

**Fossils**  
 Science  
 Standard  
 I  
 Objective  
 2  
 Connections

<b>Standard IV</b>
Students will understand how fossils are formed, where they may be found in Utah, and how they can be used to make inferences.
<b>Objective 2:</b>
Explain how fossils can be used to make inferences about past life, climate, geology, and environments.
<b>Intended Learning Outcomes:</b>
1. Use Science Process and Thinking Skills 4. Communicate Effectively Using Science Language and Reasoning
<b>Content Connections:</b>
Math: Use Patterns and Symbols, Attributes-Units-Measure, Language arts: Writing directions, inferring, writing poetry, Art: Using different media, drawing from life, Social Studies: Using maps of Utah, introducing Utah counties

**Background Information**

Understanding how the pieces of the fossil puzzle fit together allows the paleontologist to imagine Earth as it was millions of years ago. Fossils are the recognizable remains, such as bones, shells or leaves or other evidenced, such as tracks, burrows, or impressions, of past life on Earth. Scientists who study fossils are called paleontologists. Remember that paleo means ancient, so a paleontologist studies ancient forms of life.

Fossils are fundamental to the geologic time scale. The names of most of the eons and eras end in zoic, which refers to animal life, because these time intervals are generally recognized based on animal life. Rocks formed during the Proterozoic Eon may have fossils of relative simple organisms, such as bacteria, algae, and wormlike animals. Rocks formed during the Phanerozoic Eon may have fossils of complex animals and plants such as dinosaurs, mammals, and trees.

Note: paleo means ancient, meso means middle and ceno means recent so we have Paleozoic, Mesozoic and Cenozoic Eras.

**Research Basis**

-- Linda Williams, Teaching for the Two-Sided Mind

Children come to school as integrated people with thoughts and feelings, words and pictures, ideas and fantasies. They are intensely curious about the world. They are scientists, artists, musicians, historians, dancers and runners, tellers of stories, and

**Materials**

- Pencils with erasers
- Blue, Green, and Yellow Colored Pencils
- Stopwatch
- Blank Fossil Grid
- Fossil Grid Answer Key
- Fossil Line Drawings
- Environment Markings
- Two Maps of Utah with counties
- Utah Fossil Information sheet



mathematicians. The challenge we face as teachers is to use the wealth they bring us. They come with a two-sided mind. We must encourage them to use it, to develop both types of thinking so that they have access to the fullest possible range of mental abilities.

- - Seymour Sarason, *Parental Involvement and the Political Principle: Developing a culture of high standards for all*

To learn because you have to is one thing; to learn because you want to is quite another thing. And that is the overarching criterion: school is a place a very young child enters with awe, curiosities, expectations, questions, and the desire to feel competent and recognized, and that young child should have those personal characteristics when he or she finishes formal schooling. For those characteristics to be extinguished, to go underground, to get expressed primarily in fantasy is to impoverish a lifetime. When a child has graduated from high school and that child is motivated to learn more about self and world, then, schooling has achieved its overarching purpose.

## Invitation to Learn

Understanding how the pieces of the fossil puzzle come together helps the paleontologist to imagine the earth as it was millions of years ago. Tell the students they are going to be a paleontologist for this activity. As paleontologists they have found an abundance of fossil remains and they need to figure out the environment where the fossils would have existed. Based on the fossils they have found, they will draw a map showing the environments present in a certain area more than 70 million years ago. This activity will use drawings of fossils. If you have access to actual Utah fossils and are comfortable using them do so.

## Instructional Procedures

1. Students will begin the lesson in their regular seats. At specified intervals, (one and half to two minutes) they will move to another seat in a pre-selected sequence determined by the teacher. This will be repeated until they have had a chance to be in every seat.
2. Have students stand at the back of the room with pencil and paper.
3. Place one of the fossil pictures on 25 to 30 desks depending on number of students.

