters—\$10.95
Tough plastic dinos in 12 different species, 96 in all.

- Dinosaur Reward Jar—\$19.95
192 colorful rubber dinos come in a see-through jar.

At Toys to Grow On, P.O. Box 17, Long Beach, CA 90801.
Customer Severice 1-800-874-4242

- Giant Vinyl Dinosaurs—\$29.50
Set of dinos; stegosaurus is 16 inches long.

- Dinosaurs Collection Box—\$16.95
40 durable dino from 5"-long dimetron to a 1½ pteranodon.

- Set contains 3 eggs with baby dinos inside.

- Carnegie Museum Dinosaur Collection—\$115.00
Authentic reproductions in solid vinyl. 11 dinosaurs and two humans, with fiberglass playscape (22" x 36") and 4 bags of sand.

- Set of figures only—\$75.00

- Dinosaur Mobile (all ages)—\$24.95
Three-dimensional mobile has five detailed animals on heavy tagboard. Portion of purchase goes to benefit wildlife and conservation.

California State Department of Education. (1988). *Environmental education guide*. Hayward, CA: Author.

This curriculum guide for kindergarten through sixth grade contains eight units. Each unit is organized around a theme and integrates content areas. Easy to follow, this guide contains evaluation activities for each lesson.

Charlesworth, R., & Lind, K. K. (1990). *Math & science for young children*. Albany, NY: Delmar Publishers.

This publication is designed for teacher inservice in early childhood education. It presents an organized and sequential approach to creating curriculum in mathematics and science that is developmentally appropriate for

young children. Three types of learning are emphasized: naturalistic, informal and structured.

Paulu, N., & Martin, M. (1991). *Helping your child learn science*. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

This a handbook for parents, in which they are encouraged to work on nine concepts: organization, cause and effect, systems, scale, models, change, structure and function, variation, and diversity. It includes specific activities parents can provide and/or facilitate.

Peña, S. C. (1991). *Había una vez, dinosaurios*. Houston, TX: University of Houston.

This is a unit on dinosaurs, using children's books in Spanish.

Poppe, C. A., & Van Matre, N. A. (1985). *Science learning centers for the primary grades*. West Nyack, NY: The Center for Applied Research in Education.

Techniques are given to help teachers effectively manage a learning center system. Descriptions of five science learning centers, with eight learning activities based on a particular science theme, are included.

Sandbeck, E. (1989). *Dinosaur: Cut and use stencils*. New York: Dover Publications.

This is a useful and comprehensive collection for arts and crafts projects in the classroom. Has 54 black-and-white stencil designs. Designs and illustrations for graphics and crafts applications may be used for free and without special permission, provided that no more than four in the same publication or project are included.

Warren, J. (1989). *Theme-a-saurus*. Everett, WA: Warren Publishing House.

This is a series of integrated teaching units containing a collection of activities. Developmentally appropriate, the ideas use only inexpensive, readily available materials.