INTERCONNECTIONS

Science and Social Studies: A Thematic Approach

Department of Teaching and Learning

Granite School District
Salt Lake City, UT
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Welcome to Interconnections!

*Interconnections* is a thematic approach to teaching the Utah elementary science and social studies core curricula. Introduced over a decade ago, *Interconnections* was and continues to be a collaborative effort of classroom teachers, media coordinators, curriculum specialists, and district administrators. The 2009 revised program honors the past, yet embraces current research, resources, and technology. Built on the *Backward Design* model, each grade level in the 2009 program includes four to six units sequenced to build on skills and knowledge outlined in the curricula and assessed through state criterion-referenced tests (CRTs). Each unit includes an enduring understanding and three to five essential questions designed to teach both science and social studies comprehensively and efficiently.

Time is a precious instructional resource. *Interconnections* recognizes this and consolidates resources, ancillary materials, and lesson plans into one user-friendly notebook per grade level. Theme-related graphics associate individual lessons and support materials with specific units of instruction. In addition to the notebook, electronic versions of the program replace the need for overheads and excessive photocopying. Program updates and support services are available through the Granite School District *Interconnections* website.

The look may be new, but the philosophy remains the same. Students need to recognize authentic connections among content areas and use them to enhance their skills and understanding of a given subject. Students must be engaged in learning tasks that promote life skills and higher-level thinking. Students need opportunities to apply their reading and writing abilities during science and social studies instruction. While *Interconnections* adheres to this philosophy, it honors the expertise of individual classroom teachers and encourages them to make program adjustments as necessary to meet the needs of individual students and classrooms.

### 4th Grade Pacing Map

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<td></td>
<td>5 weeks</td>
<td>9 weeks</td>
<td>12 weeks</td>
<td>8 weeks</td>
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(complete EQs 1 & 2 before science CRTs)

* *Understanding by Design*, Grant P. Wiggins & Jay McTighe
Imagine it! and Interconnections Correlations
These are the places in Imagine It that correspond with Interconnections lessons.

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<th>4th Grade</th>
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Fourth Grade Interconnections
Unit I
Cycles: Patterns of the Earth

Enduring Understanding:
Matter on Earth cycles from one form to another and requires energy.

Essential Questions
- What is the relationship among energy, evaporation, condensation, and precipitation?
- How are the three different types of rock created?
- How can you sort rocks found in Utah according to the three basic types?
- What is the relationship between minerals and rocks?

Core Curriculum Concepts/Skills: observation, classification, inquiry, cause-effect, interrelationships, prediction, inference, investigation, relationships, communication

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<td>Standard I: Students will understand that water changes state as it moves through the water cycle</td>
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<tr>
<td>Objective 1: Describe the relationship between heat energy, evaporation and condensation of water on Earth.</td>
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<tr>
<td>Objective 2: Describe the water cycle.</td>
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| Standard III: Students will understand the basic properties of rocks, the processes involved in the formation of soils, and the needs of plants provided by the soil. |
| Objective 1: Identify basic properties of minerals and rocks. |

Science language students should know and use: vapor, precipitation, evaporation, clouds, dew, condensation, temperature, water cycle, mineral, weathering, erosion, sedimentary, igneous, metamorphic, topsoil, subsoil, bedrock, organism, freeze, thaw, profile, nonliving, structural support, nutrients
Essential Question #1:

What is the relationship among energy, evaporation, condensation, and precipitation?

Lessons:

- Water Cycle
- Utah’s Water Supply
- Water Cycle Terrarium

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<td>Social Studies</td>
<td>Standard I</td>
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<tr>
<td>1a</td>
<td>identify the relative amount and kind of water found in various locations on Earth</td>
</tr>
<tr>
<td>1b</td>
<td>identify the sun as the source of energy that evaporates water from the surface of Earth</td>
</tr>
<tr>
<td>1c</td>
<td>compare the processes of evaporation and condensation of water</td>
</tr>
<tr>
<td>1d</td>
<td>investigate and record temperature data to show the effects of heat energy on changing the states of water</td>
</tr>
<tr>
<td>2a</td>
<td>locate examples of evaporation and condensation in the water cycle</td>
</tr>
<tr>
<td>2b</td>
<td>describe the processes of evaporation, condensation, and precipitation as they relate to the water cycle</td>
</tr>
<tr>
<td>2d</td>
<td>construct a model or diagram to show how water continuously moves through the water cycle over time</td>
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Essential Question #1: What is the relationship among energy, evaporation, condensation and precipitation?

Lesson Title: Water Cycle

SC Standard I, Objectives 1, 2

Implementation Time: 45 minutes

Media Resources Needed: 
*Down Comes the Rain*, by Franklyn M. Branley

Materials Needed:
- Aluminum pie pans
- Paper
- Ice cubes
- Jars
- Rulers
- Measuring cups, spoons
- Science journal
- Hot pot for boiling water (self-heating water pitcher; check thrift stores for used one).

Procedure:
*This lesson uses the BSCS 5E model of inquiry and was developed by Molly Malone as part of the Physical Science Inquiry Academy, GSD*

Engage: Melting, Evaporation and Condensation Demonstration

Ask students to write about what they think is happening at each phase during the activity below:

1. Melt ice in a hot pot- record the volume of the resulting liquid
   Writing Prompt: Write about what you just saw. What happened?

2. Boil the melted ice
   Writing Prompt: What do you see happening? What is rising up from the pot?

3. Hold a pie plate filled with ice over the water vapor
   Writing Prompt: What is happening now? Where are these drops coming from? What are these drops?
Explain: The Phases of Water
1. Draw a diagram of the demonstration apparatus on the board. Ask students to copy it down. Label the diagram with the phases of water (solid, liquid, gas (or water vapor))
   - Solid = Ice in pie tin
   - Liquid = Hot Pot contents and droplets coming from the bottom of the pie tin
   - Vapor (gas) = Steam coming from Hot Pot (though steam is droplets condensing in the cooler air)

2. Read Down Comes the Rain, by Franklyn M. Branley

Explore: Evaporation Experiment
1. Refer to page 8 of Down Comes the Rain, by Franklyn M. Branley
2. State: If I put water into this pie tin and leave it out, it will evaporate. How could I measure this?
3. Have students work in pairs to make a list of ways they could measure the amount of water in the pie tin. Answers could include:
   - Volume
   - Diameter
   - Depth
   - Drawing circles around the puddle
4. Next, have students design and carry out an experiment to measure the amount of water in the pie tin over time.
   You may wish to use the following prompts to help students design their experiments:
   - We will start with this much water_______.
   - We will measure________ times this many_____ times
   - We will keep the following things the same____, _____, ______
   - This is how we will record our data________.

Water Vapor around Us
5. Refer to Page 10-11 of Down Comes the Rain, by Franklyn Branley
6. Ask students to think about where water vapor is around them. In the classroom, the school, the playground, at home, etc.
7. Next, ask students to think about which of the places around them might hold more water vapor than others (lakes, streams, terrariums, lawns etc...)
8. Have students work in pairs to formulate a hypothesis about which places around them might contain more water vapor.
   - Ex: There is more water vapor in the terrarium than on the playground.
9. Refer to pages 14-15 of Down Comes the Rain, by Franklyn Branley
10. Have students design and conduct an experiment to test their hypothesis using jars, ice cubes and water. You may wish to use the following prompts:
    - We will start with this much ice and water:
    - We will measure:
      - _______times
(Ex- we will observe the amount of water droplets on the jars every 15 minutes, or we will place a paper towel under each jar and see which one is wettest.)

- We will keep the following things the same:
- This is how we will record our data

Assessment:

**Evaluate: The Water Cycle in Nature- Foldable**

Check for understanding: Make a water cycle foldable with a diagram of water cycle in the center.

1. List the phases of water on one flap of the foldable. Have students label the phases on their water cycle diagram.
   - Solid
   - Liquid
   - Gas (Water Vapor)

2. Define the following on the other flap of the foldable. Have students identify where each occurs on the water cycle diagram.
   - Melting
   - Evaporation
   - Condensation
   - Precipitation
   - Freezing

   - Highlight where the above actions and phases were observed in the beginning demonstration and classroom investigations.

Extension:

Language Arts:

The Story of a Water Drop

Have students write a story from the perspective of a water drop traveling through the cycle. Use the following words (from the foldables flap) and underline them

- Solid
- Liquid
- Gas (water vapor)
- Melting
- Evaporation
- Condensation
- Precipitation
- Freezing
Lesson Title: Utah’s Water Supply

SC Standard I, Objective 2

Implementation Time: 60 minutes

Media Resources Needed:
Book: *Utah Water: A Precious Resource*
Video: *The Salt Lake Valley Watershed and You* (2002 Olympic video)

Materials Needed:
crayons  tape
clay  cotton  straws
construction paper  glue  foil

Procedure:
1. Read *Utah Water: A Precious Resource* for background information.

2. Review with students the water cycle.

3. Ask students to think of the factors that might affect the water cycle, e.g. drought, floods, freezing temperatures.

4. Watch the video *The Salt Lake Valley Watershed and You* and discuss.

5. Tell students they are going to make a model of a water supply system. Have students work in cooperative groups.

6. Instruct students to complete the following tasks while assembling the model:
   Construction paper is rolled into cones for mountains, cotton is placed on top for snow, but don’t glue.
   Blue butcher paper is cut into lakes, rivers, reservoirs, and groundwater forms.
   Straws are used for pipes; glue or tape together.
7. Instruct students to place them on and below students’ desks in the following manner:
   Mountains are placed on the far end of the desk.
   Rivers are taped to the mountains, flowing down to a reservoir which is placed on a student’s chair.
   Houses and other buildings are placed on the desks.
   Pipes bring groundwater and reservoir water to the houses and other buildings.

8. Direct students to explain the model in their own words.

Assessment: Have students change their models to show the cause and effect of various factors on our water supply, e.g., population, drought, pollution, flooding, freezing temperatures.
Lesson Title: Water Cycle Terrarium

SC Standard I, Objectives 1 & 2
Implementation Time: 60 minutes

Media Resources Needed:

Materials Needed:
Two-liter bottle
Gravel
Potting soil or peat moss
African violets or seeds from a flower such as marigold

Procedure:
1. Discuss the Water Cycle poster and display in the classroom.

2. Before giving to students, cut the two-liter bottles just above the top curve.

3. Pass out materials to construct a terrarium.

4. In bottom of bottle put layers of gravel, then peat moss, and then soil. Plant African violet or seeds in soil.

5. Water the terrarium lightly.

6. Tape the top of the bottle back on (use lid or tape over opening) to create a sealed environment.

7. You should not have to add more water. The violet or seeds should take up the moisture from the soil and release (transpire) it through the leaves. The water molecules will condense on the sides of the plastic bottle and "rain" into the soil.

8. Record observations for two weeks. What is happening inside the bottle? How does the plant look? How is this an example of the water cycle? What would happen if the top of the bottle was taken off?
9. Have the students draw the terrarium in their journal and label the locations where evaporation, condensation and precipitation occur.

10. Consider making these terrariums in time for a special event, such as Mother’s Day.

Assessment:
Have students record observations for two weeks. Have students explain in their own words the processes occurring and the relationship between them.
-or-
Create a model of the water cycle. This assessment can be completed on the computer or as a poster

Computer Assessment Criteria:
   Must be neat and readable
   Must be colorful
   Indicate cycle with animation
   Make sure all processes are labeled and explained

Poster Assessment Criteria:
   Printing must be neat and readable
   Must be colorful
   Indicate cycle with arrows
   Make sure all processes are labeled and explained
Water Cycle Post Assessment

1. What is precipitation?
   a. Water that falls to earth after condensing in the atmosphere.
   b. Water which flows down streams.
   c. Water which is stored in lakes.
   d. Water that is filtered through the soil.

2. Ground water is
   a. Water found under the surface.
   b. A layer of water between rock and soil.
   c. Naturally purified.
   d. All of the above.

3. Which of the following is not an example of surface run off?
   a. Lake
   b. River
   c. Stream
   d. Aquifer

4. Evaporation is the process whereby
   a. Water vapor changes to ice.
   b. Water vapor changes to water.
   c. Water changes to vapor.
   d. Ice melts.

5. The top level of the ground water is
   a. Condensation
   b. The water table.
   c. A glacier.
   d. A lake.
6. What conditions must be present for condensation to occur?
   a. Moisture, warm temperature
   b. Moisture, cool temperature
   c. Moisture, dust particles, warm temperature
   d. Moisture, dust particles, cool temperature

7. What is the source of water in a river, a reservoir, or lake?
   a. Run off from high mountains
   b. Melting snow
   c. Watersheds
   d. All of the above

8. Which one of these things is not good for water conservation?
   a. Repair leaking faucets
   b. Water lawn during the hottest part of the day.
   c. Take short showers
   d. Plant drought resistant plants.

