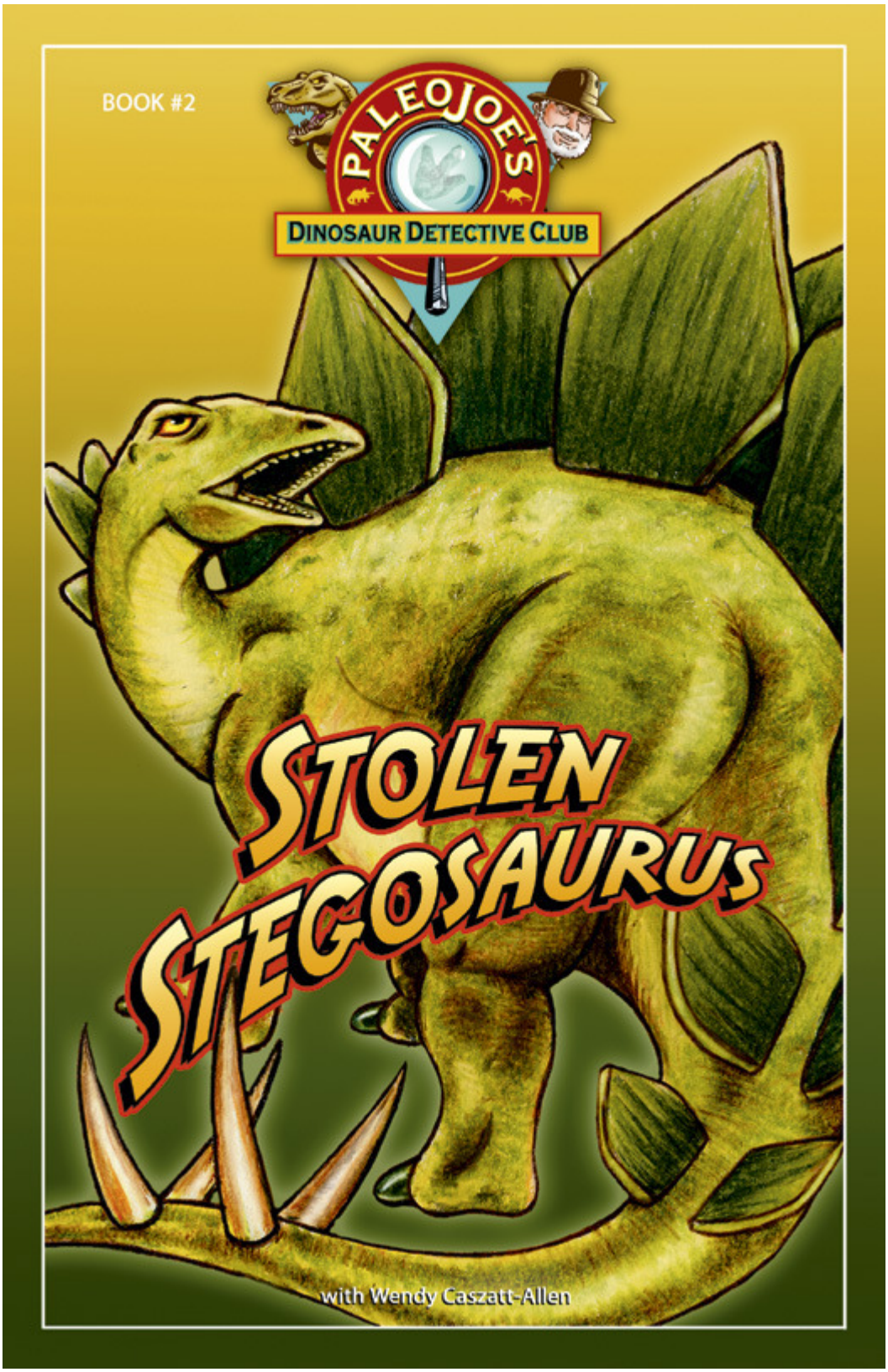

BOOK #2
PALEOJOE'S
DINOSAUR DETECTIVE CLUB
STOLEN STEGOSAURUS
with Wendy Caszatt-Allen

Activity: Dinosaur Concrete Poem

Summary: Students will learn about concrete poems by looking at examples, and they will create concrete poems about paleontology.

Materials: Examples of Concrete Poems from poetry books
Dinosaur Reference Cards (attached)

Grades 1-2 Procedure:

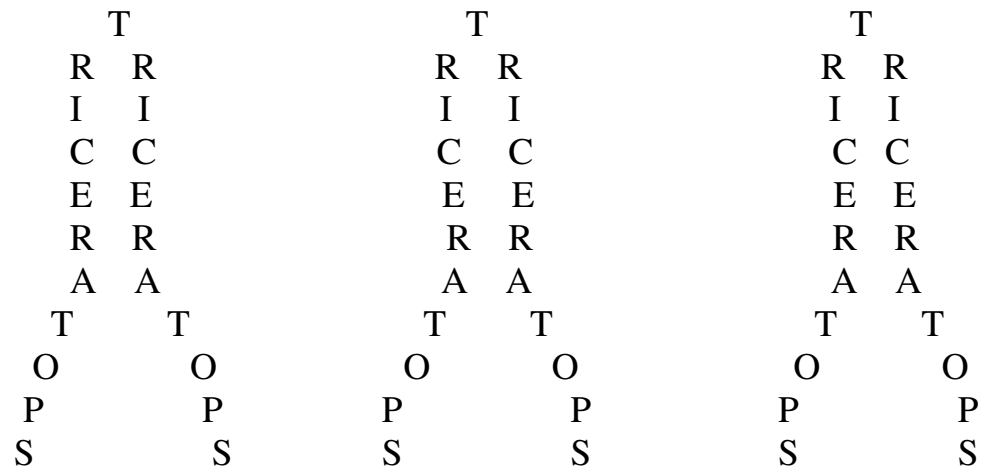
1. Students explore concrete poems from poetry books.
2. Ask, "What do all these poems have in common?"
   *Words shaped like a picture
3. Students use knowledge about dinosaurs to create concrete poems about types of dinosaurs.
   *Use Dinosaur Reference Cards for facts.
4. Share concrete poems.

Grades 3-6 Procedure:

1. Students explore concrete poems from poetry books.
2. Ask, "What do all these poems have in common?"
   *Words shaped like a picture
3. Students use knowledge about dinosaurs to create concrete poems about a type of dinosaur or something having to do with paleontology.
   *Use Dinosaur Reference Cards for facts
4. Share concrete poems.

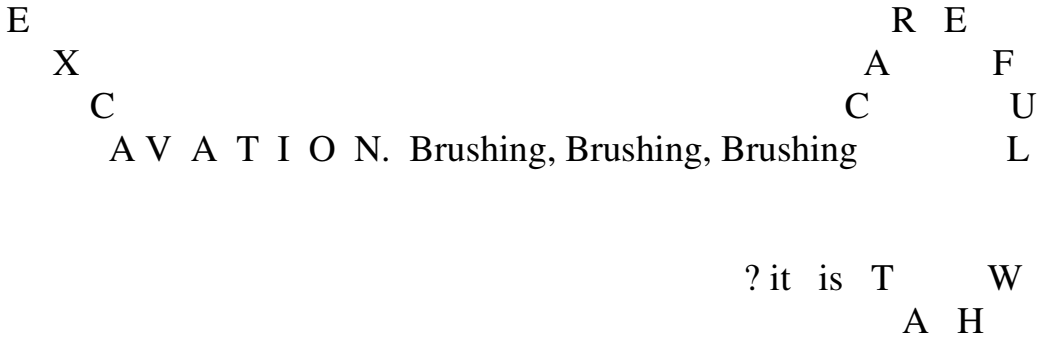
Concrete Poem Examples:

Grade 1-2 Dinosaur:



Eats vegetables. Uses three horns to protect himself from enemies.