4. Tell the students there is a card on each desk with a fossil drawn on it and a number. It is face down, and they are not to turn them over until asked to do so. When asked to go to their seats, they are to go to their regular seat but not to touch the card in front of them.
5. Students return to their seats.
6. When they have moved to their regular seats, give them each a copy of the blank grid. Have them fill in their name and the date.
7. Explain the grid. Show figure one on an overhead.
8. Ask students to turn over the card in front of them and tell them each space has a number and each card has a number. Find the space on your grid that has the number to match the card. In that space, draw the picture of the fossil found on the card in front of you and write the fossil name underneath it. You will be moving from one seat to another until all the spaces on the grid are filled. You will have to work quickly because you will have only two minutes to draw and write the name. So draw quickly and quietly.
9. Outline the movement sequence on the board so every one gets to all of the cards. You may tape arrows to the floor. Use the first move as a practice move.
10. Students proceed until the grid is complete.
11. Once the grid is complete the students use dots and hatch marks to separate the different types of environments (*Environment Markings*). Show examples of how to do this. Discuss which fossils might indicate which environments. The normal sequence would have any fossils indicating a beach found in between those of the ocean and the land. Students may work alone or in twos. Students color their grid as follows: boxes with land fossils with green, beach fossils with yellow; and sea fossil with blue.
12. Allow students to discuss their reasons and what inferences could they make from the fossil pictures. Teacher should make an overhead transparency of the solution (*Environment Markings*) and show it to the class, placing it on top of the transparency of *Fossil Grid - Answer Key*. Discuss with students any different interpretations they may have.

## Assessment Suggestions

- Successful completion of the grid.
- Students can infer environment from the fossil type.
- Students successfully interpreted the difference between beach, sea, and land fossils.

## Curriculum Extensions/Adaptations/Integration

- Students identify as many “fossils” as possible that might be found 50 million years from now.
- Students with special needs may work with a partner or may use a modified grid with the pictures already on it.
- Art may include: Making Plaster of Paris fossils, amber fossils, and tri-fold three dimensional diorama of the different environments
- Write a story as a future scientist discovering our present day fossils.
- Write a newspaper story about a fossil discovery including what type of environment it would have lived in.
- Read *Tyrannosaurus Was a Beast* by Jack Prelutsky, and write a poem about fossils
- Using a map of Utah with counties outlined, make a flap book. Cut around three sides of each county so it will fold up or over and on a second copy of the map note what fossils can be found in each county.
- Go through a student’s desk to see what inferences could be made from the contents.
- Assign an environment to groups of students to research.
- Research different animals to see the adaptations that they have made to survive in their environments (e.g., flippers for animals at sea, webbed feet for aquatic birds).

## Family Connections

- Students take home fossil grids and share with parents.
- Visit local museums or science departments.
- Go on a fossil search in the city. List all the fossils found.

## Additional Resources

### Books

- The Amazing Earth Model Book*, Donald M. Silver & Patricia J. Wynne ISBN # 0-590-93089-3
- The Big Beast Book*, Jerry Booth ISBN #0-316-10266-0
- Dinosaur-The Story Behind the Scenery*, Allan Hagood ISBN # 0-916122-10-7
- Dinosaurs of Utah and Dino Destinations*, Pat Bagley and Gayle Wharton ISBN #1566846013
- The Dinosaur Alphabet Book*, Jerry Pallotta
- Everything You Need to Know About Science*, Anne Zeman and Kate Kelly, ISBN # 0-590-49357-4
- Eyewitness Books, Fossil*, Dr. Paul D. Taylor, ISBN # 0-7566-0682-9
- Eyewitness Books, Rocks and Minerals*, Dr. R. F. Symes, ISBN # 0-7894-5805-5
- The Extinct Alphabet*, Jerry Pallotta, ISBN # 088106-471-8
- The Fossil Factory*, Douglas, Niles, and Gregory Eldredge, ISBN #1-57098-417-4
- Kingfisher Young Knowledge, Rocks and Fossils*, Chris Pellant, ISBN #0-7534-5619-2
- Reader's Digest, Pathfinders, Dinosaurs*, Paul Willis, ISBN # 0-7944-0001-9
- If You Are a Hunter of Fossils* by Byrd Baylor McMillan Pub. ISBN 0-689-70773-8
- Encyclopedia Prehistorica Dinosaurs* by Robert Sabuda And Matthew Reinhart Pub Candlewick Press ISBN 0-7636- 2228-1

### Videos

- Earth Science for Children, All About Fossils
- Eyewitness, Dinosaur
- Eyewitness, Prehistoric Life

### Web Sites

- <http://www.ucmp.berkeley.edu/fosrec/MunGun3.html>
- <http://www.ucmp.berkeley.edu/fosrec/BarBar.html>
- <http://pubs.usgs.gov/gip/fossils/scale.html>

### Additional Media

- University of Utah Museum of Natural History Fossil Kit, Lorie Millward

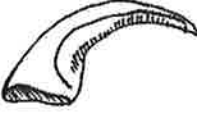


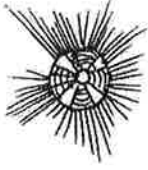






Name \_\_\_\_\_

# Fossil Grid

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

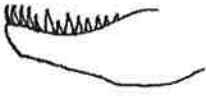







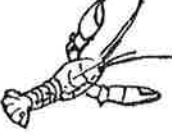

# Fossils - Figure 2

Fossils for gird spaces 1 through 10. (Modified from Moor, Lalicker, and Fischer)