9. List 3 things you have learned about water that are not covered on this test.
   1. __________________________________________________________
   2. __________________________________________________________
   3. __________________________________________________________
Water Cycle Post Assessment (Key)

1. a
2. d
3. d
4. c
5. b
6. b
7. d
8. b
9. Water vapor is called humidity
   The water cycle is one example of a cycle in nature.
   Transpiration is the release of water by plants
Essential Question #2:

How are the three different types of rocks created?

Lessons:

- The Rock Cycle
- Igneous Rocks
- Sedimentary Rocks
- Metamorphic Rocks

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Lesson Title: The Rock Cycle

SC Standard III, Objective1

Implementation Time: 60 minutes

Media Resources
Optional video: Rocks and the Rock Cycle. (19 min, online eMedia)

Materials Needed:
Worksheet “Rock Cycle”
Hand lens for each student (in the kits you can check out from USGS or UMNH)
Rock samples (you can check kits out for free from the USGS http://geology.utah.gov/teacher/teachkits.htm or the UMNH http://www.umnh.utah.edu/toolbox )

Procedure:
1. Display the rock samples. Have students observe them and talk about what the rocks are like.

2. Instruct the students to study the rocks with a magnifying glass. Look for the shiny particles in the rocks. They are most likely crystals. Have the students list the properties they observe. Have them describe color, size, shape, and pattern of particles. As a group, list on the board the properties observed.

3. Show examples of three types of rocks (sedimentary, igneous, and metamorphic). Explain how each is formed.

4. Show video “The Rock Cycle”, have students answers the questions that are posted on-screen during the video.

5. Distribute the worksheet, “Rock Cycle.” Have the students color the rock name boxes red. Instruct them to color the process labels yellow and the paths a rock could take around the cycle, blue.
6. Explain that any rocks the students are studying could be changed by any of the processes under the right conditions. All rocks do not necessarily go through the same cycle. Explain that most rocks are a combination of different minerals (heterogeneous). Rocks that are one mineral are called homogenous and are quite rare.

7. Assign the students to make an informal classification of their rocks by using this simple criteria:
   a. If the rock has easily observed grains, it is probably sedimentary.
   b. If the rock has crystals that line up, or the crystals look like they’ve been stretched or “scrunched” up, it is probably metamorphic.
   c. If the rock is not sedimentary or metamorphic, it is igneous. Sometimes igneous rocks have air bubbles in them and are quite light in weight. However, note all igneous rocks are formed with air bubbles and may be quite dense and heavy.

**Assessment:** Play “Rock Cycle” game
ROCK CYCLE GAME INSTRUCTIONS

**Directions:** Moving within the rock cycle, each player may bump another person off his/her spot by saying how his/her type of rock was formed or changed to another rock form. E.g. I am an igneous rock and I was formed when magma cooled? Or “I am an igneous rock and I can become metamorphic rock through heat and pressure.” At any time, the person taking a turn may say “All rocks change over time” and everyone has to move to a new position on the game board.

**Object of the game:** Students use the knowledge they have of the rock cycle to move within it. This could be used as an assessment tool.

**Game Boards:** The game boards for this game can be made in the following ways:

1. Felt squares and yarn placed on carpet floors, students stand on one of the rock forms within the circle. There are four players per game.
2. Made with sidewalk chalk on the playground, students stand on one of the rock forms within the cycle.
3. Paper game board copies can be used, students moving place marker.

**Alternative Play:** Instead of moving physically through the rock cycle, students pass/roll a ball of yarn through the rock cycle while still holding onto the other end. Player must say how the rock was formed or created or changed before passing the ball of yarn to the next player.

**Debrief:** After playing this game, discuss with the students what happened, what they learned from playing the game, and what you as the teacher observed.
The Rock Cycle

**Igneous Rocks**

- **Compaction and Cementation**
- **Weathering and Erosion**

**Metamorphic Rocks**

- **Burial**
- **Recycles under Heat and Pressure**
- **Heat and Pressure**

**Sedimentary Rocks**

- **Weathering and Erosion**
- **Mineral and Crystal Changes**

**Cooling and Crystallization**
ROCK CYCLE

Sedimentary Rocks

Igneous Rocks

Magma

Metamorphic Rocks
Lesson Title: Igneous Rocks

SC Standard III, Objective 1

Implementation Time: 20 minutes

Media Resources Needed:
This lesson could be done on the same day as Sedimentary and Metamorphic Rock lessons.

Optional: Sci-Ber Text
(could do this lesson the same day as Sedimentary and Metamorphic lessons. Students could make each of the rock types or just choose one)

Materials Needed: (per student)
1 spoon of pink aquarium gravel
1 spoon of white aquarium gravel
½ spoon of dark colored gravel
piece of granite rock or picture of one

Procedure:
1. Read this passage from the Sci-Ber Text: You know that rocks are made of minerals. Now it is time to find differences between various rocks. You will learn about the three basic rock types. Then you can use that information to group rocks into these three types.

Igneous rocks--It’s Hot, Hot, Hot!
Do you might think that many summer days get a bit hot? Do you sweat as the thermometer creeps up to 38°C Celsius (about 100°Fahrenheit?) These temperatures are nothing, compared to the heat within Earth. At depths of 60 to 200 Kilometers (36 to 120 miles) below the Earth’s surface, temperatures reach over 1400°C Celsius (over 2500°Fahrenheit) This temperature melts rocks. This is also where we will begin Rocky the Rock’s incredible journey.
Rocky was hanging out deep within Earth when he quickly began his journey upward. He traveled through a lava tube and blasted up out of a volcano. As he went through the air he began to harden. You know the saying, "What goes up must come down." When he hit the ground he continued to cool and harden.

**Rocky Rocks!**
As soon as Rocky hit Earth, he began to move quickly down the mountain. "Wow, what a ride!" Not only was he part of a great river of red hot lava meandering through the tropical mountainside, he was also feeling a little chilled. He was cooling down. Little did he know that within a few short minutes he would get the "big chill." Rocky was heading towards the ocean. When Rocky met the great salty sea, he really cooled down. Before he could say "How cool," Rocky became a rock.

Igneous rocks are rocks that start out deep inside the earth—sometimes the liquid magma escapes through volcanoes. Sometimes the magma pushes towards the surface of the earth, but never makes it, but cools and hardens under the ground.

What kinds of rocks are igneous? Lava rock, pumice, granite, obsidian

**Assessment:**
Check for students understanding that igneous rocks are formed by hot magma under the earth that has cooled and hardened.

**Extension:**
Students could create a rock collection of igneous rocks (either with real rocks or photos).
Students could write their own story of magma's journey to become an igneous rock.
Igneous Rock Simulation

You can make your own granite (igneous rock) by following the recipe below.

Procedure:
1. Mix gravel in a paper cup.
2. Add the glue and mix well with the craft stick or spoon.
3. Allow the mixture to dry for 24 hours.
4. Pull away the paper and look at your sample.

Compare your sample of granite to a sample of the real thing.

How are they alike? How are they different?

Record your answers in your science notebook.
Essential Question #2: How are the three different types of rock created?

Lesson Title: Sedimentary Rocks

SC Standard III, Objective 1

Implementation Time: 20 minutes

Media Resources Needed:
Optional: Sci-Ber Text
(could be taught on the same day as Igneous and Metamorphic lessons—students could choose to make one of the three types of rock or do all three)

Materials Needed: (per student)
¼ cup of sand
1 spoon of small rocks or gravel
Paper cup
White glue
Water

Procedure:
1. Read the passage from the Sci-Ber Text:
Rocky and the Rockies
As millions of years passed, Rocky found himself being pushed higher and higher above the valley floor. Rocky was becoming part of the great Rockies. He liked the view from his home on the mountainside. It seemed he could see forever. But nothing lasts forever, not even a rock. One day after a raging downpour, Rocky lost his grip on the mountainside. He started tumbling down the mountain until he found himself in a stream of rushing water. Rocky’s journey down the mountain creek was stop and go. Sometimes during the spring runoff, the stream rushed down the mountain carrying Rocky a long way. Other times Rocky stayed put for a long, long time.
The Big Splash!
One day, a swift current threw Rocky on the banks of the stream. He looked at himself. He had changed. Rocky was a round mound of rock. Colliding with the other rocks in the stream had caused him to lose his "rough" edges. The stream eventually took Rocky to a river. During his journey down the mountain, Rocky found himself getting
smaller and smaller.

**Parts are Parts!**

Now you may think that Rocky has "come full circle" in the great rock cycle, but he is not finished with his adventures yet. Rocky had become a tiny pebble. He had been worn away to almost nothing by the forces of nature on the Earth’s surface. Parts of Rocky were scattered all about. As our tiny friend (and his parts) laid about on the salty ocean floor, he soon lost his view of the life that flourished around him. Rocky was once again being buried. Sediments from the river that brought him to the great sea and the remains of past ocean life soon covered Rocky. The pressure of the sediments above him had cemented him together. He looked nothing like his old self, but was a "new kid on the rock." Eventually the mountain building processes had brought him to Earth’s surface.

### Make Your Own Sedimentary Rock

1. Place the sand and gravel in a paper cup. Put hand over cup and shake.
2. Mix glue with water about half and half. Pour into cup. Place the cup in a place where it will not be disturbed.
3. Wait two days before you peel off the cup.
4. Observe the sediments and draw a diagram representing the sediments in your cup.

### Assessment:

Have students explain that sedimentary rocks are those that are formed when small sediment and particles of rock get compressed together.

### Extension:

Make a foldable that shows how a sedimentary rock is formed.
Write your own story of how a sedimentary rock is formed.
Lesson Title: Metamorphic Rocks

SC Standard III, Objective 1

Implementation Time: 20 minutes

Media Resources Needed:
Optional: Sci-Ber Text
(could be taught on the same day as Igneous and Sedimentary lessons—students could choose to make one of the three types of rock or do all three)

Materials Needed:
Pancake/Waffle mix that needs only water
One bag M & M® candy
Large mixing bowl
Waffle maker
Measuring cups
Vegetable Oil or Cooking Oil
Syrup
Forks
Plates

Procedure:
1. Read the passage from the Sci-Ber text and then do the activity.
Metamorphic rocks
Slowly - over time
The story of Rocky is a very "time consuming" one. Millions of years passed. Rocky was buried beneath tons and tons of rock material. The pressure from the rock above him was great. Eventually, Rocky started to warm up again. Over many millions of years, Rocky found himself changing again.

Metamorphic rocks are formed under extreme pressure and heat. These conditions are not great enough to make the rock melt again, but the heat and pressure do cause the minerals within the deeply buried rock to change. Sometimes the minerals will become
rearranged. This can cause the rock to become layered. As the temperature continues to rise, the crystals within the rock may grow in size. Chemical changes may also take place at even higher temperatures.

Make Your Own Metamorphic “Rock”
Follow the steps below to make your own tasty “rocks”.

1. Heat and oil your waffle maker. This represents the heat and pressure from the earth.
2. Mix up the batter.
3. Pour in the M & M’s® candy and mix well. This represents sediments or magma. You could add any other types of sediments you think would taste good such as coconut, walnuts, chocolate chips etc.
4. Place the batter on the griddle. Make waffles.
5. Notice how the heat and pressure changed your rock. Sedimentary changes to metamorphic through heat and pressure.

Assessment:
Write a “Rock Rap” that describes how a sedimentary or igneous rocks changes into a metamorphic rock.

Extension:
Make a foldable that shows where metamorphic rocks fit into the rock cycle.
Essential Question #3:

How can you sort rocks found in Utah according to the three basic types?

Lessons:

- What Kind of Rock am I?

<table>
<thead>
<tr>
<th>Core Standards</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Studies</strong></td>
<td><strong>Science</strong></td>
</tr>
<tr>
<td>Standard III</td>
<td></td>
</tr>
<tr>
<td>1d classify common rocks found in</td>
<td>sedimentary (including: sandstone,</td>
</tr>
<tr>
<td>Utah as sedimentary (including:</td>
<td>conglomerate, shale); igneous (including:</td>
</tr>
<tr>
<td>sandstone, conglomerate, shale);</td>
<td>basalt, granite, obsidian, pumice); and</td>
</tr>
<tr>
<td>igneous (including: basalt,</td>
<td>metamorphic (including: crystals/minerals,</td>
</tr>
<tr>
<td>granite, obsidian, pumice); and</td>
<td>often in layers)</td>
</tr>
<tr>
<td>metamorphic (including: crystals/</td>
<td></td>
</tr>
<tr>
<td>minerals, often in layers)</td>
<td></td>
</tr>
</tbody>
</table>
Lesson Title: What Kind of Rock Am I?

SC Standard III, Objective 1

Implementation Time: 10 minutes

Media Resources Needed:
Optional: USOE Sci-Ber Text

Materials Needed:
Rock Sheet (could do on the LCD as a whole class. It is in color on your Interconnection disc)

Optional: Check out the rock kit from the Utah Museum of Natural History or Utah Geological Survey and use real rocks instead of pictures.