Grade 3-6 Dinosaur or Paleontology



Activity: Name Your Own Dinosaur (Latin/Greek Root Study)

Summary: Students will explore the names of dinosaurs and create new creatures using Latin / Greek roots.

Materials: Dinosaur Reference Cards
Latin Root Pieces website (Grades 5-6 only)
Website: www.enchantedlearning.com/subjects/dinosaurs/allabout/Nameroots.shtml

Grade 3-4 Procedure:

1. Discuss 2-3 of the different dinosaur cards. Focus on why each dinosaur name makes sense.

   Example: brontosaurus "thunder-lizard"
   pterodactyl "winged-fingers"

2. Ask "What would happen if we combined qualities of each of these dinosaurs into one animal?
   -What would it look like?
   -What would you call it?
   (example: pterobrontodactyl)

3. Students draw a picture of and name "new" dinosaurs.

4. Students make reference cards for new dinosaurs.
   (See attached blank reference cards.)

5. Share.

Grade 5-6 Procedure:

1. Discuss 2-3 of the different dinosaur cards. Focus on how each dinosaur name fits with the Latin / Greek roots.
   -Use website to construct "new" dinosaurs.

2. Students create new dinosaurs (combining 2-3 known dinosaurs or making "new" dinosaurs out of Latin / Greek roots).

   Example of "new" dinosaur:
   Penta "five" + Ops "eyes" +Saurus "lizard"=Pentaopsaurus
   (A large lizard-like dinosaur with 5 eyes)

Activity: Real vs. Not-Real Theme Unit

Summary: Students will investigate the theme of "real vs. not real" things as it threads through *Secret Sabertooth.* Students will gather information while reading and periodically discuss findings with the whole class. Using gathered information, students will participate in guided discussions questions about the real vs. not-real theme.

Materials: Large Chart Paper
Black Notebooks (one for each student)
-Put together using attached pages.
-Surround each notebook with black construction paper
-Staple for each student.
Guided Discussion Questions: Real vs. Not-Real theme

Procedure for Grades 1-2:

1) Read Aloud *Secret Sabertooth* in stages (around 2 weeks).

2) While reading, students are detectives who find things that are real or not-real.

3) Teacher records findings on a class T-chart as students share.

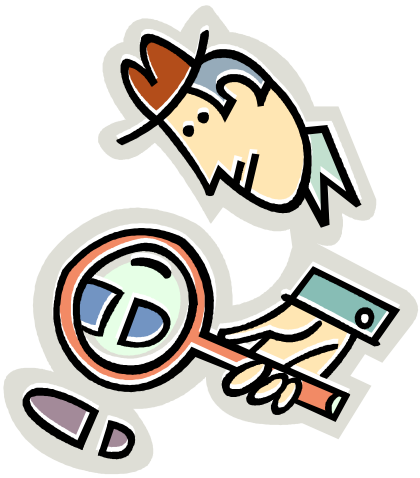
Procedure for Grades 3-6:

1) Students read *Secret Sabertooth* in stages, reading in novel groups or independently.

2) Students act as detectives who record things that are real or not-real in black notebooks as they read.

-Periodically assemble the real and not-real things on a class chart.

3) Ask "Guided Discussion Questions" (attached) to discuss class chart.



_____'s

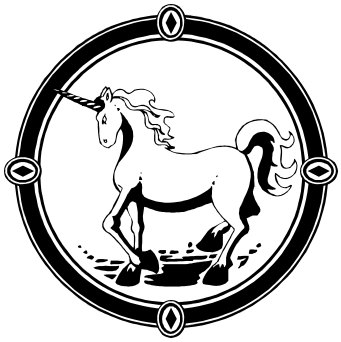
Black Notebook

Is It Real?

Or

Is It Not-Real?

Page	Things that Are Real:



Page	Things that Are Not-Real:

Activity: Risk-Taking Theme Unit

Summary: Students will read PaleoJoe book(s) while finding and analyze risks that the characters take.

Materials: Any Combination of *PaleoJoe* Series Books
Large Chart Paper
My Life Risks worksheet(attached)
Risk-Booklet for each student (attached)
Rewrite the Risk worksheet (attached)

Procedure for Grades 3-4:

4) **Day One:**
   Discuss what it means to take a risk. Students share examples of times when they have taken a risk. Record examples on chart paper.

5) **Day Two (and following):**
   Students read PaleoJoe book(s) and record risks that the characters are taking in their risk booklets.

6) **Culmination Activity** (when books / risk booklets finished):
   *Rewrite the Risk activity (attached)

Name_____

Date_____

My Life Risks

Directions: List as many risky actions that you can find from your life (past or present).

Risky Action	Did you choose to do it? YES	NO
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

PaleoJoe Risks Booklet

Risks I found in the book:

_____

Name_____

Book page #_____

Character(s):_____

Risky Action:

_____

_____

_____

Would you have taken this risk? (Circle one) YES NO

Why or why not?

_____

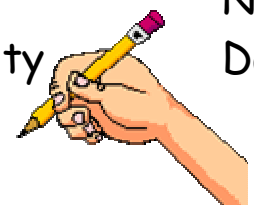
_____

_____

Did the character take the risk? (circle one) Yes No

Name_____

Culminating Activity
Rewrite the Risk



Date_____

Directions: Shelly and Dakota take many dangerous risks as young detectives. Luckily, their risks always seem to work out for them. Pick one of their dangerous risks, and think of a way they could have been good detectives while being safer. Rewrite that part of the story to include a less risky alternative.

Original Risk
Book Title _____
Character(s)_____
Risk_____
_____

New Risk:

_____

_____

_____

_____

_____

_____

_____

Activity: Risk-Taking (Pros and Cons) Theme Unit

Summary: Students will read PaleoJoe books(s) while finding and analyze risks that the characters take.

Materials:

My Life Risks (attached)
Risk-Booklet for each student (attached)
Rewrite the Risk (attached)

Procedure for Grades 5-6:

1) **Day One:**

-Discuss what it means to take a risk. Students share examples of times when they have taken a risk. Record examples on chart paper.

-Discuss reasons for or against taking a risk:
Ask, "What would be a "pro" argument for taking a risk?"
Ask, "What would be a "con" argument for taking a risk?"

-Students risks they have or have not taken
Students complete My Life Risks worksheet (attached).

2) **Day Two (and following):**

Students record risks that the characters take (or choose not to take) in their risk booklets while they read any of the *PaleoJoe* books.

3) **Culmination Activity** (when books / risk booklets finished):

*Rewrite the Risk Activity (attached).

Name_____

Date_____

My Life Risks

Directions: List as many risky actions that you can find from your life (past or present).