1  Allosaurus claw	2  dinosaur eggs	3  Brachiosaurus backbone	4  sea urchin	5  Mackeral Shark tooth
6  dinosaur track	7  Tyrannosaurus foot	8  Allosaurus tooth	9  clam	10  fish scale






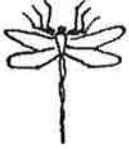




# Fossils - Figure 3

Fossils for gird spaces 11 through 20. (Modified from Moor, Lalicker, and Fischer)

11  tyrannosaur jaw	12  cycad tree	13  Porosaurolophus skull	14  burrows	15  Plesiosour skull
16  ginkgo tree	17  dinosaur footprint from China	18  oyster	19  lobster	20  nautilus

# Fossils - Figure 4

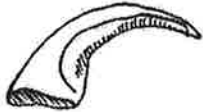


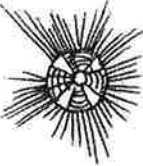














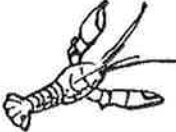










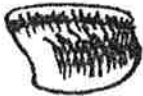
Fossils for grid spaces 21 through 30. (Modified from Moor, Lalicker, and Fischer)

<p>21</p>  <p>Triceratops leg bone</p>	<p>22</p>  <p>Stegosaurus picle</p>	<p>23</p>  <p>marine snail</p>	<p>24</p>  <p>coral</p>	<p>25</p>  <p>marine turtle skull</p>
<p>26</p>  <p>dragonfly</p>	<p>27</p>  <p>dinosaur skin design</p>	<p>28</p>  <p>dinosaur footprint in sand</p>	<p>29</p>  <p>Tiger Shark tooth</p>	<p>30</p>  <p>Ichthyosaur skeleton</p>