Procedure:
1. From the Sci-Ber Text: You know about the three major groups of rocks: Igneous, Sedimentary, and Metamorphic. You learned that igneous rocks result from the cooling of magma (liquid rock). Sedimentary rocks form by joining smaller pieces of other rocks. Metamorphic rocks were once Igneous or Sedimentary rocks but have been changed by heat and pressure.

2. Now you get to apply what you know about the three types of rocks. Look closely at each of the following rocks. Write what kind of rock you think it is and explain why.

Essential Question #4:

What is the relationship between minerals and rocks?

Lessons:

- Classifying Rocks and Minerals
- Mineral Mining

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Standard III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a</td>
<td></td>
<td>describe the differences between minerals and rocks</td>
</tr>
<tr>
<td>1b</td>
<td></td>
<td>observe rocks using a magnifying glass and draw shapes and colors of the minerals</td>
</tr>
<tr>
<td>1c</td>
<td></td>
<td>sort rocks by appearance according to the three basic types: sedimentary, igneous, and metamorphic</td>
</tr>
</tbody>
</table>
Lesson Title: Classifying Rocks and Minerals

SC Standard III, Objective 1

Implementation Time: 60 to 90 minutes

Media Materials Needed:
Optional video: *Rocks and the Rock Cycle* (segments 4, 5, 6) eMedia online

Materials Needed:
Samples of Rocks, Minerals, and Fossils (free kit at UMNH or UGS)
Student Copies of Characteristics of Rocks, Minerals and Fossils
Rock Worksheet #1
Mineral Detective Worksheet
Mohs’ Hardness Scale
art paper white vinegar
crayons or marker droppers
magnifying glasses safety goggles
items for testing hardness or rocks magnets (any kind, any size)

Procedure:
1. Show the video *Rocks and the Rock Cycle* and discuss as a class. Ask students to be thinking of the major points as they are watching. Brainstorm and list the main points as students mention them. (Examples: Rocks are made of different minerals. Each mineral has crystals. Different minerals mixed together make different kinds of rocks: igneous, metamorphic, and sedimentary. Rocks go through a rock cycle. People use rocks: tools, weapons, buildings, art, etc.)

2. Do Activity #1

3. Instruct the students to complete the follow-up activity, “Mineral Detectives,” to reinforce concepts of rocks and minerals classification. Give students a copy of Mohs’ Hardness Scale and the materials to scratch the rocks to test for hardness: silver, copper penny and steel nail. (You may want to test the ones that need to be scratch with glass, depending on what you are using.)
4. Pass out art paper and have the students individually or in groups choose a rock. Students should observe the rock with a magnifying glass and draw the shapes and colors of the minerals.

**Assessment:** Students will complete and document an experiment in a collaborative group. When finished, have students share one or two of their findings with the group.
CLASSIFYING ROCKS, MINERALS, AND FOSSILS
Activity #1

A. Background:
Minerals occur in nature. Minerals can be pure substances (elements) or combination of substances (compound). Minerals are the raw materials of rocks. Rock types are characterized by the types of minerals present in their relative proportions, and the processes by which the rocks were formed. Of these processes, heat, pressure, and time are the most important.

B. Materials:
For the students (groups of 4-5)
Samples of as many of the following as possible
- Rocks: gneiss, marble, basalt, sandstone, conglomerate, granite, shale, limestone, and pumice.
- Fossils
- Minerals: iron ore, quartz, mica
- Magnifying glass
- White vinegar in small dropper bottles
- Thick glass with smooth edges (for scratching)
- Copies of Characteristics of Rocks, Minerals, and Fossils Worksheet and Rock Worksheet #1 for each team

C. Procedures
1. Assign students to groups. Assign a number to each sample. This can be done at stations if rock samples are scarce (1-3 rocks at each station). If rock samples are plentiful, organize them into egg cartons for each group.
2. Number the cups in the carton and put one rock sample in each. Distribute materials and a worksheet to each group.
3. Suggest that the group listing the most samples correctly in 20 minutes will be the winners.
4. Put the students to work. Move among the groups answering questions but do not identify samples.
5. After 20 minutes, correct the groups' papers as a class. Help students understand the differences between rocks, minerals, and fossils.
### Reference Sheet
#### Characteristics of Rocks, Minerals and Fossils

<table>
<thead>
<tr>
<th>Name</th>
<th>Fizzes with acid</th>
<th>Appearance</th>
<th>Scratches Glass</th>
<th>Easily Seen Holes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gneiss</td>
<td>No</td>
<td>Has stripes, sinks in water</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Marble</td>
<td>Yes</td>
<td>Light colored, looks like a chunk of colored sugar</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Basalt</td>
<td>No</td>
<td>Dark gray or black, sinks in water.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sandstone</td>
<td>No</td>
<td>Made up of cemented sand grains</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Conglomerate</td>
<td>Sometimes</td>
<td>Composed of smaller samples of rock, cemented together, varies in color, and sinks in water.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Granite</td>
<td>No</td>
<td>Usually white or pink with many black particles, sinks in water.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Shale</td>
<td>No</td>
<td>Flat surfaces, feels powdery or chalky.</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Limestone</td>
<td>Yes</td>
<td>No stripes, sinks in water.</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pumice</td>
<td>No</td>
<td>No stripes, usually floats.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Fossils</td>
<td></td>
<td>An imprint or a skeleton of a plant or animal in the rock.</td>
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</tbody>
</table>
Rock Worksheet #1

Team Members:

PROBLEM:
You are a geology student. Your teacher has asked you to investigate the properties of some samples found on a field trip and then to identify them.

DIRECTIONS:
1. Carefully observe each sample. You will need to perform several tests on each sample:
   - Does the sample have holes? What color is it?
   - Does the sample have stripes? How does it feel?
   - Does the sample scratch glass?
   - Does the sample look glassy?
   - Does the sample have flat sides?
   - Does the sample fizz when you put several drops of acid on it?
   - Does the sample sink or float when you put it in water?
2. Identify and describe each sample by answering each of the questions above:
   Sample #1

Sample #2

Sample #3

Sample #4

Sample #5
Sample #6

Sample #7

Sample #8

Sample #9

Sample #10

Sample #11

Sample #12

Sample #13

Sample #14

Sample #15
MINERAL DETECTIVES

Name: ___________________________

Rocks are classified in many ways. We will classify rocks in six ways:

1. How **dense or porous** it is. (Is it solid or does it have holes in it?)
2. How **bright or dull** it is. (Is it shiny or not?)
3. How **colorful or clear** it is. (Can you see through it or into it or not?)
4. How **smooth or rough** it is. (How does it feel?)
5. How **hard or soft** it is. (What can you scratch it with, or can it scratch something?)
6. If it is **magnetic or non-magnetic**. (Does a magnet stick to it?)

<table>
<thead>
<tr>
<th>ROCK #</th>
<th>DENSE OR POROUS</th>
<th>BRIGHT OR DULL</th>
<th>COLORFUL OR CLEAR</th>
<th>SMOOTH OR ROUGH</th>
<th>HARD OR SOFT</th>
<th>MAGNETIC OR NON-MAGNETIC</th>
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</tbody>
</table>
Mohs’ Hardness Scale
The ten minerals in increasing order of hardness to softness are (1-softest to 10-hardest)

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talc</td>
<td>1</td>
</tr>
<tr>
<td>Gypsum</td>
<td>2</td>
</tr>
<tr>
<td>Calcite</td>
<td>3</td>
</tr>
<tr>
<td>Fluorite</td>
<td>4</td>
</tr>
<tr>
<td>Apatite</td>
<td>5</td>
</tr>
<tr>
<td>Feldspar</td>
<td>6</td>
</tr>
<tr>
<td>Quartz</td>
<td>7</td>
</tr>
<tr>
<td>Topaz</td>
<td>8</td>
</tr>
<tr>
<td>Corundum</td>
<td>9</td>
</tr>
<tr>
<td>Diamond</td>
<td>10</td>
</tr>
</tbody>
</table>

**Hardness Test**

<table>
<thead>
<tr>
<th>Mineral scratched by:</th>
<th>Hardness:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fingernail</td>
<td>2.5 or less</td>
</tr>
<tr>
<td>Silver</td>
<td>2.5-3</td>
</tr>
<tr>
<td>Copper Penny</td>
<td>3.5</td>
</tr>
<tr>
<td>Steel Nail</td>
<td>5.5</td>
</tr>
<tr>
<td>Glass</td>
<td>6</td>
</tr>
</tbody>
</table>

If a mineral cannot be scratched by glass, but can itself scratch glass, its hardness is greater than 6.
Essential Question #4: What is the relationship between minerals and rocks?

Lesson Title: Mineral Mining

SC Standard III, Objective 1

Implementation Time: 45 minutes

Media Resources Needed:
Video: Earth Science Collection. Rocks. The Solid Earth Materials I. (online, eMedia)
Rocks and Minerals: A True Book by Ann Squire

Materials Needed: (per student/group)
1 Cup Total cereal
Zipper bag
Plastic cup
Water
Magnet
Optional: samples of minerals (kits can be borrowed from UMNH or UGS for free)

Procedure:
The students should recall from previous lessons that there are different types of rocks. Today they will learn that rocks are composed of minerals.

1. Create a T-Chart for Rocks versus Minerals. Then read the Rocks and Minerals book or show the online video The Solid Earth Materials I.

2. Students need to be able to understand that all rocks are made of minerals (sometimes several kinds of minerals), but a mineral is made up of only 1 thing.

3. Minerals are inorganic, which means they are not made of anything living (or used to be living).

4. Minerals are described using properties such as color, luster, streak, crystal shape, and hardness.
5. Have students discover a mineral right in their own breakfast! Students will do the Mineral Mining activity and record their results in a science notebook (make your own or use spiral notebooks)

**Assessment:**
Check the T-charts to see if students understand the differences between rocks and minerals.

**Extension:**
Students could check to see if different types of cereal have more or less iron content.

Students could do a web scavenger hunt to find the uses of minerals in every day items.

Do a report on mineral and mining resources in Utah (http://minerals.usgs.gov/minerals/pubs/state/2001/utstmyb01.pdf)
1. Put the cereal in the zipper bag and crush the cereal (you could use a book or your shoe. Just be careful not to tear the bag). The more crushed the cereal the better the experiment will work.

2. Open the bag and add the water. Let it sit for about 20 minutes.

3. Tilt the bag so that the cereal collects on one side.

4. Have a partner hold the bag while you rub the magnet along the outside of the bag on the bottom (iron is heavier than the rest of the cereal so it should sink to the bottom). You should start seeing fuzzy particles attracted to the magnet. That is the mineral iron.

How do you know that the black particles are made of iron?

What do you think the purpose of crushing the cereal first is?

What do you think would happen if you used a different type of cereal?
Fourth Grade Interconnections

Unit II:

Change over Time: Utah’s Physical & Geographic History

Enduring Understanding:

The physical environment of Utah has changed over time. There is a relationship among Utah’s physical environment, geography, and its inhabitants.

Essential Questions

- What makes Utah unique?
- How does water influence living things in Utah?
- What forces cause changes in Utah’s environment and how do those changes impact Utahans?
- How have human actions changed Utah’s physical environment?

Core Curriculum Concepts/Skills: observation, classification, inquiry, cause-effect, interrelationships, prediction, inference, investigation, relationships

Core Standards

Social Studies

Standard I: Students will understand the relationship between the physical geography in Utah and human life.
  Objective 1: Classify major physical geographic attributes of Utah
  Objective 2: Analyze how physical geography affects human life in Utah
  Objective 3: Analyze how human actions modify the physical environment.

Science

Standard I: Students will understand that water changes state as it moves through the water cycle
  Objective 2: Describe the water cycle

Standard II: Students will understand that the elements of (Utah) weather can be observed, measured, and recorded to make predictions and determine simple weather patterns.
  Objective 1: Observe, measure, and record the basic elements of weather
  Objective 2: Interpret recorded weather data for simple patterns
  Objective 3: Evaluate weather predictions based upon observation data

Standard III: Students will understand the basic properties of rocks, the processes involved in the formation of soils, and the needs of plants provided by soil.
  Objective 1: Identify basic properties of minerals and rocks
  Objective 2: Explain how the process of weathering and erosion change and move materials that become soil
  Objective 3: Observe the basic components of soil and relate to plant growth.

Standard IV: Students will understand how fossils are formed, where they may be found in Utah and how they can be used to make inferences.
  Objective 1: Describe Utah fossils and explain how they were formed.
  Objective 2: Explain how fossils can be used to make inferences about past life, climate, geology, and environment.

Social Studies language students should know and use: natural resources, landforms, regions, erosion, seismic activity, tourism, communication, transportation, archaeology, artifacts, excavations

Science language students should know and use: vapor, precipitation, evaporation, clouds, dew, condensation, temperature, water cycle, mineral, weathering, erosion, sedimentary, igneous, metamorphic, topsoil, subsoil, bedrock, organism, freeze, thaw, profile, nonliving, structural support, nutrients, infer, environments, climate, dinosaur, preserved, extinct, extinction, impression, fossil, prehistoric, mineral, organism, replacement, trilobite, sedimentary, tropical

Science & Social Studies Interconnections: A Thematic Approach
Essential Question #1:

What makes Utah unique?