Risky Action	Did you choose to do it? YES	NO
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

*Pick one risky action to explain at least 2 pros and 2 cons that you might have been thinking when deciding whether to take the risk or not. (Write it on the back)

PaleoJoe Risks Booklet

Risks I found in the book:

_____

Name_____

Book page #_____

Character(s):_____

Risky Action:

_____

_____

_____

Pros for taking the risk:

_____

_____

Cons for not taking the risk:

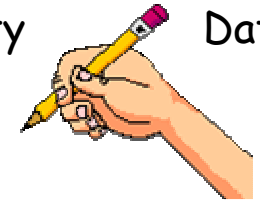
_____

_____

Did the character take the risk? (circle one) Yes No

Name_____

Culminating Activity
Rewrite the Risk



Date_____

Directions: Shelly and Dakota take many dangerous risks as young detectives. Luckily, their risks always seem to work out for them. Pick one of their dangerous risks, and think of a way they could have been good detectives while being safer. Rewrite that part of the story to include a less risky alternative.

<u>Original Risk</u>
Book Title _____
Character(s)_____
Risk_____
_____

<u>New Risk:</u>

_____

_____

_____

_____

_____

_____

_____

_____

_____

Activity: Dakota's Rules for Life

Summary: Students will identify and analyze Dakota's Rules for Life in *Stolen Stegosaurus*. Students will also formulate their own "Rules for Life."

Materials for Grades 1-2: List of Dakota's Rules (attached)
Materials for Grades 3-6: List of Dakota's Rules (attached)
Chart paper

Procedure for Grades 1-2:

1) Dakota creates rules for life in *Stolen Stegosaurus*. As students read new rules in the book, uncover them on the class chart.

2) Ask, "Do you agree or disagree with this rule?" when new rules are discovered.

Procedure for Grade 3-4:

1) As you read rules for life in *Stolen Stegosaurus,* record rules on a class chart.

2) When finished with the book, have the kids re-organize Dakota's list of rules so they are in order from "most important rule" to "least important rule."

3) Ask, "What rule did you decide was the "most important?"
"What rule did you decide was the "least important?"
"Why?"

4) Students create 2 new rules that they would have in their own notebooks.
-Make a class list of "new" rules on chart paper.

Procedure for Grades 5-6:

1) Before reading *Stolen Stegosaurus,* give students Dakota's list of rules.

   -Introduce Dakota as a new main character who makes up "Rules for Life" as a result of things that happen in the story.

2) Students pick one of the rules that they think is interesting.
   -Students predict what might happen in the story to make Dakota write that specific rule.

   -Students write mini-stories to fit predictions.
   -Share predictions

3) Students read *Stolen Stegosaurus* and record rules on a class chart.

4) When finished with the book, students reorganize Dakota's list of rules in order from "most important rule" to "least important rule."

5) Ask, "What rule did you decide was the "most important?"
   "What rule did you decide was the "least important?"
   "Why?"

6) Students create 2 new rules that they would have in their own notebooks.
   -Make a class list of "new" rules on chart paper.

Dakota's Rules for Life

Name_____

1. Never show you are concerned even when being stared at by giant men who look like pirates.

2. Always be polite, especially if you think you might be dealing with crazy people.

3. Don't ask questions around annoying know-it-all girls.

4. Never forget rule number three.

5. If you want something, use good manners to get it.

6. When you do something wrong, the best thing to do is own up to it. Excuses make you weak.

7. Always apologize for rudeness unless you are being rude on purpose to some baboon brain who is trying to clobber you for your lunch money.

8. Always insult your enemy.

9. Get off on the right foot with a girl by giving her some of her favorite candy bar.

10. When hanging with dudes who are bad to the bone, your seat belt can never be fastened too tight.

11. Don't volunteer to make yourself look stupid.

12. You should always pay attention to lectures even when you are being threatened by neanderthal types who smell like moldy shoes.

12. Try not to care so much.

13. Never trust your life to technology.

Activity: *Stolen Stegosaurus* Discussion Questions / Writing Prompts

Summary: Students will participate in guided discussions and write responsively to the text.

Discussion Questions / Writing Prompts for Grades 1-6:

Chapter 6- Dakota borrowed a trilobite fossil without asking PaleoJoe or Shelly.

- Is it okay to borrow something if you don't ask first?

Chapter 10- Shelly feels like she is going to get in trouble because she is with Dakota, the king of trouble.

- Is it fair to call Dakota "King of Trouble?"
- How do you think it makes Dakota feel to be called the "King of Trouble?"

- Have you every felt like you get in more trouble when you are around certain people?
- Was it because of them or you?

Chapter 15- Dakota did not take Shelly's pink tool roll, but Detective Franks thought he took it.

- Have you ever been accused of doing something you did not do?
- How did it feel?
- How did you react?
- How was the situation resolved?

Chapter 22- Dakota risked his safety to go undercover, joining up with Buzzsaw and Chuck.

- Should Dakota have risked his safety like this?

Activity: Suspicious Behaviors Journal

Summary: Students will act as detectives to find and record suspicious behaviors from Chuck and Buzzsaw in *Stolen Stegosaurus*.

Materials for Grades 1-2: Chart paper
Materials for Grades 3-6: Suspicious Behaviors Journal Page

Procedure for Grades 1-2:

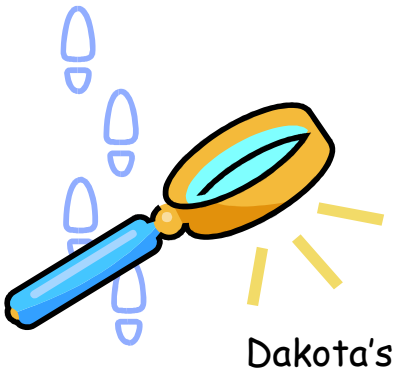
1) Read Aloud *Stolen Stegosaurus*.

2) Students act as detectives, looking for suspicious behaviors that Dakota sees from Chuck and Buzzsaw.

3) Record suspicious behaviors on a class chart.

Procedure for Grades 3-6:

7) As students read through *Stolen Stegosaurus*, students record suspicious behaviors that Dakota sees from Chuck and Buzzsaw.



Name_____

Date_____

Dakota's Observations of Suspicious Activities

Chapter	Suspicious Behaviors

Activity: Dakota Character Map

Summary: Students will map character traits of Dakota using paper or *Kidspiration* or *Inspiration Software*.

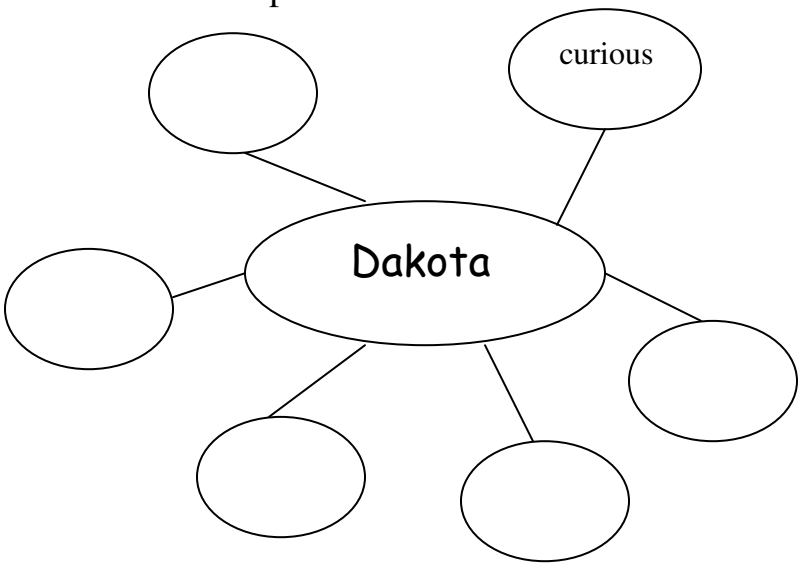
Materials for Grades 1-2: Chart paper or *Kidspiration Software.*

Materials for Grades 3-6: Chart paper and large construction paper
Inspiration Software (Electronic Mapping)

Procedure for Grades 1-2:

3) Read *Stolen Stegosaurus* aloud in stages. Describe the new main character, Dakota, as you read.