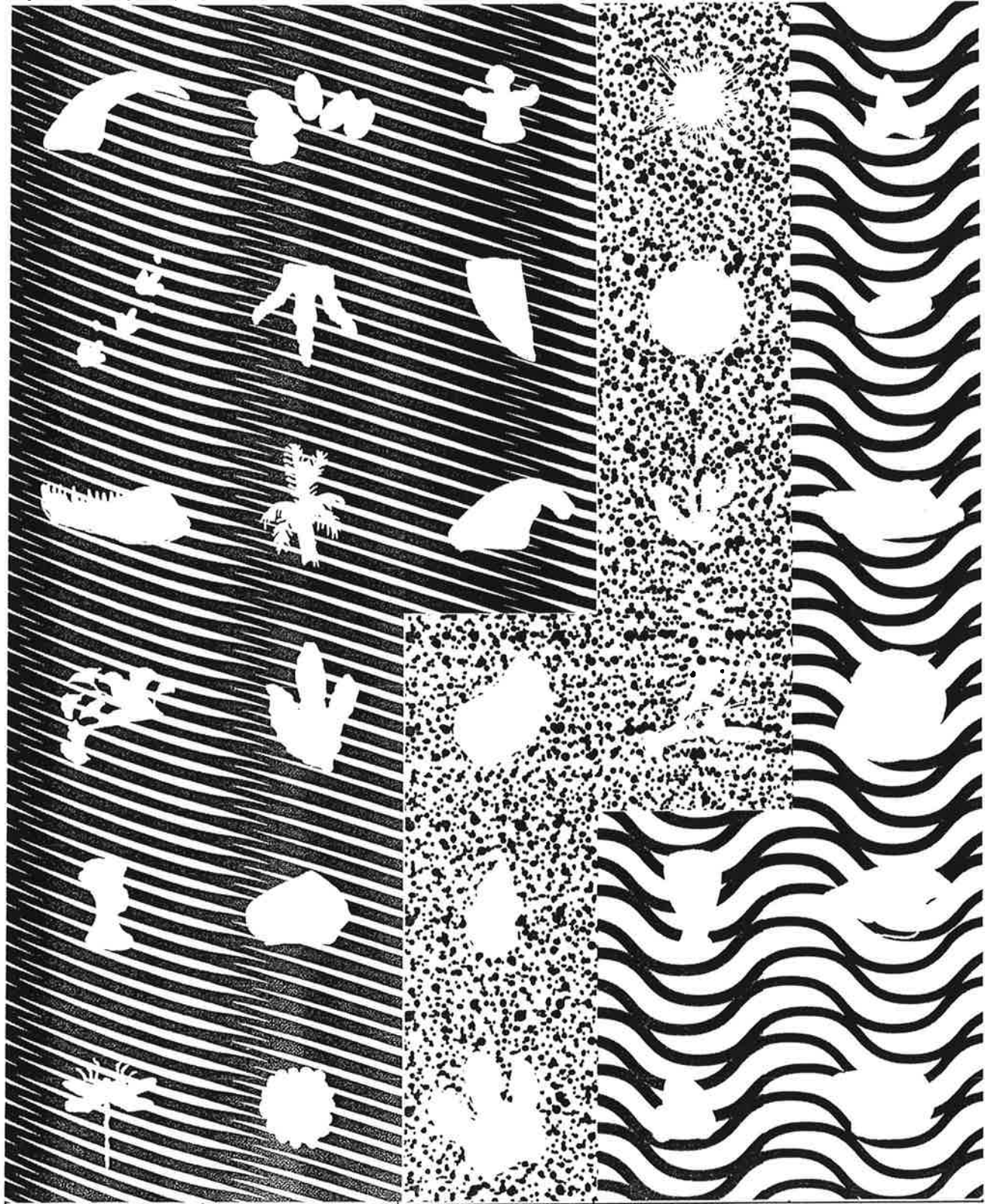
# Fossil Grid - Answer Key

Completed grid for fossil puzzle activity. To be prepared as an overhead transparency.

1 	2 	3 	4 	5 
6 	7 	8 	9 	10 
11 	12 	13 	14 	15 
16 	17 	18 	19 	20 
21 	22 	23 	24 	25 
26 	27 	28 	29 	30 

# Environment Markings

Markings to indicate different environments for the fossil puzzle grid. To be prepared as an overhead transparency to be placed on top of the transparency of Fossil Grid.



Land

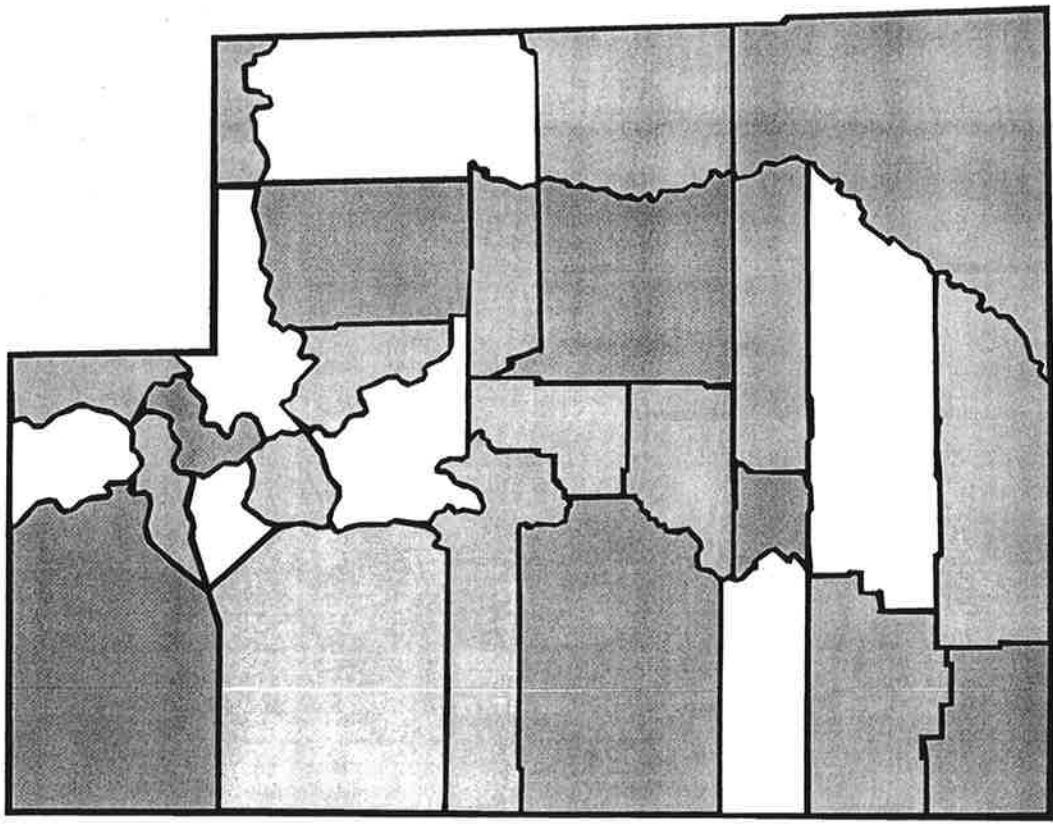


Beach



Ocean

# Utah Counties - 2



# Utah Counties - 1