Lessons:

- Rocks and Minerals of Utah
- What is Soil?
- Utah’s Three Land Regions
- Fossils
- Utah’s Physical Features & Scenic Attractions

<table>
<thead>
<tr>
<th>Core Standards</th>
<th>Social Studies</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard I</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a identify Utah’s latitude, longitude, hemisphere, climate, natural resources, landforms, and regions using a variety of geographic tools</td>
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<tr>
<td>1b examine the forces at work in creating the physical geography of Utah (examples may include: erosion, seismic activity, climate change)</td>
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<tr>
<td>2b classify the distribution and use of natural resources</td>
<td></td>
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<tr>
<td>2d make inferences about the relationships between the physical geography of Utah and the state’s communication and transportation systems</td>
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<tr>
<td>2f explain how archeology informs about the past</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard III</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1d classify common rocks found in Utah as sedimentary including sandstone, conglomerate, shale; igneous including basalt, granite, obsidian, pumice; and metamorphic including marble, gneiss, schist.</td>
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<tr>
<td>3a observe and list the components of soil including minerals, rocks, air, water, living and dead organisms and distinguish between the living, nonliving, and once living components of soil</td>
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<tr>
<td>3b diagram or model a soil profile showing topsoil, subsoil, and bedrock, and how the layers differ in composition</td>
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<tr>
<td>3c relate the components of soils to the growth of plants in soil</td>
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<tr>
<td>3d explain how plants may help control the erosion of soil</td>
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<tr>
<td>3e research and investigate ways to provide mineral nutrients for plants to grow without soil</td>
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<tr>
<td><strong>Standard IV</strong></td>
<td></td>
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</tr>
<tr>
<td>1a identify features of fossils (Utah)</td>
<td></td>
<td></td>
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<tr>
<td>1b describe three ways fossils are formed in sedimentary rock including: preserved organisms, mineral replacement of organisms, impressions or tracks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1c research locations where fossils are found in Utah and construct a simple fossil map</td>
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<tr>
<td>2a explain why fossils are usually found in sedimentary rock</td>
<td></td>
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<tr>
<td>2b based on the fossils found in various locations, infer how Utah environments have changed over time</td>
<td></td>
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<tr>
<td>2c research information on two scientific explanations for the extinction of dinosaurs and other prehistoric organisms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2d formulate questions that can be answered using information gathered on the extinction of dinosaurs</td>
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</tbody>
</table>

Science & Social Studies Interconnections: A Thematic Approach
Lesson Title: Rocks and Minerals of Utah

SC Standard III, Objective 1  
SS Standard IV, Objective 4

Implementation Time: 45 minutes

Materials Needed:
- Rock and mineral samples of granite, obsidian, geode, petrified wood, sandstone and gneiss (check out free kit at UGS or UMNH)  
- Copies of Utah County Map
- Colored pencils
- Optional Book: *Rocks, Minerals, and Fossil Localities of Utah* (UGS bookstore, also in the kit you check out from UGS)

Procedure:
1. Pass around each of the 6 rock or mineral specimens as the teacher reads about where it might be found and any special information about it.
2. Have students create a legend on their county map for each of the 6 types of rock.
3. Using the Reference Sheet for Rocks and Minerals in Utah, have students label/color the counties that contain that kind of rock.

Extension:
Have students select additional rocks or minerals from the county sheet and add them to the map.
ROCKS AND MINERALS FOUND IN UTAH

1. Obsidian is a dark, glassy rock that is formed when lava cools quickly. It is usually black, but it can be other dark colors. One of the places where obsidian is found in is the Black Rock Desert of Millard County.

2. Geodes are usually hollow rocks filled with minerals like quartz (which can be different colors). Geodes form when rocks have little holes or cavities that water is able to get into. The water allows minerals to precipitate into the holes and create crystals. A famous place in Utah to find geodes is known as the Dugway Geode Bed in Juab County.

3. Petrified wood is a type of fossil: it consists of fossil wood where all the organic materials have been replaced with minerals. Emery County is one of several in the state where you can find petrified wood.

4. Granite is speckled with white and black colors. The Temple Quarry Nature Trail on the south side of Little Cottonwood canyon (Salt Lake County) is a great place to see this rock.

5. Sandstone is a rock made of layers of sand and can be found many places in Utah. Many of the features in Arches National Park (Grand County) are sandstone rock.

6. Gneiss is a rock with layers of minerals like mica, quartz and feldspar. A good place to see gneiss is in Farmington Canyon in Davis County.
ADDITIONAL ROCKS AND MINERALS BY COUNTY
(For a more comprehensive list, refer to the *Rock, Mineral, and Fossil Localities of Utah* book in teacher toolbox or other resource guides)

BEAVER
Quartz, malachite, magnetite, pyrite, galena, calcite

BOX ELDER
Gypsum, fossils

CACHE
Fossils, quartz, malachite, galena

CARBON COUNTY
Coal, fossils

DAGGETT COUNTY
Garnet, staurolite, kyanite, tourmaline, anthophyllite, beryl

DAVIS
Migmatite, pegmatite, gneiss

DUCHESENE
Gar fish fossils

EMERY COUNTY
Agate, petrified wood, jasper, quartz, calcite, geodes,

GARFIELD
Petrified wood, agate, stibnite, gypsum, hornblende, agate, jasper, sand calcite crystals,

GRAND
Agate, petrified wood,

IRON
Agate, topaz, quartz, fluorite, hematite, fluorite, chalcedony

JUAB
Agate, geodes, Calcite, Pyrite, Aragonite, Topaz, Red Beryl, Hematite, Chalcedony, Amethyst, Fluorite,

KANE
Petrified wood, Agate, Jasper
MILLARD
Fossils, Sunstone, aragonite, obsidian, quartz, chalcopyrite, garnet,

MORGAN
Pyrite, calcite

PIUTE
Alunite, fluorite, calcite, quartz, stilbite, Amethyst

RICH COUNTY
Fossils

SALT LAKE
Pyrite, galena, hemimorphite, marble, magnetite, ludwigite, vesuvianite, garnet, serpentine, quartz,

SAN JUAN
Agate

SAN PETE
Quartz, aragonite, magnesite

SEVIER COUNTY
Gypsum, Anhydrite, Halite,

SUMMIT
Fossils

TOOELE
Agate, Gypsum, oolitic sand, cinnabar, gypsum sand, orthoclase feldspar, calcite, azurite, malachite, hemimorphite, pyrite, galena, Wonderstone, Calcite, fluorite, Azurite

UINTAH
Hydrocarbons (like oil shale), fossils, pyrite, quartz, marble, Limestone

WASATCH
Spinel, garnet, vesuvianite, titanite, hematite, quartz,

WASHINGTON
Petrified wood, agate, Garnet

WAYNE
Agate, jasper, chert, petrified wood

WEBER
Calcite, fossils
Utah Counties

Make a legend and color the counties that contain the rock and mineral samples you saw in class.
Lesson Title: What is Soil?

SC Standard III, Objective 3
SS Standard I, Objective 1

Implementation Time: 50 minutes

Materials Needed:
- soil samples
- hand lenses
- paper plates
- clear cups
- measuring cup
- scale
- spoons
- sand
- paper towels
- tweezers
- insect viewer (opt)
- plates
- insects

Procedure:

Pre-Assessment
Ask students what they think soil is composed of. Generate a list containing mineral or rock particles, air, water, living and dead organisms. Ask students to make a pie chart showing how much of each they think soil contains. Ask them to save it and compare their answers at the end of the activity.

Activity 1: Observation

1. Give each student 1/4 cup of soil, plate, paper towel, lens, tweezers. Instruct them to use the hand lens to examine their soil. They are to look for organic matter (living and dead plants, insect parts, living insects) and non-living material (rocks and minerals).
2. Have them make separate piles. They could put living insects in an insect view for better viewing and to contain them.
3. Students should record what they find in their logs
Activity 2: Water in the soil

1. Have students place their soil on a paper towel.
2. Fold it in half and gently press.
3. Return the soil to the plate.
4. Examine the towel.
5. Ask them to describe the condition of the towel. They should observe that it is wet.
6. Ask what ingredient was removed from the soil? (water)
7. Place one cup of damp soil in a container. Weigh it. Record weight in science log.

Place soil in a sunny window. Weigh it after a few days. Record results and differences in weight. Discuss how much water was in the soil. How can they tell?

Activity 3: Air in the soil

1. Give each group of students exactly one cup of loose soil. Have them pack it down as tightly as possible. What does the soil now measure? Ask them how they were able to pack it down? What is now not in the soil? (air)
2. With a spoon, loosen the soil so the top is again at the 1-cup line. Give the students another measuring cup of water. Have them pour it slowly into the soil until it starts collecting on the top. Observe the air bubbles rising up. Discuss why they see air bubbles. How much water is left in the measuring cup? How much water did you pour into the soil? How much air was in the soil before adding the water? How do you know? Where did the air go when you added the water? Why do we see lots of worms on the top of the soil after a big rainstorm?
3. Answers to discussion questions should be recorded in science logs.
4. Discuss the soil pie chart on the student worksheet. What percentage of soil is air? Have students convert the information from the pie graph to the bar graph.

Activity 4: Soil Profiles

1. Have students read about soil profiles on the Sci-Ber Text
2. Students should create their own soil profiles. They can be done using coloring materials or using glue and actual soil samples.
3. Students will need to do some measuring and math to figure out the layers for the sample soil profile.
   Horizon A is 12 inches deep.
   Horizon B is 20 inches thick.
   Horizon C starts at the bottom of Horizon B and goes to the bottom of the profile.
Fourth Grade
Unit 2: Change over time: Utah’s Physical & Geographic History

Essential Question #1: What makes Utah unique?

Lesson Title: Utah’s Three Land Regions

SS Standard 1, Objective 1

Implementation Time: 60 minutes

Media Resources Needed: Utah Atlas: Geography & History by Cliff B. Craig and M. Elijah Carr; Joyful Noise or I am Phoenix: Poems for Two Voices by Paul Fleischman and Eric Bellows

Resources Needed: overhead projection of page 8, 9, and 24 of Utah Atlas: Geography & History; blank maps of Utah (1 per student); regions information pages (1 per student)

Materials Needed: crayons for each student; highlighters/light colored crayons

Procedure:

1. Distribute a blank Utah map to each student and ask them what is on the page. After they have determined it is Utah, direct students to label the map “Utah”. Have students predict the cardinal directions when looking at the map of Utah faced correctly on their desks. Draw a compass rose on the board and have students draw one on their map.

2. Encourage students to share everything they know about what they usually see on a map of Utah/shapes and objects that help them recognize Utah as unique from other states (Great Salt Lake, shape of state boundary). Have students determine where in Utah the Great Salt Lake is located and draw it on their map. Discuss what color represents water on maps and have students color the Great Salt Lake blue.

3. Project/direct students’ attention to page 8 in the Utah Atlas. Discuss how the earth is divided into four hemispheres (northern, southern, eastern, western) and how Utah, as part of North America, is located in the northwestern hemisphere. Have students record this on the upper right-hand corner of their paper (northwest corner).
4. Project/direct students’ attention to page 9 in the *Utah Atlas*. Have students determine Utah’s longitude and latitude and record it on their map. Direct students’ attention to the states surrounding Utah and ask them to make predictions about the similarity/differences in climate among these states and Utah.

5. Project/direct students’ attention to page 24 in the *Utah Atlas*. Have them divide their map into the three regions of Utah: Basin & Range, Rocky Mountain, and Colorado Plateau. Direct them to quickly color each region a different color. Point out other southwestern states that share Utah’s physical features.

6. Give each student a copy of the information pages and a highlighter. Guide students in reading and highlighting main ideas and extracting key information about Utah’s three regions.

**Assessment:**

Read an example of a poem for two voices with a student volunteer. Ask two students to read another example together, out loud. Divide students into groups of three and assign them to write a poem for *three voices* that compare/contrasts Utah’s three land regions (see instructions). You may assign ideas to compare/contrast or let students decide for themselves, depending on ability level. Poems should be illustrated with appropriate drawings, read in three parts in a presentation for the class, and published on a classroom bulletin board.

**Extension:**

Assign students to create a triorama of Utah’s three land regions.
The Rocky Mountains

The Rocky Mountains are represented by the Wasatch and Uinta Mountains in northern Utah. These tall beautiful ranges furnish much of the water that supports life in Utah. In these mountains there is a lot of rain and snow that falls. The mountains are Utah’s watershed. A shed is a place where things are stored or kept. A watershed then is a place where water is stored or kept. Utah’s mountains store the water three different ways: as underground water, as snow, and as rivers, lakes and reservoirs.

The snow in the mountains melts slowly. The water that melts from the snow flows into the valleys most of the summer long. When the snow stops melting the lakes and reservoirs give us the water we need. The dams that have been built hold back the water in the reservoirs, or man-made lakes. The water is then let out as it is needed for irrigation or use in homes.