4) Create a class character map of Dakota.
-Start with his name in the middle.
Example:



Procedure for Grade 3-6:

1) Use large chart paper to make a character map of Harry Potter or another well-known fictional character (as an example).

2) Students create character maps of Dakota on large construction paper or *Kidspiration / Inspiration Software*.

Activity: Sifting for Treasures

Summary: Students act as paleontologists by sifting through sand to locate "fossils" and tallying their findings.

Materials: sieves and/or screens; sandbox or tubs with sand; very small treasures (beads, jewels, pebbles, sprinkles); cups; spoons; creative names for the treasures (example: wood bead= vertebrate; sprinkles=toe bones)

Procedure:

1) In Stolen Stegosaurus the team needs to sift through all the dirt they dig in order to make sure that no fossils are lost. Even the smallest fossil is a treasure that provides information to paleontologists. What types of fossils would show up after the dirt has been sifted? Do you think they are important? Can't you just pick out the fossils with your hands?
2) Students receive a screen, cup, and spoon. They take a cup of the sand mixture and run it through the screen (make sure it is over the tub!). Are any treasures left behind? Were any not visible until you sifted? Give more time for sifting.
3) Make a class tally list of each treasure found. Count by 5s in order to tabulate each. Which did we find the most of? Least? Why do you think so?

Activity: Plaster Casts

Summary: Students act as paleontologists by preparing plaster casts, transporting fossils, and later opening the casts.

Materials: bones (chicken bones can be obtained from a butcher—remove meat, boil, and let dry before use); paper towel; tin foil; burlap cut in strips; plaster powder; water; buckets; safety goggles; hammers; small picks

Procedures:

1) In Stolen Stegosaurus, the participants at the dig need to protect the fossils and eggs from a bad storm. They use the same procedure that is used for transporting fossils to a new location—it is similar to the old ways of casting a broken bone. How would students protect their findings? How do paleontologists? Why do think they go through such lengths for transporting? Would this procedure be easy or difficult?
2) Mix the plaster powder and water until a thick paste is formed. Distribute one bucket of the paste per group.
3) Have students select a bone that they will protect for transport. Students follow the correct sequence of the procedure: cover with wet paper towel, wrap in foil, soak burlap strips into plaster paste until soggy, wipe off excess paste and wrap around tin foil layer. Let dry overnight.
4) Decide as a class where bones will be transported. Put into a storage bin and take the walk (maybe to the art room). Bumps and near drops can happen along the way!
5) Students then use a small hammer and pick to crack the plaster. Remove plaster and various layers—check to see if bones are intact.
6) Discuss success of their transport. What was difficult? What was easy? How did you feel upon breaking open the bone?

Activity: Sweet Dig

Summary: Students simulate a dig by carefully removing whole ingredients from a baked cookie and graphing their results.

Materials: baked bars or cookies loaded with "fossils" (M&Ms, Red Hots, shelled sunflower seeds, raisins, white chocolate chips, and other ingredients that will stay intact when baked); tweezers; toothpicks; other small digging tools; paper plates; set of edible cookies ready to go as the others will be destroyed.

Procedure:

1) In Stolen Stegosaurus the team goes on a dig in South Dakota. What does a fossil dig look like? What would the entire site look like? What types of tools are used at the dig? What does the soil look like? What are the challenges faced by paleontologists?
2) Students receive their sample (cookie) of the dig site to be excavated. Their goal is to get the fossil pieces out of the sample—hopefully in one piece. The surrounding rock (dough) may be destroyed in the process, but fossils should be kept intact.
3) Students carefully pick away at the rock (dough) surrounding their fossils. They make a pile of each type of fossil found within their dig.
4) Students make a graph showing the number of teach type of fossil found. Which fossil did you find the most of? Which was the least? What was the hardest fossil to excavate? Why do you think so?

Activity: About 300,000,000 Years Ago Name_____
Place Value to the Billions Place

In Stolen Stegosaurus, Dakota finds out that the trilobites lived 300,000,000 years ago. He understands 30 years ago, but he has a hard time getting his head around this bigger number.

Look at the number below—it is about 300,000,000. Read it out loud.

317,462,958

1. Write the number in **expanded** form._____

_____

2. Write the number in **word** form._____

_____

_____

_____

3. Tell the place value of the 4. _____

4. Tell the number in the ten millions place._____

5. Tell the number that is 2,000,000 more. _____

6. How many 30s are in 300,000,000? _____

7. The Earth is an amazing 4.5 billion years old. Write that number in standard form. _____

8. Write a number that would round to 4.5 billion. _____

Activity: Amazing Eggs

Summary: Students investigate components and sizes of dinosaur, reptile, and bird eggs through researching and creating accurage models.

Materials: research materials for bird, reptile, and dinosaur eggs; oval balloons; flour; water; newspaper; paint; permanent marker; gram weights; measuring tape; rulers; balance or scale; wheat paste (flour and water to thickness of pancake batter); buckets.

Procedure:

1) In Stolen Stegosaurus, Shelly is thrilled when she finds not only stegosaurus egg fragments, but a whole fossilized egg. Draw the cross-section of a dinosaur egg including the following parts: chorion, yolk sac, amniotic fluid, albumen, allantois, eggshell. Discuss the function of each in the development of the dinosaur. Crack open a chicken egg and search for those same parts.
2) How big do you think a stegosaurus egg would be compared to the chicken egg? Provide dimensions and sketch circumference and length of each on the board (model measuring on the chicken egg).
3) Have groups of two students research the size of various large bird, large reptile, and dinosaur eggs. Each partner selects one animal for they will make an egg model which. Make sure a variety of sizes are selected. They should record the circumference, length, and mass (if available) for their egg as this will be needed to make the model.
4) After researching, students need to blow up a balloon to match the circumference of their egg. They should also double check the length.
5) Have one large bowl with wheat paste for each table/group of children. Distribute newspaper and demonstrate how to tear long narrow 1-2 inch strips of newspaper. Let the students tear up a pile of newspaper for their paper mache.
6) Students then dip the strips of newspaper in the paste and wrap them around the balloon to cover with several layers. Let dry.
7) Upon drying, students paint the egg (using correct color if known—otherwise, deduce a logical color for the egg). They record the name of the animal, circumference, length, and mass of egg either on a card or on the actual egg with permanent marker. Older students can try to match the mass of their egg model to the actual mass by filling in the hollow paper-mache structure with gram weights.
8) Order the eggs from smallest to largest and display.

Activity: Place Value Game

Summary: Students practice and compare place value from the hundreds place (gr. 1) to the billions place (gr. 6)**.**

Materials: small cards with numbers 0-9 (several sets per partner group); place value mat with number of places to match your particular grade level; cards with < and > .

Procedure:

1) Numbers are a major part of all of the PaleoJoe books. They represent the number of years, the amount of specimens, the amount of money, various sizes of prehistoric animals, and more.
2) Review place value up to the appropriate level of your students. Practice reading numbers, telling place values of numbers, comparing numbers, and writing numbers in expanded form.
3) Explain the Place Value Game by modeling the play of two students. Put a set of cards (multiple sets of 0-9) face down between two players. Players take turns picking a card and placing it on the place value mat. Once a card is laid, it is played and cannot be moved. When all place value spaces are filled in, students can read their numbers to each other, write their numbers in expanded form, record their numbers on a class chart, and/or use the < > signs between them.
4) There are many variations of the Place Value Game: making the highest number, making the lowest number, making the number closest to 500,000, allowing one trade at the end, etc.

Example Place Value Mat for up to 100,000s place.

Activity: Chasing Rainbows

Summary: Students deduce the color of a particular dinosaur, draw it, and surround it with a painted habitat.

Materials: crayons or pastels, watercolors, paper; reference books

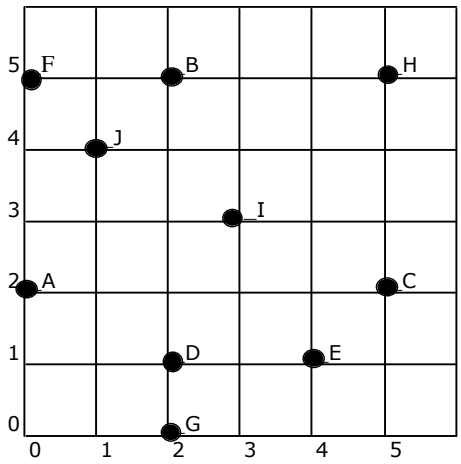
Procedure:

1) PaleoJoe and the Dinosaur Detectives know so much about dinosaurs even though they roamed the earth over 65 million years ago. What do paleontologists know about dinosaurs? No one has ever seen a dinosaur, so how do they know this information? What might they not know? What else would you like to know about the dinosaurs, if we could really see one?
2) Read Uneversaurus by Professor Potts to the class.
3) Discuss the different possibilities and the reasons that a dinosaur might have been a particular color.
4) Make a crayon or pastel drawing of a dinosaur in its habitat. Use your imagination and reasoning to create your picture. Embellish with watercolor. Bring your picture to life!
5) Share your picture with the class. Tell your dinosaur's name and why you chose the colors that you did.

Name _____

Coordinate Grids of Dig Site in South Dakota

PaleoJoe has located ten specimens at the dig site in South Dakota. In order to remember their locations, he plotted them on this coordinate grid. Use ordered pairs to help locate the fossils.



Write the ordered pair for each fossil.

1. **A** _____
2. **B** _____
3. **C** _____
4. **D** _____
5. **E** _____

Write the letter name located at each ordered pair.

6. **(2, 0)** _____
7. **(3, 3)** _____
8. **(1, 4)** _____
9. **(0, 5)** _____
10. **(5, 5)** _____

11. Are (0, 5) and (5, 0) the same location? Explain. _____
_____

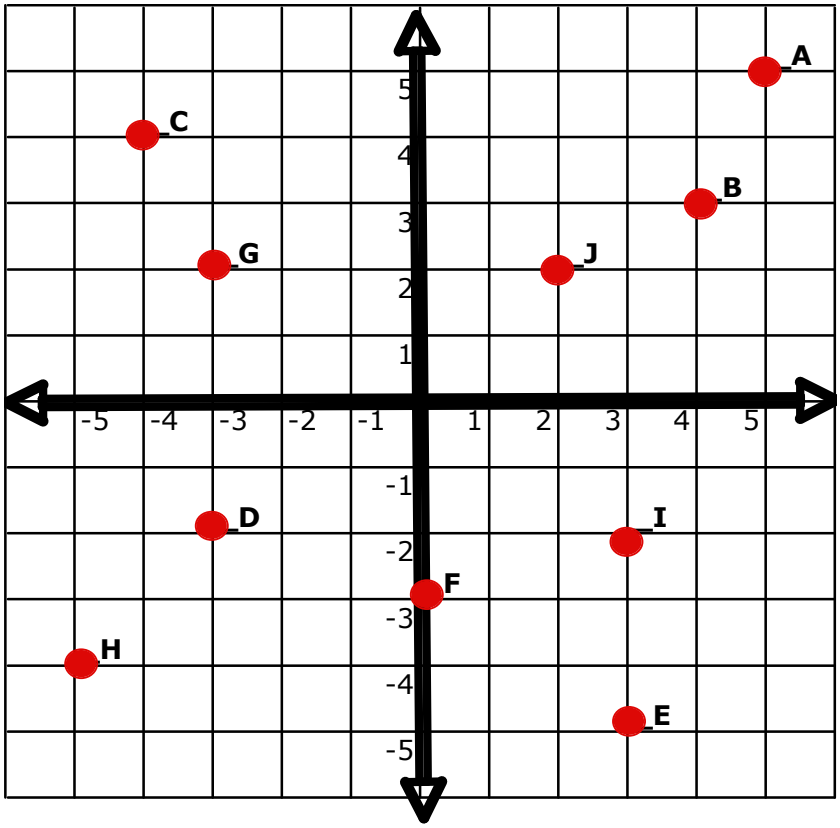
12. To find "J" from (0,0), how many spaces to you move up? _____

13. Which fossil is 2 places to the right of (0, 5)? _____

Name _____

Coordinate Plane of Dig Site in South Dakota

PaleoJoe has located ten specimens at the dig site in South Dakota. In order to remember their locations, he plotted them on this coordinate plane. Use ordered pairs to help locate the fossils.



Write the ordered pair for each fossil.

1. **A** _____ 2. **B** _____

3. **C** _____ 4. **D** _____

5. **E** _____

Write the letter name located at each ordered pair.

6. **(2, 2)** _____ 7. **(-5, -4)** _____

8. **(0, -3)** _____ 9. **(-3, 2)** _____

10. **(3, -2)** _____

11. Plot the following on the coordinate plane: K (-1, 3) and L (3, 0).

Activity: Arguing Dinosaurs

Summary: After researching the five best traits of a particular dinosaur, students take on a dinosaur's persona and debate (either in verbal or written form) which is the best dinosaur.

Materials Gr. 1-4: dinosaur profiles (tracing patterns) with the jaw area cut into a separate piece (it will be able to move up and down when speaking); brads; glue sticks; cardstock; markers; popsicle sticks; tape; paper with conversation bubbles and/or cartoon format; reference materials

Materials Gr. 3-6: reference materials

Procedure Gr. 1-4:

1) Dakota and Shelly are constantly arguing over who is the best in regards to knowledge, speed, and ideas. If dinosaurs could talk, would they argue? Is one better than another?
2) Students select a dinosaur (don't have more than two of the same within a class). Each student researches his/her dinosaur looking for these characteristics: type of eater, talents, intelligence, movement, adaptability, reproduction, size, and special abilities.
3) Students then create a "Five Best Traits" list based on their research.
4) Students trace their dinosaur profile and cut it out—separate the lower jaw and reattach with a brad. Students can make teeth, color and add details.
5) Pair the students for the mini-debates. Each debate can begin with, "I am far superior to you because. . ." Students move the mouth of the dinosaur head and mimic the voice of their dinosaur as they debate back and forth. Students should "stick to the script" by referring to their Five Best Traits list. Change partners as many times as the teacher chooses or pairs can perform with the rest of the class as an audience.
6) As a post-activity students can write a conversation between two arguing dinosaurs in a word bubble or cartoon format.

Procedure Gr. 3-6:

1) Dakota and Shelly are constantly arguing over who is the best in regards to knowledge, speed, and ideas. If dinosaurs could talk, would they argue? Is one better than another?