The mountains make a summer pasture for many sheep, cattle, deer, elk, and other animals. They also make a very good recreational area. During the summer people go fishing, picnicking, camping, and hiking. In the fall the trees and other plants change colors. During winter months there is excellent snowmobiling, skiing, sledding, and sleigh riding.

The Colorado Plateau

The Colorado Plateau, located in southeastern Utah, is known for its brilliant coloring and fantastic shapes of its rock formations. A plateau is an area of the land that has been lifted up. Most of the surface land is level, although mountains rise about the plateau and canyons have been cut through it. The Colorado Plateau area is higher in elevation than the Great Basin, but it also includes Utah’s lowest elevation and its hottest desert.

The Colorado Plateau belongs to a huge land mass that was slowly pushed up by great pressure under the surface of the earth. As the land was lifted higher, rivers cut deep canyons into the underlying rocks. Nearly all of the unusual rock formations have been carved into sandstone and limestone that was once mud and silt on the bottom of ancient seas.

Many mountains were formed by molten lava pushing up from beneath, raising the earth’s crust into domes that have eroded into mountains.

Most of the Colorado Plateau is arid, receiving very little rainfall or snow except in the mountain areas. The moisture that does come to region drains rapidly through the rivers, into the Colorado River, and then runs into Lake Powell.
Basin & Range

The Great Basin covers nearly one third of the state of Utah along its western border. Since most of this area gets less than 10 inches of rainfall per year, it is called a desert. There are many birds, plants, mammals, reptiles, and insects that live in this land area.

This region has many valleys and mountain ranges. The valleys are used for winter grazing ranges. Cattle and sheep ranchers bring large flocks of sheep and herds of cattle to this area during colder months of the year. The sheep and cattle eat the plants. Where there is not enough water for the animals, ranchers take water to them in large tank trucks.

The mountain ranges in the Great Basin run north and south. There are wide valleys between these mountain ranges. This is why the area is called a Basin and Range Province. The word “province” means a section or area of a country.

The mountain ranges in the Great Basin are not very large. They do not get very much rain or snow. Most of Utah’s population lives along the eastern edge of the province, at the base of the mountains where there is more water.

Almost all of western Utah is low like the bottom of a bowl (basin). It was once the bottom of a huge, ancient lake called Lake Bonneville. The Great Salt Lake is what is left of Lake Bonneville.
How to Write a Three-Voice Poem

A three-voice poem is written for three people to perform and has lines for each of the readers to read. When the three different voices talk alone, they are each talking about how their own topics are different. When the three different voices talk together, they are talking about how their topics are the same.

1st: Think about general ideas that apply to the Utah region you are writing about. Examples: location, water, mountains, people, animals

2nd: List examples or words (from your reading) that fit your general ideas and are important about your region.

3rd: Group your ideas into stanzas or poem paragraphs to highlight the differences among the three regions. Three lines should talk about the differences while the fourth line (read by all three poets) talks about the similarities among the regions.

4th: Have fun! Performing your poem for three voices is a fun way to show all you know about Utah’s regions.

Example:

“Utah’s Three Regions”

I am the Rocky Mountain Region, located in northern Utah.
    I am the Colorado Plateau Region, located in southeastern Utah.
        I am the Basin and Range Region, located in western Utah.
            We are Utah’s three regions.

I have rain and snow – water for reservoirs, skiing, elk, and sheep.
    I have little rainfall or snow – my moisture drains into the Colorado River.
        I have less than 10” of rainfall a year – a desert land for lizards, birds, and plants.
            Water shapes life in our regions.

-Dawn Hauser
TRIORAMA DIRECTIONS

1. Use a square piece of paper
2. Fold into triangles two ways
3. Cut one fold to center
4. Fold one side over other and staple to form base
5. Use 4 “trioramas.” Write a summary on the fourth one.
6. Make a state of Utah for the Cover. Add yard to tie it open or closed.
7. Draw and color background.
8. Add 3-D figures to base.
9. Make one for each region. Include plant and animal life in each region. This will help in the World Strand when you need a model for Wetlands, Forest, and Desert.
10. Glue backs together to form triorama.
RUBRIC FOR UTAH’S REGIONS TRIORAMA

<table>
<thead>
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<th>CRITERIA</th>
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<th>3</th>
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<tbody>
<tr>
<td>1. Label your Region</td>
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<tr>
<td>2. Use information from book/handout</td>
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<tr>
<td>3. Draw and color a Background</td>
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<tr>
<td>4. Add-3D Figures (3-4)</td>
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<td>5. Completed on time</td>
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Rating Scale:
1. Work is of Excellent Quality
2. Work is OK
3. Work is not evident

Name______________
Date Due______________
Lesson Title: Fossils

SC Standard IV, Objective 1
SS Standard I, Objective 2

Implementation Time: 30 minutes per activity (several days in a row)

Media Resources:
Optional DVD: Bill Nye Fossils (eMedia online)

Materials Needed:
If you don’t have fossil samples, borrow a free fossil kit from the GSD Media Center, the UMNH or the UGS
http://geology.utah.gov/teacher/teachkits.htm
http://www.umnh.utah.edu/toolbox#fossil
Could use pictures, actual fossils or models:
Leaf imprint in stone (impression)
Cast fossil (impression)
Footprint in stone (impression)
Insect in amber (preserved)
Petrified wood or bone (mineral replacement)

Activity 1
Per student:
Plaster of Paris or clay
Leaf, real or silk
Cup or milk carton

Activity 2 Materials
Per student:
plaster or clay
cup or milk carton
1 seashell
petroleum jelly
talcum powder

Activity 3 Materials
Per student:
sm. paper plate
plaster
a few toothpicks
butcher paper (to keep desks clean)
Activity 4 Materials  Activity 5 Materials
- glue gun
- glue sticks
- Per student:
- real dried bone
- fossilized bone
- S\small plastic item
- hand lens
- 3x5 index card
- Venn Diagram Sheet
- Pencil

Procedure:

Pre-Assessment/Invitation to Learn
Before you show the students these fossils, ask them again what fossils are. Tell students that today they are going to learn how nature makes fossils. Let them see the five examples of fossils. Tell them the name of each fossil. Let them speculate as to how these fossils were made by the name that is given to each fossil.

Activity One - Make an Imprint Fossil (Impression Fossil)
Review what an imprint fossil is and give examples. Tell students they are going to make something that is similar to an imprint fossil to understand how it happens.
1. Mix up some Plaster of Paris, enough for each student. (It should have the consistency of a milkshake.)
2. Pour about an inch into each plastic cup.
3. Right after the Plaster of Paris is poured into each cup, have each student place his/her leaf, vein side down, on top of the plaster. Have them press it so the whole leaf is in contact with the plaster, but it is still lying on top. (It must cure for a couple of hours so it doesn't break.)
4. Ask the students or have them write their answers in their journals:
   - What do you think the plaster will look like when you take the leaf off tomorrow? (It will have a leaf print on it.)
   - Why do you think this is? (Because the plaster became hard while the leaf was still on it, leaving the leaf design.)
   - Why is this like a fossil? (It shows what a leaf looks like even though the leaf is no longer there.)

Activity Two - Make a Mold and Cast Fossil (Impression Fossil)
Review what mold and cast fossils are and give examples. Tell students they are going to make something similar to mold and cast fossils to see how they are formed.
1. Have the students coat the bottom of their sea shells (rib side) with petroleum jelly. (This will make it so the shell doesn't stick to the plaster.)
2. Mix up some plaster for each student.
3. Pour about an inch into each plastic cup.
4. Have each student place the shell, upside down, on top of the plaster. Press the sea
shell so about 3/4 of it goes into the plaster.
5. When the plaster is almost hard, have the students pull the shell out. It will leave an impression in the plaster of what the shell looks like. This is the mold.
6. Let the plaster harden for the next part of the activity. Ask the students these questions:
   *What does taking the shell away from the plaster represent? (It represents the shell decaying and disappearing.)

   *Why did the plaster take on the design of the shell? (When it was placed on the plaster the plaster turned hard and was able to take on the shape and design of the shell.)

   *Why is this like a fossil? (It shows what a shell looked like even though it is no longer there.)

7. Put a thin layer of talcum powder on top of the plaster so it is evenly sprinkled everywhere.
8. Mix up some more plaster for each student.
9. Pour some more Plaster of Paris on top of the mold of the shell. (This will be the cast. It must cure for a couple of hours so it doesn't break.)
10. Ask the students these questions:
    *What do you think the cast will look like when the two pieces of plaster are separated tomorrow? (It will take on the design and shape of the mold.)

    *Why will it look like this? (Because the plaster was liquid when it was poured onto the mold. When it hardened it took the shape of the mold.)

    *Why is this like a fossil? (The cast shows the outside design, the shape, and the outline of what the shell looked like.)

**Activity Three - Make Trace Fossils (Impressions Fossil)**
Review with students what a trace fossil is and how they are made.
1. Give each student a small paper plate, paper mat for spills, and a toothpick.
2. Make some Plaster of Paris for each student.
3. Pour some plaster in each plate.
4. Before the plaster hardens have the students make animals tracks, animal trails, skin prints (fingerprints), and burrows in the plaster with toothpicks.
5. When they are done making the trace marks, explain to them that they have done a simulation. They made marks made by animals and then they left the area, leaving only traces that they were there.

**Activity Four - Make an “Amber” Fossil (Preserved Fossil)**
Review with the students ways animals can be preserved for thousands and many years. Show some pictures if you don’t have a sample.
[http://www.fossilmuseum.net/EdResources/Amber-Images.htm](http://www.fossilmuseum.net/EdResources/Amber-Images.htm)
1. Tell them they are going to do a simulation of an ant getting stuck in tree sap.
2. Give each student a small plastic item representing an ant (Zurcher’s sells of mini plastic ants for about $2.00 for 100) and a 3 x 5 index card.
3. Have each student put the item on the left half of the card.
4. Have the students bring their cards, with the “ants” on them, up to you so you can encase the “ants” in hot glue (represents tree sap).
5. After everyone is done, explain to the students that over a period of millions of years, the sap fossilized to amber and the “ant” is preserved.
6. Have them write on the right side of the card the process of how the “ant” was preserved.

**Activity Five** - Compare and Contrast a Fresh Bone with a Fossil Bone (Mineral Replacement)

1. Allow the students to handle the real bone and fossilized bone.
2. Hand out the Venn Diagram Sheet.
3. Have students discuss similarities and differences of two items and fill out the Venn Diagram.

Optional: After all the activities, you could show *Bill Nye Fossils* to summarize what the students have learned.

**Assessment:**
Have the student correctly identify the type of impression fossil that is shown to them with pictures, real fossil, and /or made fossils.

Read students’ journals to see if they answered the questions correctly that were asked about the fossil they made.

Using their own words, have the students write how their fossil is made. Students should write in expository style with the words they should know and understand.

**Extensions:**

**Language Arts**
Have the students find books about fossils. Have them read about the fossil they made.

With the knowledge the students have about these fossils, have them write a fictional essay about the journey of an animal or plant becoming a fossil.

**Music**
Have students sing the Fossil Song (or make up their own!)
Fossil Song
by Agnes Peirce

A fossil is name we give to plants and animals
That lived on earth before we did,
A long, long time ago.
Remains and traces left behind can tell us of Earth’s past
Their shells and bones and teeth are hard,
They don’t decay too fast!

A fish might die and settle to the bottom of a lake,
It sinks into sediment,
Silt covers its remains.
As years go by new layers pile up on top of all the bones
Then water adds the minerals
That turn it into stone.

Some fossils form in other ways (not just in sediment)
The wind blows sand that buries plant
And animal remains.
Volcanoes erupts, spew ash. Mud-flows slide down the hills
And amber is the sticky sap
That preserves bus so well.

The forest once were deserts and mountains were under seas
We know this because fossils tell
Us our earth’s history.
A woolly mammoth froze to death, thousands of years ago
Which tells us once upon a time
The Arctic had less snow!
A fossil is name we give to plants and animals
That lived on earth before we did,
A long, long time ago.
Remains and traces left behind can tell us of Earth’s past
Their shells and bones and teeth are hard,
They don’t decay too fast!

Sung to the tune of “Supercalifragilisticexpialidocious”
Fossil Bone

Real Bone
Background for Teachers:

In this investigation students will investigate four different ways fossils are made in sedimentary rock: impression, trace, preserved and mineral replacement (petrification) fossils.

Impression Fossils: These fossils are made by organisms that are left in sediments. If a small soft, organism is completely covered with sediment, the organism will leave its body prints on the surrounding mud. It will eventually decay with only the prints left on the sediments. Impression fossils are broken down into two categories: (1) imprint fossils and (2) mold and cast fossils.

Imprint: These are impressions of thin organisms such as feathers, leaves, or fish that had fallen into sediment before the sediment hardened. Later the organisms decomposed leaving only the carbon remains of the organisms on the sedimentary rock.

Mold and Cast: Mold fossils are impressions made from larger organisms. When an organism dies and is covered by sediments, it decomposes slowly, but eventually decays completely. The cavity left in the rock will retain the exact shape and size and is called the mold.

The cavity in the sedimentary rock may later fill with sediments and may take the shape of the mold. This is the cast. It looks just like the original organism on the outside.

Trace Fossils: These fossils are marks or tracks left by ancient organisms that have been preserved in sedimentary rock. These are fossils that show organisms were once in the area and then went on their way. They include:
Tracks or footprints made in soft mud
Trails or paths left by a moving body in soft mud
Burrows made in soft mud.
Coprolites - dinosaur dung
Egg shells
Gastroliths - digestive stones
Body imprints

Preserved Fossils: These are fossils that are unaltered and the original organism stays intact. The soft body parts as well as the hard parts are preserved. Here are different ways preservation happens:
Freezing- Sometimes whole organisms will be encased in ice or snow and the ice or snow never melts. The freezing of an organism prevents decaying and preserves the organism.
Amber- Sometimes an insect gets trapped in tree sap. Over time the sap fossilized to amber.
Mineral Replacement: The fossils that students are most familiar with are mineral replacement fossils (also known as mineralized, petrified, and fossilized). When an animal is buried in sediments, the soft parts of the organism decay quickly. The hard parts such as bones, teeth, and claws will not decay right away in the sediments. Since they stay in the sediments unchanged for many years, they have a chance of becoming mineralized. For example, when the original bone is buried, water must seep through the sediment and pass through the bone. At this point mineral replacement can take place. The seeping water dissolves the bone, but as the water is dissolving it, the minerals in the water replace the bone one cell at a time changing it into stone. Wood changes to stone in the same way except that wood is often covered with volcanic ash instead of sediments. When a volcano explodes and sends ash into the air, it lands in thick layers. If a forest is nearby, it will cover the trees and prevent the wood from rotting. Rainwater falls on the ashes for many years and seeps through the ash to the wood. The water dissolves the wood and replaces each cell with minerals changing it to stone. There are activities in this investigation that simulate the ways nature makes the fossils described above. All students don’t have to do all the simulations to understand how fossils are made. You can break the students up into groups and have each group make a simulated fossil. Have the students keep a journal of what they do to make these fossils.
Lesson Title: Utah’s Physical Features & Scenic Attractions

SS Standard 1, Objective 1

Implementation Time: 45 minutes

Media Resources Needed: Encyclopedias (hard copy or online); Utah Atlas: Geography and History by Cliff B. Craig and M. Elijah Carr

Resources Needed: student-created Utah maps (Utah’s Three Regions Lesson)

Materials Needed: crayons (for each student); poster-sized butcher paper; markers, crayons, pencils

Procedure:

1. Project/direct students’ attention to page 22 in the Utah Atlas. Point out the blue lines on the map and explain what they represent. Assist students in adding and labeling Utah’s major rivers and water bodies (in blue) to their maps, encouraging students to share their background knowledge and experience.

2. Project/direct students’ attention to page 17 in the Utah Atlas. Direct students to find a Utah State Park, a National Forest, and a National Park, Monument, Recreation Area, or Historic Site in each of Utah’s three regions and label them on their maps.

3. Divide students into cooperative groups and assign each group to research the scenic attractions in a specific region of Utah. Have students note what type of physical feature (the cause) the scenic attraction is in (the effect). Have each group create a poster-sized “postcard” that highlights the region and share their postcard with the class, teaching their peers about the scenic attractions and land features of Utah.
Assessment:

Assign each student to write a letter home describing a Utah scenic attraction/recreation area that the student would like to visit (students must choose a place they haven’t yet visited). In the letter, students must describe where the attraction is located (region, direction), what weather to expect, what makes the attraction unique (physical features), and what visitors can expect to learn/see/experience.

Extension:

Assign students to choose several scenic attractions in different regions of Utah and use Utah road maps to determine the mileage from their local community to the scenic attraction. Students can check their figures on MapQuest and collaborate to find the quickest routes, most scenic routes, and routes that allow them to visit more than one scenic attraction.
Essential Question #2:

How does water influence living things in Utah?

Lessons:

- The Where and How of Utah’s Water
- Utah Recreation

Core Standards

<table>
<thead>
<tr>
<th>Social Studies</th>
<th>Science</th>
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<tbody>
<tr>
<td>Standard I</td>
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<tr>
<td>□ 2a identify population concentrations in the state and infer causal relationships between population and physical geography</td>
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<tr>
<td>□ 3b explain viewpoints regarding environmental issues (examples may include: species protection, land use, pollution controls, mass transit, water rights, trust lands)</td>
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<tr>
<td>□ 3c outline the development of recreation in Utah since 1900</td>
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</table>
Essential Question #2: How does water influence living things in Utah?

Lesson Title: The Where and How of Utah’s Water

SS Standard 1, Objective 2

Implementation Time: 45 minutes

Media Resources Needed: Utah Atlas: Geography and History by Cliff B. Craig and M. Elijah Carr

Resources Needed: student-created Utah maps (Utah’s Three Regions Lesson); “Cause and Effect” graphic organizer

Procedure:

1. Ask students to brainstorm all the ways that water is important to their life in Utah (drinking, bathing, watering plants, growing food, recreation, fishing, etc.). Referring to the Utah maps they created for essential question #1 and all they learned about Utah’s three regions, rivers, and bodies of water, ask students to infer: Where in Utah would be the best places to get your water needs met? Which places would be more challenging? Why? How would you adapt?

2. As students continue to reference their maps, project/direct their attention to pages 14 & 15 in the Utah Atlas. Direct students to the relationship among water, location of cities and towns, and population concentrations.

3. Review the importance of water in Utah: basic need, limited resource, Utah is the second driest state; every living thing needs water to survive. Discuss water conservation and list ways students can conserve water. Talk about some of the advertisements and public campaigns in Utah that encourage Utahans to conserve water.

Assessment:

Assign students to complete the “Cause and Effect” graphic organizer, demonstrating all they know and understand about the relationship among water, population concentration, and cities and towns in Utah.
WATER: CAUSE AND EFFECT

Water influences *where* people in Utah live.

Limited resources influence *how* people in Utah live.
Lesson Title: Utah Recreation

SS Standard 1, Objective 3

Implementation Time: 45 minutes

Media Resources Needed: Utah Travel Guide: Life Elevated (free from the Utah Travel & Tourism department); Utah Travel & Tourism webpage at http://utah.travel/; computer and LCD projector; computer lab/classroom computers

Procedure:

1. Ask students to think of all the recreation activities available to them in Utah. List them on the board, allowing students to share their experiences and connections to Utah recreation. Circle all of the recreation activities that involve water and discuss the importance of water to Utah’s travel and tourism industry (skiing, boating, river rafting, fishing, kayaking, etc.)

2. Project the official Utah Travel & Tourism website at http://utah.travel/. Watch the short tourism “podcast” videos and ask student to look for forms of recreation that would not have existed 50, 70, 100 years ago. Share.

3. Explain to students that recreation and tourism generates revenue for Utah, so it is important for our state to attract visitors and to protect the recreation sights people want to visit. These sites are located throughout the state.

4. Divide the class into three groups. Assign each group one of the regions listed under the “Regions” tab on the website (Northern Utah, Central Utah, Southern Utah). Divide the three larger groups into smaller groups of 3-5 students and assign each group a different city within their region (see Utah Travel Guide for names of cities). After demonstrating how to manipulate the http://utah.travel website, allow each small group to access the pages for their region on the online version of the Utah Travel Guide: Life Elevated document.

5. As a group, assign students to find examples of recreation in their city, particularly those involving water, and campgrounds/lodging in the vicinity. Use the “Water Activities” section of the Travel Guide, accessible through the
“Attractions” window on the backpack slide. Allow students time to view pictures and explore the website. Have small groups report back to the large group, sharing information about the different cities within their common region.

6. Ask students to stand if they found some form of recreation in their region associated with water. Allow them time to share the recreation, region, and city. Tell students they can remain standing if their form of recreation existed 10 years ago, 20 years ago, and so on, until you have illustrated (through the small number of students left standing), how recreation has changed/developed over the past 100 years.

Assessment:

Assign students to write a 3-5 sentence answering the essential question *How does water influence living things in Utah?* in the context of state recreation. Have students pass their papers to the right/left repeatedly, giving classmates 20 seconds to read each response. By the time students’ papers return to them, they should have read all their classmates’ responses. Give students time to revise any details/information before submitting their paragraph.
Essential Question #3:

What forces cause changes in Utah’s environment and how do those changes impact Utahans?

Lessons:

- Weathering
- Erosion
- Utah’s Public Health & Safety

### Core Standards

<table>
<thead>
<tr>
<th>Social Studies</th>
<th>Science</th>
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</thead>
<tbody>
<tr>
<td><strong>Standard I</strong></td>
<td><strong>Standard III</strong></td>
</tr>
<tr>
<td>2e examine the interactions between physical geography and public health and safety (examples may include: inversions, earthquakes, flooding, fire)</td>
<td>2a identify the processes of physical weathering that break down rocks at Earth’s surface including water movement, freezing, plant growth, wind</td>
</tr>
<tr>
<td></td>
<td>2b distinguish between weathering including wearing down and breaking of rock surfaces and erosion including the movement of materials</td>
</tr>
<tr>
<td></td>
<td>2c model erosion of Earth materials and collection of these materials as part of the process that leads to soil</td>
</tr>
</tbody>
</table>
Lesson Title: Weathering

SC Standard III, Objective 2

Implementation Time: 60 minutes plus observation time on following days

Materials Needed: (per student/group)

**Activity 1 Materials**
- 16 oz. paper cups
- Colored Chalk
- Salt

**Activity 2 Materials**
- Plastic bottle with lid
- Small pieces of sandstone (about 3 pieces per bottle)
- Water

**Activity 3 Materials**
- 16 oz. paper cups
- Bean seeds
- Plaster of Paris
- Paper towels

**Activity 4 Materials**
- Small plastic bags
- Clay (the soil kind, dig it in a yard)
- Water

Procedure:
Teacher Background Info: Soils form over millions of years from parent material that is broken down by weathering from wind, water, temperature, chemical changes, and living organisms. Over time, glaciers move over the land and grind rocks together, rubbing off particles of all sizes. By day, rocks are warmed by the sun and expand, while at night the rocks cool and contract.

Over time, enough expansion and contraction cause rock particles to chip off. In cold temperatures water in the cracks of rocks freezes and expands, causing the rocks to break into smaller pieces. Plant roots will grow into "soft" rock and cause them to break. Water and wind wear away at rocks carrying tiny bits of rock along until they get trapped by soil.
Many rocks are broken apart by lichens. Lichens are tiny crusty, coral-like plants (green, orange, gray, etc.) that live on rocks. These tiny plants secrete an acid that dissolves some minerals and breaks down the rock. Decaying plants and animals are organic matter. Organic matter is also acidic. When water and organic matter mix, they form a slightly acidic solution that breaks down rocks in soil. That is why soils in the eastern United States are more acidic than the soils in the West. They contain more organic matter.

Organic matter is good for plants. It keeps topsoil in its place, keeps soil particles together, retains soil moisture, and speeds up soil formation. It takes between 100 and 500 years for just one inch of topsoil to form, depending on the type of rocks and climate.

Pre-Assessment/Invitation to Learn

1. Ask the students to consider these questions: Which is stronger, a plant or rock? Is water stronger than a rock? Would you expect water to damage or break apart large rocks? Assessment: Students should draw diagrams illustrating each of the following types of weathering processes. Some of these will occur over a period of days and weeks. They should draw and label a series of diagrams to show the progression of weathering.

Activities

Activity 1 - Wind as an agent of weathering

1. Give groups of students a cup half-filled with salt and a colored piece of chalk. Have them take turns stirring the colored chalk through the salt.
2. Two things will happen: the salt will be colored and the chalk piece will wear away.
3. Relate this to wind blowing sand on rocks and wearing them away like the formations seen southern Utah. (Instead of wind blowing sand against Arches, tell them the chalk represents Arches and they are moving Arches through the sand.)

Activity 2 - Running water as an agent of weathering

1. Compare river rocks with sharp-edged rocks. Rub two pieces of sandstone together and notice the pile of sand that collects.
2. Fill the plastic bottle 3/4 full of water.
3. Drop in three or four small pieces of sandstone.
4. Make sure the top is screwed on tightly. Have students observe the clean, clear water, and the shape of the rocks.
5. Shake bottle vigorously for three minutes.

Activity 3 - Plant growth as an agent of weathering
1. Explain that Plaster of Paris hardens and will represent rocks in this demonstration. Mix the Plaster of Paris quite well and pour into a disposable 16 oz. cup. 2. "Plant" several bean seeds in the wet mix so that some are covered and are just below the surface and the others are resting on the surface (about half submerged).
3. Assign a student to keep a wet folded paper towel on top of the cup. It must be moistened every day. (Soaking the seeds ahead of time will hasten their growth.) 4. Ask students to predict what will happen to the seeds. Record predictions and subsequent observations in their science log.
5. Over the course of two to three weeks you will see the seeds sprout. As they do, small fragments or flakes of the Plaster of Paris will break away. These flakes represent rock flakes broken away from large rocks as plants take root and grow on them.