2) Students select a dinosaur (don't have more than two of the same within a class). Each student researches his/her dinosaur looking for these characteristics: type of eater, talents, intelligence, movement, adaptability, reproduction, size, and special abilities.
5) Students then create a "Five Best Traits" list based on their research.
6) Pair the students for the mini-debates. Each debate can begin with, "I am far superior to you because. . ." Students mimic the gestures and voice of their dinosaur as they debate back and forth. Students should "stick to the script" by referring to their Best Five Traits list. Change partners as many times as the teacher chooses or pairs can perform with the rest of the class as an audience.
7) In conjunction with the oral debate, students can write a dialogue using quotation marks, indentation and proper punctuation. Students may also enjoy using a cartoon format for the written portion.

Activity: Point Me in the Right Direction

Summary: Students practice using a base plate (orienteering) compass correctly to follow a simple course using the bearings and distances given.

Materials: Large grassy area; a bone or similar small flat object not easily seen from a distance; hand-held compass (orienteering compass)

Procedure:

In Stolen Stegosaurus, the Dinosaur Detectives discuss fossils orientating themselves to the path of least resistance. Paleontologists use orienteering when describing the fossils' locations in the dig site. Define orienteering—when would we use this skill? How about today? Provide as much background as needed (see site at the end of the activity for more information).

Give the students these directions:

1. Place the bone on the ground at your feet. Set the compass at 60° and turn your body to face this bearing. Walk 10 paces forward along this bearing and stop. It is important to keep your paces regular in size.

2. Now add 120° to your present bearing so that the compass reads 180° on the dial. Turn your body to face this bearing and walk another 10 paces in the new direction. Stop.

3. Again add 120° to your last bearing so that the compass dial now reads 300°. Walk 10 paces at this new bearing.

You have now walked in a triangle and if you have been really accurate the bone will be at your feet when you completed the last leg...is it?

Tell your students that if they didn't do too well, pick up the bone, try again and remember your paces should be regular and in a straight line along the bearings. Check to see that you are reading the bearings on the compass dial correctly and that you are using the compass correctly.

Notes for the teacher:

This exercise is excellent for determining whether students understand how to use the compass to follow directions. If they don't do it correctly they won't end up back at the bone, or even near it.

It requires little preparation and is really effective. You will soon see that students are turning the compass to the bearing instead of turning their whole body to face the direction of the compass bearing.

The other interesting thing that puzzles students is that they used 60°, plus 120°, plus 120° which adds up to 300°. Why not a full 360° to get back to where they started from? Why not only 180° because they walked in a triangle?

To answer these sorts of questions it is useful for students to draw a scale diagram of the course they followed and then look at the angle relationships. It will help them to visualize and understand the bearings they took.

*For instructions on how to use a compass and for more orienteering information and exercises go to the website www.learn-orienteering.org/old/

*This lesson was adapted from Kjetil Kjernsmo's lesson plans. More are available on the above website.

Activity: Digging For Bones!

Summary: Students will simulate a dinosaur dig by using a coordinate grid layout, carefully digging with scientific equipment, and recording their observations and positions of fossil finds. Students then classify bone types found and reassemble the skeleton(s).

Materials: Whole boiled turkey carcass bones or other skeleton or commercial dinosaur skeletons*; sandbox or dig site; small brushes; dig tools; string/rope for grids; square paper on clipboards; pencils; compasses; water bottles; sunscreen; hats. *www.dinosaurdiscovery.com/dinosaur-kits.html- dinosaur skeleton kits are available for purchase

Procedure:

**Prior to the activity, use string/rope to lay out a grid that will accommodate your class size (4 x 5 or 5 x 5) in a dig site (sandbox). Hide the bones so there is an equal amount of "fossils" in each square.

1) In Stolen Stegosaurus, Shelly was so excited to go on her first dig. What does a dig site look like? What is the goal of the dig? What tools do paleontologists have in their tool rolls? What is the pace of a dig? Besides tools, what else should scientists think about bringing?

2) Each student will receive coordinates indicating their square for the dig—for example (3, 5) would mean third column, fifth square up. To better the pace and carefulness at the dig, possibly allow students to only use one hand to dig or brush with—this may help prevent disturbing the location or condition of the find.

3) Upon discovery of a bone, students should note and sketch the location, orientation and/or position, and other observations of the bone on their square paper. Remind students to draw the location and position of the find as they found it in their square.

4) Upon completion of the dig, arrange the student paper squares according to their position on the grid at the dig site—this can be hung up or placed on the floor. Analyze any patterns, interesting discoveries, surprises observed.

5) In Raptor's Revenge, Bob had the difficult job of reassembling the Utahraptor fossils back into a skeleton prior to the exhibit opening. The next big challenge for the students will be to reassemble their bones back into the skeleton(s)—bones will be laid out flat, but in the correct order. Having skeleton diagrams will help students identify their type of bones and the location they belong.

6) Discuss the challenges and successes of a dinosaur dig. What do digs reveal about the history of the earth?

Web Sites for Paleontology Curriculum
2007-2008

Book 2 - Stolen Stegosaurus

Paleo Joe Home Page: http://www.paleojoe.com/

National Parks Service Badlands:
http://www.nps.gov/badl/

- Has frequently asked questions about fossils, excavations.
- Download a Badlands Visitor Guide.
- Has a webcam.

Black Hills Institute: http://www.bhigr.com/

- Involved in many paleontology excavations.
- Has links to eight Tyrannosaurus rex skeletons - Sue, Stan, Bucky, Duffy, Wyrex.

Dinosaurs at the Black Hills Institute:
http://www.wmnh.com/wmbhi000.htm

- Gives a "Resume" of Sue.

Current Digs: http://www.dinoruss.com/dig.html

Dinosaur Digs You Can Join:
http://www.dinoruss.com/dinodigs.html

Laws Protecting Fossils:
http://www.blm.gov/heritage/fossils_laws.htm

- Federal Land Policy and Management Act 1976
- National Environmental Policy Act 1969
- Paleontology Permits

Journal With Links:
http://www.dinosauria.com/jdp/jdp.htm

- Archaeopteryz, Ancient Birds, and Dinosaur-Bird Relationships.
- Dinosauria.
- Dromaeosaurids.
- Fossilization.

- Impact Theories and Extinction Events.
- Legal Issues.
- News and New Discoveries
- Miscellaneous

Activity: History of the Earth in Inches

Summary: Students conceptualize and measure the age of the earth and major earth events by using a much smaller scale.

Materials Gr. 1-2: master sheet, string with timeline markings, cards with name of each earth event, markers
Materials Gr. 3-6: master sheet, 38 ft. string for each group, permanent marker, small cards for writing earth events, tape, measuring tape, yardstick, rulers

Procedure Gr. 1-2:

1) How old are you? How old am I? How old is your grandparent? How old is the earth? Show what 4.5 billion looks like as a number. What does that mean? If the earth is that old, how long ago did the dinosaurs live? Show 200,000,000 years ago. It's hard to understand these numbers—let's look at the history of the earth in a different way.
2) Provide each student with a card labeled with an earth event and its corresponding measurement. Have them draw a picture that represents his/her event on the card.
3) Lay the string in a large space. Each student sits or stands by the appropriate marking on the string when done. Call out the first event and measurement; the first student stands and shows his/her picture and place on the string. Repeat for the subsequent events/students.
4) Discuss the results. Where would your birthday fit on the string?