Activity 4 - Freezing water as an agent of weathering

1. Wet a chunk of clay about the size of a grapefruit. Roll it into a ball.
2. Place the ball in a plastic bag and put it in the freezer. Leave it overnight.
3. Next day, removed the clay from the freezer. Its surface should be slightly cracked and broken. Ask students to record their observations.
4. Wet the clay again, taking care not to close up the cracks that have been formed. Put it back into the freezer for another night.
5. On the following day, take it out and have students observe what has happened to the cracks. Measure the cracks. You could repeat this process several more times, watching the cracks widen. Discuss how this relates to the breaking down of rocks on a larger scale. Compare this to autumn rains filling cracks in the rocks (and sidewalks) then freezing during the winter.

Assessment:
Take a tour around the school grounds to look for evidence of weathering.
Show pictures and categorize types of weathering illustrated.

Extension:
Make sand drawings or sketch Utah locations (like Zion’s Park or Arches).
Lesson Title: Erosion

SC Standard III, Objective 2

Implementation Time: 45 minutes

Media Resources Needed:
Optional video: *Weathering and Erosion* (Earth Science Collection- eMedia, online)

Materials Needed:
Seed tray or other tray with sides  trowel
grass seed  watering can
dry soil  hair dryer or sm. fan
gravel  piece of sod

Procedure:
1. Discuss with students the difference between *weathering* (wearing down and breaking of rock surfaces) and *erosion* (the movement of materials).

2. Optional: Show the video Weathering and Erosion. Have students put check marks next to items mentioned in the film that were also mentioned during the class discussion on weathering and erosion.

3. Do the following experiment to demonstrate erosion:
   a. Fill the seed tray with dry soil and blow air across it using a hair dryer or fan. Ask students to record their observations. Raise the end of the seed tray by stacking books under one end and use the watering can to trickle water on the raised end of the tray. Have students observe and record in their logs what happens to the soil as the water runs through it.
   b. Refill the tray with soil. Scatter gravel across the surface. Repeat the wind and water demonstrations. Have the students compare what happens with
the presence of the rocks on the soil. How does this relate to
some of the unique land formations found in Utah?
c. Put a piece of sod over the soil and repeat the wind and water
demonstrations. Have students compare what happened and summarize this
experiment in their science logs.

4. Take students on a walking field trip around the school-yard. Have students
observe evidence of erosion. Pay particular attention to areas where sand
collects, such as around the swings, at the edge of the playground, at the doors
to the building. Have students also observe evidence of weathering, such as
cracks in the sidewalk, plants pushing through sidewalk areas. Have students
record observations.

**Assessment:** Discuss the activities and observations. Have students discuss
definitions for erosion and watering and write them in their science logs.
Lesson Title: Utah’s Public Health & Safety

SS Standard I, Objective 2

Implementation Time: 45 minutes

Media Resources Needed: Utah Atlas: Geography and History by Cliff B. Craig and M. Elijah Carr; computer and LCD projector; computer lab/classroom computers

Resources Needed: “Utah Emergency Management” handout

Procedure:

1. Activate students’ background knowledge by asking them how Utah’s geography presents unique public safety challenges (floods, earthquakes, wildfires, inversion).

2. Project page 36 “Earthquakes & Faults” of the Utah Atlas. Ask students what they observe about the major and minor faults and about the historical magnitude of Utah earthquakes.

3. Without frightening students, refer their attention to page 14 in the Utah Atlas and ask them what they observe. Students will notice that Utah’s settlement pattern follows the high hazard earthquake and fault lines and that the major fault lines run along the I-15 corridor. Explain that settlers chose these locations because of water, which comes from the mountains, but that the mountains present other public health and safety issues. Thus, it is important and necessary to know what to do in case of an emergency.

4. Project the http://kids.utah.gov/ website. Under “Parents and Safety,” link to the “Emergency Management for Kids” website sponsored by FEMA. Direct students to the “Disaster Area” link and allow them to explore the information on earthquakes, floods, wildfires, thunderstorms, and winter storms. Assign each student to use the information they find to complete the “Utah Emergency Management” handout.
Assessment:

Assign students to take their lists home and share them (and the website, if appropriate) with their families.
<table>
<thead>
<tr>
<th>Terms to Know</th>
<th>Things to Know</th>
<th>How I can be prepared</th>
</tr>
</thead>
<tbody>
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<tr>
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<tr>
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<tr>
<td><strong>Winter Storm</strong></td>
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<tr>
<td><img src="image" alt="Winter Storm" /></td>
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</tr>
</tbody>
</table>
Essential Question #4:

How have human actions over time changed Utah’s physical environment?

Lessons:

- Human Impact on Utah’s Environment

Core Standards

<table>
<thead>
<tr>
<th>Social Studies</th>
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</thead>
<tbody>
<tr>
<td>Standard I</td>
<td></td>
</tr>
<tr>
<td>□ 2c compare the development of industry and business in Utah as it relates to its physical geography (examples may include: mining, oil, agriculture, tourism)</td>
<td></td>
</tr>
<tr>
<td>□ 3a describe how and why humans have changed the physical environment of Utah to meet their needs (examples may include: reservoirs, irrigation, climate, transportation systems and cities)</td>
<td></td>
</tr>
<tr>
<td>□ 3b explain viewpoints regarding environmental issues (examples may include: species protection, land use, pollution controls, mass transit, water rights, trust lands)</td>
<td></td>
</tr>
<tr>
<td>□ 3c outline the development of recreation in Utah since 1900 (examples may include: sports, tourism, state and national parks)</td>
<td></td>
</tr>
</tbody>
</table>
Science & Social Studies Interconnections: A Thematic Approach
Lesson Title: Human Impact on Utah’s Environment

SS Standard I, Objective 2

Implementation Time: 60 minutes


Resources Needed: three small sticky notes per student

Procedure:

1. Begin the lesson by asking students to think about the ways human actions change the physical environment including land, animals, and natural resources. If appropriate and visible, have students look across the Salt Lake Valley to the Oquirrh Mountains. Instruct students to look for evidence that human actions have changed Utah’s physical environment (they should notice visible scarring on the mountain from the Bingham/Rio Tinto Mine). Call for other examples and allow students to share their background knowledge.

2. Project page 10 “Mosaic of Utah” of the Utah Atlas. Ask students to visualize how Utah may have once looked. Project page 34 “Early Settlements” and then page 11 to demonstrate how Utah has been developed by human actions over time. Project page 13 “Utah’s Transportation Network” to illustrate where roads and interstate highways have been built in the state. Discuss the benefits of good transportation systems (jobs, essential for transporting goods, good for tourism and recreation, brings revenue to our state, connects our state to the rest of the nation) as well as the negative impacts (destroys natural environment, disrupts animal migration patterns, pollution).

3. Project page 16 and 17 and discuss Utah’s land ownership and recreation areas, comparing the amount of privately owned land with the amount of wilderness...
and state/national land in Utah and how that land is used. Discuss the benefits and negative impacts of recreation and how this issue is very contentious in Utah because people have strong opinions about how Utah’s land should be used.

4. Finally, project page 35 “Mining in Utah” and discuss the different mineral deposits mined in Utah and the impact mining has on the physical environment. Have students think about the example of the Oquirrh Mountains or the open-pit mine in Bingham Canyon.

5. Divide students into groups of six, giving each member of the group the same excerpt from *It Happened in Utah*. Explain that students are going to be reading a short story about human events that changed Utah’s physical environment and that they need to look for evidence of this as they read. Assign students to skim their excerpts, familiarizing themselves with the structure of the text (expository, narrative). Give each student three sticky notes, explaining that students should carefully read their excerpt this time and use the sticky notes to mark places in the text where they find evidence. Have each group share the evidence they find.

6. Jigsaw groups so that each group now has a representative of each excerpt. Each student in the jigsaw should summarize his/her piece in one minute or less and then share the evidence generated by their large group. Repeat for each student in the group. Those not sharing information should be listening carefully and should be prepared to ask clarifying questions of the presenter(s).

**Assessment:**

Assign students to observe their surroundings on the way home from school, noting how human actions have changed Utah’s physical environment. Assign students to write their own story (with the student as the main character) about the changes they see taking place in their community (houses being built on farm fields, roads being expanded, people polluting/littering) and the impact those changes are having on the physical environment in their community/state.
Extension:

Bake a chocolate cupcake for each student. Mix coconut, raisins, hard candy pieces (red-hots work well), and sunflower seeds into the mix before baking. Frost with a thin layer of chocolate frosting and freeze. Give each student a cupcake, napkin, paper plate and toothpick and instruct them to “mine” their cupcake. Students should first scrape off the frosting and place it together on the paper plate – instruct them that this represents top soil. Next, using only their toothpick, students must extract the different “deposits” and separate them on the paper plate. As students conduct this exercise, ask them to reflect on what happens to the physical environment when mining takes place and ask them to determine ways to “restore” the environment so that it can still be used after extractions have taken place. Cupcakes can be made and frozen months in advance. Advise students of this and discourage them from eating their “mines”!
Fourth Grade Interconnections

Unit III

*Cause & Effect: Utah’s People, Ideas and Events*

**Enduring Understanding:**
Utah has been shaped by many diverse people, ideas and events that continue to impact life in our state.

**Essential Questions**
- *In what ways is Utah shaped by diverse people and their ideas?*
- *How have human-caused events shaped Utah’s past and present?*
- *How do weather and weather patterns affect different aspects of life in Utah?*
- *How does Utah’s economy impact life in our state?*
- *How can data-supported prediction help us plan for Utah’s future?*

**Core Curriculum Concepts/Skills:** observation, classification, inquiry, cause-effect, interrelationships, prediction, inference, investigation, relationships

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**Core Standards**

**Social Studies**

Standard I: Students will understand the relationship between the physical geography in Utah and human life.
   - Objective 3: Analyze how human actions modify the physical environment.

Standard II: Students will understand how Utah’s history has been shaped by many diverse people, events, and ideas.
   - Objective 1: Describe the historical and current impact of various cultural groups on Utah.
   - Objective 2: Describe ways that Utah has changed over time.
   - Objective 3: Investigate the development of the economy in Utah.

**Science**

Standard II: Students will understand that the elements of weather can be observed, measured, and recorded to make predictions and determine simple weather patterns.
   - Objective 1: Observe, measure, and record the basic elements of weather.
   - Objective 2: Interpret recorded weather data for simple patterns.
   - Objective 3: Evaluate weather predictions based upon observational data.

Standard V: Students will understand the physical characteristics of Utah’s wetlands, forests, and deserts and identify common organisms for each environment.
   - Objective 2: Describe the common plants and animals found in Utah environments and how these organisms have adapted to the environment in which they live.

**Social Studies language students should know and use:** immigrant, supply, demand, producer, economy, consumer, technology, globalization

**Science language students should know and use:** atmosphere, meteorologist, freezing, cumulus, stratus, cirrus, air pressure, thermometer, air temperature, wind speed, forecast, severe, phenomena, precipitation, seasonal, accuracy, barometer, rain gauge, components
Essential Question #1:

In what ways is Utah shaped by diverse people and their ideas?

Lessons:

- Utah Petroglyphs
- Utah’s Five American Indian Tribes
- Introduction to Historical Groups of Utah
- Diversity in the Beehive State
- People of Utah: Points of View

Core Standards

<table>
<thead>
<tr>
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<th>Science</th>
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</thead>
<tbody>
<tr>
<td>Standard II</td>
<td></td>
</tr>
<tr>
<td>□ 1a chart the routes that diverse cultural groups took from their places of origin to Utah, using maps and other resources</td>
<td></td>
</tr>
<tr>
<td>□ 1b explore points of view about life in Utah from a variety of cultural groups using primary source documents</td>
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</tr>
<tr>
<td>□ 1c explore cultural influences from various groups found in Utah today (examples may include: food, music, religion, dress, festivals)</td>
<td></td>
</tr>
<tr>
<td>□ 1d identify and describe leaders from various cultures who exemplify outstanding character and life skills</td>
<td></td>
</tr>
<tr>
<td>□ 1e explain the importance of preserving cultural prehistory and history, including archeological sites and other historic sites and artifacts</td>
<td></td>
</tr>
</tbody>
</table>
Fourth Grade
Unit 3: *Cause & Effect: Utah’s People, Ideas and Events*

**Essential Question #1:** In what ways is Utah shaped by diverse people and their ideas?

**Lesson Title:** Utah Petroglyphs

**SS Standard I, Objective 1**  
**Art Standard IV, Objective 1, 2**

**Implementation Time:** 45 minutes

**Media Resources Needed:** petroglyph and map examples from the National Park Service website [http://www.nps.gov]; THU *Indians of Utah* by Paul Thompson or teacher-preferred resource; *Treasures of the Tavaputs* by Jerry D. Spangler & Donna K. Spangler

**Resources Needed:** large Utah timeline*

**Materials Needed:** plaster of Paris squares; brown tempera paint; cement nails

**Procedure:**

7. Share background information from *Indians of Utah* (pages 10-11) by Paul Thompson or other teacher-preferred resource, referencing your classroom Utah timeline. Take a virtual field trip on the National Park Service website at [http://www.nps.gov] and view colored maps and photographs of Utah petroglyphs and Newspaper Rock. Examine the photographs in *Treasures of the Tavaputs*.