Procedure: Gr. 3-6:

1) How old are you? How old am I? How old is your grandparent? How old is the earth? Show what 4.5 billion looks like as a number. What does that mean? If that earth is that old, how long ago did the dinosaurs live? Show 200,000,000 years ago. It's hard to understand and compare the ages of things with these numbers—let's look at the history of the earth in a different.
2) Provide each group with the master sheet, 38 ft. string, permanent marker, cards, tape, and measuring equipment. They are to show a timeline of the history of the earth by measuring, marking, and taping a label on their string.
3) When groups are done, they lay their strings right next to each other and compare. Discuss the results. Do our histories match? What surprised you? Where would your birthday fit on the string?

LENGTH OF STRING FROM START **YEARS AGO** **EVENTS**

38 feet	4.5 billion	Earth begins
29 feet	3.5 billion	Life begins
25 feet	3 billion	First fossils form (algae, bacteria)
5 feet	600 million	Jellyfish, sponges and worms
4 feet	480 million	First primitive fish
40 inches	400 million	Earliest land plants
35 inches	350 million	Amphibians and early land animals
31 inches	310 million	First reptiles
27 inches	270 million	Reptiles rule
20 inches	200 million	Age of Dinosaurs begins
18 inches	180 million	Flowering plants
16 inches	160 million	Birds appear, dinosaurs abundant
7 inches	70 million	Modern birds develop
6.5 inches	65 million	Dinosaurs gone
5 inches	50 million	Birds and mammals
0.5 inches	5 million	First Humans
Thickness of a fingernail	10,000	Last Ice Age Over

Activity: Dinosaurs On the Move

Summary: Students investigate dinosaur physical features and movements in order to create a flipbook.

Materials: Paper pieces cut to 4" x 3" pencils; markers; scissors; staplers

Procedure:

1) Ask the students if they noticed a little secret on the pages of each Dinosaur Detective book. Each has its own flipbook showing the movement of a dinosaur involved in the story. Have students flip through to observe the movements.
2) Brainstorm the ways that dinosaurs moved. Have books available to research the physical features and movements of dinosaurs.
3) Cut white printer paper in 4 inches x 3 inches pieces for the pages of the book. Distribute twenty per student. What steps need to be taken to make a flipbook? Do you think numbering pages would be helpful on the back? What will give the best results?
4) Have the students choose a dinosaur and make a flipbook that demonstrates the dinosaur's movement. Make a cover with the name of the dinosaur and staple all of the pages.
5) Exchange books with other class members to see the different choices and how they move.

Activity: Mapping the Dinosaur Detectives

Summary: Students will locate on a U.S. map and describe the geography of the places the Dinosaur Detectives visit in each book. They will use cardinal and intermediate directions, estimate distances using the map scale, and calculate actual distances in miles to map their journeys.

Materials: U.S Wall Map, colored pushpins, colored yarn, reference book/atlas for mileage and geographical information

Procedures:

1) Prior to reading the Dinosaur Detective Club Series, mount a U.S. map on the wall so that the students will be able to locate the starting points and various destinations traveled to by the characters. Color code the yarn and push pins so that each color represents a different book. Make a legend of the colors and which book they represent. For example: Book 1- red yarn, red pushpin, red card with mileage.

2) As each book is read, map the travels of the characters by pinpointing locations and connecting them with yarn. Discuss which direction they went using cardinal and intermediate directions. Estimate the distance using the map scale. Calculate the mileage between locations and tally for the various books.

3) Discuss the geography of the place they visit. What is the climate there? What is the topography? Is there a time change? How long did it take them to get there? How many students have been to these locations?

Activity: Majestic Models

Summary: Students research historical information, physical characteristics, and habits of dinosaurs in order to make a dinosaur museum exhibit.

Materials: clay (art clay, that can be fired and glazed); glaze; clay tools; dinosaur books for reference; kiln; boxes; paint; items for habitats; exhibit cards

Procedure:

1) What is a model? Show a globe, toy car, plastic bug, etc. How are these models the same as the items they represent? How are they different?
2) Have students think about the physical characteristics of dinosaurs. How would they feel? What textures would be on some dinosaurs and not others? What were some unique features they could have? What features need to be included on a model?
3) Have students peruse the dinosaur books. Each student chooses a different kind of dinosaur to make out of clay.
4) Distribute clay blocks to use for each student. Model different pinching techniques that could be used to make the plates, mouth, spikes, etc.
4) Fire. Glaze and fire again.
5) Upon completion, create a classroom museum with mini-dinosaur exhibits. Using a display box of your choosing, students create the habitat for their specific dinosaur. Exhibit cards including the name of the dinosaur, habitat, period it lived, diet and other interesting facts could be displayed on each box.
6) Invite other classes and parents to parade through to view the exhibit.

Activity: Edible Rock Layers

Summary: Students describe how sedimentary rocks are used to understand the history of the earth. They act as scientists as they observe, sketch, and describe properties of edible rocks and match their sample to a scientist's description.

Materials: sedimentary rock samples; Three Musketeers, Milky Way, Kit Kat, and Twix candy bars—all cut in 1x1 inch squares; descriptions of rock samples; small paper plates; paper, pencil

Procedure:

1) Cut up small squares of the candy samples and arrange at a distribution sight. Ask the students to pick out one small sample, place it on a paper plate, and take it back to their seats. Students should select different samples.

2) When reading the Dinosaur Detective Club Series books, discuss how the layers of rock and fossil locations tell a story. Explain that geologists look at rock samples very closely to determine their composition and age. The layers and features found in sedimentary rocks show the history of the earth—animals living at a particular time, changes in the ocean levels, catastrophic events. Show samples of sedimentary rock. Geologists and paleontologists use detailed sketches and descriptive language to describe rock samples because they truly tell the story of the earth.

3) Tell students that they have a slice of sedimentary rock taken from the earth. Students are to make a detailed sketch of their rock sample. They also need to write and describe in detail their rock sample so that another scientist would be able to pick the sample out of a group.

4) In groups of 4-6, students mix up their descriptions and rock samples. Rotate groups so that a new set up students now must match the other student descriptions with the samples. Switch back and determine the success.

5) Read the four given descriptions of the rock samples (page 2) out loud and distribute copies of them. Have the students select the description that they feel matches their rock sample.

6) Reveal the identities. Hand out the left over samples!

Teacher Notes:

1. Three Musketeers
2. Milky Way
3. Kit Kat
4. Twix

Sample 1

Sample has a similarly colored light brown interior with a few small tiny holes. The exterior looks like a fairly regular, dark brown blended crust with some patterning.

Sample 2

Outside: Thin medium brown layer with wavy ripple marks on the bottom

Inside: **Bottom**- dense dark buff layer

Top- shiny, smooth, medium tan layer

Sample 3

Four segments of layered material.

Outside: Thin medium brown

Inside: Alternating light and medium colored material

Sample 4

Outside: Thin medium layer with wavy ripples on the bottom

Inside: **Bottom**- poorly consolidated light tan porous layer

Top- shiny smooth medium tan layer

Activity: Earth: This is Your Life

Summary: Students describe the changes in the history of the earth throughout its 4.5 billion years by constructing an illustrated, informational timeline and role-playing an organism or feature from the past.

Materials: reference books or computer resources; paper; colored pencils; tape; microphone; clip from "This is Your Life" (www.tv.com)

Procedure:

1) In talking about the lifetime of a person, how would you divide his/her life into parts? By the decade—their twenties, thirties? By major events in their life—graduations, marriage, children, travels, retirement? When dealing with the earth's lifetime, it gets a little more complicated. How do scientists divide up such a massive amount of time—4.5 billion years?
2) Provide students with some background regarding the three eras, their division into periods, and how scientists determined this timeframe. What makes us move to a new era or period in the life of Earth?
3) Have partners select a period in the history of the earth (draw from a hat). Each group is responsible for researching and depicting the years, vegetation, climate, plant and animal life, position of continents, and evolutionary stages present during their period.
4) Students connect the periods in sequential order in a colorful timeline to be displayed in the room.
5) In order to share the information, present "Earth: This is Your Life." Show a clip from a show to see the format. Each partner group acts as a living thing or feature present during their particular period. They come out and remind the earth about their qualities and what the earth was like during that period. Earth remembers each flash from the past!

Activity: Geometric Dinos

Summary: Students identify geometric shapes and solids alone and within another shape (a dinosaur!). They then use their geometric properties to create their own dinosaur.

Materials: geometric shapes and solids for modeling; cut-outs of geometric shapes and solids; construction paper; gluestick; dinosaur books

Procedure:

*For students who haven't read Raptor's Revenge, proceed to reviewing geometric shapes and solids step.

1) In Raptor's Revenge, Shelly and Dakota saw petroglyphs on the walls of Calamity Canyon. These etchings (most likely done eight hundred years ago by the Fremont Indians) used geometric shapes (trapezoids, squares, circles) to depict human figures and actions.
2) Read the passage on p. 137. What is a trapezoid? What would it look like with a square on top? Possibly a head and body? Review geometric shapes with students including the following: rectangle, square, oval, circle, trapezoid, rhombus, triangle, pentagon, hexagon, and octagon. Expanding the lesson to geometric solids such as cone, pyramid, cylinder, sphere, cube, and rectangular prism would also be beneficial.
3) Show some pictures of dinosaurs. Do you see any geometric shapes (or solids) in their features? What part of the dinosaur is similar to a triangle? A rectangle? An oval? A cone? A cylinder?
4) Using various size cut-outs of geometric shapes and solids, students will design their geometric dinosaur. Provide students with dinosaur books to give them ideas, but tell them to be creative in their placement of shapes. Students should use a variety of shapes and solids; there is no limit on the number of each used.
5) Students can name and display their geometric creations. Sharing their geometric features is a good review for all.

Annotated Bibliography for Dinosaur Detective Series

Fradin, Dennis B. With a little luck : surprising stories of amazing discoveries. Dutton Children's Books, c2006.
This easily accessible book for middle grades includes a chapter on Mary Anning, the princess of paleontology.

Harrison, David L. Cave detectives : unraveling the mystery of an Ice Age cave. Chronicle Books, c2007.
With plenty of color pictures and interesting text for middle grade readers, this book explores a cave and the bones found in it.

Larson, Peter L. Bones rock! : everything you need to know to be a paleontologist. Invisible Cities Press, c2004.
Young readers will learn how to dig for fossils, clean them, keep records, and develop and test theories. Also included are descriptions of projects from the authors' experience, including the excavation of Sue, the Tyrannosaurus Rex.

Marrin, Albert. Secrets from the rocks : dinosaur hunting with Roy Chapman Andrews. Dutton Children's Books, c2002.
Roy Chapman Andrews adventures in the Gobi Desert in Mongolia are talked about in Book 2 of PaleoJoe. This book adds more information that students want on this intriguing expedition.

Kelsey, Elin. Canadian dinosaurs. Maple Tree Press ;, c2003.
Using photos and illustrations along with a rich text, this book focuses on the dinosaurs found in Canada

Kerley, Barbara. The dinosaurs of Waterhouse Hawkins. Scholastic, 2000.
Victorian artist Benjamin Waterhouse Hawkins built life-sized models of dinosaurs as he tried to tell the world about these amazing animals. The lush illustrations and interesting and unique details will appeal to all ages.

Potts, Professor. Uneversaurus. David Fickling Books, c2006.
With humor and enthusiasm, this book offers the reader the chance to speculate on one thing we will never know about dinosaurs—what color they were.

Arnold, Caroline. Dinosaurs with feathers : the ancestors of modern birds. Clarion Books, c2001.
While we think of most dinosaurs as reptilian, this book, with colorful illustrations, offers a discussion of why scientists now believe that there were dinosaurs with feathers.

Aliki. Wild and woolly mammoths. HarperCollins, c1996.
As in all books by Aliki, a simple text and many illustrations are offered to describe the woolly mammoth.

Mash, Robert, 1939-. How to keep dinosaurs. Weidenfeld & Nicolson, 2003.
For a little humor, especially for older readers, take a look at his guide to the care and feeding of the dinosaur that you might decide to keep for a pet.

Fleischman, Paul. Time train. HarperCollinsPublishers, c1991.
This is something of a classic, in no small part because of its intriguing and enticing illustrations, as it tells the story of a class that travels back to the time of the dinosaurs.

Rohmann, Eric. Time flies. Crown, c1994. Without a single written word, this story uses vibrant illustrations to follow a bird into the museum of natural history where the dinosaurs seem to come alive.

Yolen, Jane. How do dinosaurs say good night? Blue Sky Press, c2000.
There are now several in this series of anthropomorphized dinosaurs setting a good example for picture book readers.

Alphin, Elaine Marie. Dinosaur hunter. HarperCollins, c2003.
This easy reader is set in Wyoming in the 1880s where a young boy finds a dinosaur skeleton on his father's ranch.

Hoff, Syd, Danny and the dinosaur. Harper & Row, c1958.
This is the classic early reader about dinosaurs—a tale of friendship that continues to delight youngsters after all these years.

McLeod, Kate, Outback adventure. DK Pub., 2004.
James and his family find dinosaur footprints as they explore Australia..

Butterworth, Oliver. The enormous egg. Boston : Little Brown, 1956.
This story of a boy and an egg that hatches a dinosaur has become a classic.

Conrad, Pam. My Daniel. Harper & Row, c1989.
A grandmother tells stories of her brother's historical quest for dinosaur bones on their Nebraska farm.

Dickinson, Peter, A bone from a dry sea. Delacorte Press, 1993.
Upper elementary and middle school students love these two parallel stories. A woman of a prehistoric group works to advance her people, and the daughter of a paleontologist is there when important fossil remains are discovered on a dig in Africa.

Richler, Mordecai, Jacob Two-Two and the dinosaur. Knopf :, c1987.
Jacob runs away with him to British Columbia when the lizard, now identified as a Diplodocus, frightens the adults around him. Jacob Two-Two is an appealing and humorous young boy who appeals to early to mid-grade readers.

General Websites for Paleontology and Dinosaurs

Emerson School
2006-2007

The Paleontology Portal: http://www.paleoportal.org/

Strange Science: http://www.strangescience.net/

American Museum of Natural History: Division of Paleontology: http://paleo.amnh.org/

National Geographic News:
http://news.nationalgeographic.com/news/archaeology.html

University of California Museum of Paleontology:
http://www.ucmp.berkeley.edu/

Great Websites for Kids – Dinosaurs:
http://www.ala.org./gwstemplate.cfm?section=greatwebsites&template=/cfapps/gws/displaysection.cfm&sec=2

Children's Museum – Dinosphere:
http://www.childrensmuseum.org/dinosphere/index.html

Classroom Clipart – Dinosaurs:
http://classroomclipart.com/cgi-bin/kids/imageFolio.cgi?direct=Dinosaurs

Understanding Evolution for Teachers:
http://evolution.berkeley.edu/evosite/evohome.html