8. Discuss the symbols on Newspaper Rock and their meanings. Discuss how Ancient Pueblo, Freemont, and Ute peoples drew animals, people, and symbols that meant something to them and to tell stories. Allow students to draw inferences about ancient cultures from what they observe in these artifacts.

9. Assign students to create their own message on the plaster of Paris squares using nails to scratch the message on the square. Discuss the fact that stone is long lasting is the reason we can enjoy ancient rock art today.

10. Have students share their petroglyphs with classmates, allowing others to make inferences about the messages. Display them on a “Newspaper Rock”
bulletin board in the classroom. Ask students to make an emotional connection to how they would feel if someone destroyed their petroglyph/message. Connect this to the importance of respecting and preserving historical artifacts for future generations to enjoy.

Assessment:

Have students write a short “editorial” for the local paper arguing why it is important for Utahan’s to appreciate and protect historical artifacts. Students should include an understanding of how Utah has been shaped and continues to be impacted by its ancient cultures and historical artifacts.

Extension:

Review the “Tips for Desolation Canyon Visitors” in Treasures of the Tavaputs. Have students simplify and re-write the 10 bulleted tips in their own words and then create an illustrated brochure or flyer explaining to other children how to visit and protect archeological sites and artifacts.

*A Utah classroom timeline should be displayed throughout the unit/school year. A large, computer-generated timeline can be laminated and used repeatedly.*
4th Grade
Unit 3: Cause & Effect: Utah’s People, Ideas and Events

Essential Question #1: In what ways is Utah shaped by diverse people and their ideas?

Lesson Title: Utah’s Five American Indian Tribes

SS Standard II, Objective 1

Implementation Time: 45 minutes

Media Resources Needed: Native American People: The Ute by Doherty or True Book Utes by Flanagan or Utes by Lassieur; Utah Atlas: Geography and History by Cliff B. Craig and M. Elijah Carr; computer and LCD projector; http://www.kued.org/productions/weshallremain/

Materials Needed:
• note taking page and key for Utes and Goshutes
• chart paper, marker

Procedure:
1. Tell students the following story:
   The Ute believed that long ago a Ute hunter had seen a bear come out of his winter den and dance. The bear told the hunter that if he would copy the bear’s dance he would become a better hunter and a better husband. So each year the Ute gathered together and held their bear dances. A special brush enclosure was made by the group hosting the dance. The dance lasted for as long as ten days. During the dance, a group of Ute singers would sing the bear-dance songs and play a rasp like instrument.

   The man and women of the tribes formed separate lines that faced each other and then selected a partner to dance opposite them. It was at the Bear Dance that young men and women would find a person to marry. During the Bear Dance, the people not dancing would visit with each other and gamble. At the end of the dance, the host group provided a feast for all those who had come.
2. Tell students this is a story of the Ute people. Children did not go to school, but they learned from their parents and grandparents in the same way you just did, usually through stories.

3. Explain that Utah has five major American Indian tribes: Ute, Shoshone, Goshute, Paiute, and Navajo. Although some tribes consist of smaller groups or bands, most associate with one of the five major tribes. These tribes still exist today and continue to contribute to Utah’s culture. Although many of Utah’s American Indians live in our communities, some live on reservations. Project page 29 in the *Utah Atlas* to orient students to the geographical location of Utah’s American Indian tribes and the locations of their reservations.

4. Pass out the note taking page and tell students to listen carefully so they can answer the questions on their note taking page (answers will vary depending on student interpretation, so teacher should model).

5. Read sections from one of the books listed above about the cultural influences of Utah’s five major American Indian tribes, including: music, food, clothing, government, religious beliefs, and festivals.

Assessment:

Discuss and clarify any question on the note taking page. Assign students to summarize the cultural contributions of one of the five tribes (student choice) in a five sentence paragraph.

Extensions:
1. Invite an expert (preferably a representative from one of Utah’s five major American Indian tribes) to speak on culture.
2. Visit the Museum of Natural History or [http://www.umnh.utah.edu/toolbox](http://www.umnh.utah.edu/toolbox) to borrow the *Native Utah* Teaching Toolbox.
UTAH’S FIVE AMERICAN INDIAN TRIBES

1. What were the different types of shelters and what were they made of?

2. How did American Indians in Utah get their food?

3. What were the foods eaten by the different tribes?

4. What were the different tribes’ clothing made of?

5. How were most indigenous people in Utah governed?

6. What were the different religious beliefs of Utah’s American Indian tribes?

7. What are the different festivals of Utah’s American Indian tribes?

8. List other cultural contributions (music, art, etc.):
Lesson Title: Introduction: Historical Groups of Utah

SS Standard II, Objective 1

Implementation Time: 60 minutes

Media Resources Needed: The Utah Adventure by John McCormick

Resources Needed: “My Group in Utah” sheet; “Characteristics List”; “My group in Utah: Women”; “Note taking Web”

Procedure:


2. Ask students what questions they have about their group. The teacher may need to display the “Characteristics Lists” on a chart. The answers to the questions will reveal the various points of view of the Utah groups. Use the “Women” questions sheet for a model. (See example)

3. Instruct students to generate questions about their groups, then write the questions in the boxes on the sheet. The questions they generate must address the issues of cultural contributions and cultural traditions of the group they are studying.

4. Assign one question to each of the students in the group. The student cuts out the question and glues it to the center of a blank page. As the student researches and finds answers, the answers are drawn on a web around the question (See example).

5. Allow students to engage in inquiry (research) for the remainder of the lesson.
Assessment:

Each group will generate three questions which will help them discover the point of view of the people they will be studying.
CHARACTERISTICS LIST

Language influences
Reasons for coming
Food
Economics
Community planning
Religion
Traditions/celebration
Recreation
Disease/starvation
POSSIBLE QUESTIONS STUDENTS COULD BRAINSTORM FOR RESEARCH

1. What words or names do we see in Utah today that came from other languages or cultures?

2. What kind of food did my group eat? Is this food found in Utah today?

3. What did they do for a job?

4. Where in Utah did they live? Can my group still be found living there today?

5. How did they set up their towns or villages?

6. What religions did they practice? Do I see evidence of this religious community in Utah today?

7. What traditions or celebrations did they have? Are these traditions and celebrations continued today?
MY GROUP IN UTAH:

1. Why did they come?

2. What were some of their traditions and cultural contributions?

3. What was their shelter, food, clothing, and arts like?

4. Interesting Facts and questions:
WOMEN

What were some of their cultural contributions?
What were some of their cultural contributions?

1st Woman Congressman Martha Hughes Cannon

First woman to have equal rights

Great work ethic (quilts, farming, etc.)

Helped build houses

1st to have vote in 1895

Worked to help with the war effort
Lesson Title: Diversity in the Beehive State

SS Standard I, Objective 1

Implementation Time: 45 minutes

Media Resources Needed: selected audio clips from the Beehive Archive Radio website http://www.utahhumanities.org/BeehiveArchive.htm; computer with speakers; computers/computer lab and headphones

Resources Needed: “Diversity in the Beehive State” note taking sheet; selected audio clips from the Beehive Archive Radio website; Utah timeline

Materials Needed: three sets of different colored sticky notes (large)

Procedure:


2. Divide students into pairs and assign them to listen to one of the following radio broadcasts: Bnai Israel; Simon Bamberger, Utah’s Jewish Governor; The Town that Couldn’t Keep Its Name; The Godbeites; Samuel Newhouse; Women’s Home Missionary Society; Reva Beck Bosone, Keetley; Holy Trinity Church; Catholic Dioceses of Salt Lake City; 24th Infantry Regiment.

3. Have students first listen to their two-minute radio broadcast without taking notes. During their second (or more) listen, have student pairs complete the “Diversity in the Beehive State” note taking sheet, extracting information as they listen.

4. Give each pair three different colored sticky notes. On the first colored sticky note, assign pairs to record the name of the group highlighted in their radio broadcast (some pairs may need more than one set of sticky notes); on a second colored sticky note, assign pairs to list the ways their group shaped Utah’s
culture; on the third colored sticky note, assign pairs to note the names of leaders within their group and one character trait/life skill that made him/her a good leader. Note: not all pairs will be able to complete the third sticky note and students may need help inferring some of the information.

5. Invite pairs to share their information with the class and post their sticky notes on the appropriate place on the timeline (may need teacher guidance/support). Pairs should first state the name of their group then share contributions and leadership, arranging the sticky notes vertically on the timeline. Instruct the class to listen carefully to their classmates’ presentations and record information for at least two other groups in the box on the bottom of their worksheet. Students should include the date, group, cultural contributions, and leadership for the two groups they choose.

6. After each pair has shared, discuss Utah’s diversity using the timeline as a reference. It is important for students to understand that Utah is the place it is today because of all the diverse groups of people who have lived, worked, and made their homes in Utah.

Assessment:

Assign students to research when and why their first family member came to Utah by talking to family members. Assign students to write their name on a large sticky note and place it on the appropriate place on the Utah timeline.
Diversity in the Beehive State

Beehive Archive Radio Title: ________________________________

Is your radio broadcast about a group or an individual? (circle one)

When did your group/individual come to Utah? ________________________________

Why did your group/individual come to Utah? ________________________________

How did your group/individual make a difference to Utah?

________________________________________________________

________________________________________________________

________________________________________________________

Were any leaders of your group mention? If so, what was his/her name?

________________________________________________________

List the character traits and life skills that made this person a leader:

________________________________________________________

________________________________________________________

________________________________________________________

Timeline:

________________________________________________________
Fourth Grade
Unit 3: *Cause & Effect: Utah’s People, Ideas and Events*

Essential Question #1: In what ways is Utah shaped by diverse people and their ideas?

**Lesson Title:** People of Utah: Points of View

**SS Standard I, Objective 1**

**Implementation Time:** 60 minutes

**Media Resources Needed:** *Utah History to Go* articles [http://historytogo.utah.gov/](http://historytogo.utah.gov/) from “Utah Chapters” collection

**Resources Needed:** “People of Utah” graphic organizer; hard copies/electronic display of selected *Utah History to Go* articles; United States and world maps OR student atlases; Utah timeline

**Materials Needed:** poster-sized pieces of butcher paper (1 per group)

**Procedure:**

1. Use an LCD projector to demonstrate the *Utah History to Go* website at [http://historytogo.utah.gov/](http://historytogo.utah.gov/), modeling how/where to find short articles, pictures, and documents on a variety of Utah cultural groups (see “Utah Chapters”).

2. Divide students into research teams and assign each team to find and read an article dealing with a Utah cultural group (look under “Utah Chapters” labeled American Indians; Trappers, Traders & Explorers; Pioneers & Cowboys; Mining & Railroads, etc.).

3. Use the graphic organizer to guide individual students in reading and extracting main ideas and key information from the articles, documents, and pictures that answers the questions: *Where did your group come from and how did they get to Utah? When and why did they come to Utah? What was/is their life like in Utah? What contributions did they make to Utah’s culture?*

4. In cooperative research teams, have students compare the information uncovered about their Utah cultural group, synthesizing ideas on a poster-sized piece of butcher paper. Students will include the name of their cultural group,
5. Arrange posters around the room. With their incomplete graphic organizers in hand (students should have only their cultural group filled in), instruct students to individually “walk about” the room and visit each poster. As they do so, students should continue to fill in their graphic organizers.

6. As a whole class, review the information students have gathered on their graphic organizers. As each group is reviewed, indicate on the wall/desk maps/atlases where each group came from and ask students to make teacher-supported inferences about the route (s) different groups took to get to Utah.

Assessment:

Exit Ticket: Have each student write a 5-8 sentence paragraph or complete a Venn diagram that compares/contrasts their choice of two Utah cultural groups. Students should use the information gathered on their graphic organizers and during whole class discussion as their sources.
Essential Question #2:

How have human-caused events shaped Utah’s past and present?

Lessons:

- Utah Events Timeline
- Explorers
- The Pioneer Experience
- The Utah War
- Endangered Species

<table>
<thead>
<tr>
<th>Core Standards</th>
<th>Social Studies</th>
<th>Science</th>
</tr>
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<tr>
<td></td>
<td>2a identify key events and trends in Utah history and their significance (examples may include: American Indian settlement, European exploration, Mormon settlement, westward expansion, American Indian relocation, statehood, development of industry, World War I and II)</td>
<td>2e find examples of endangered Utah plants and animals and describe steps being taken to protect them</td>
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<tr>
<td></td>
<td>2b compare the experiences faced by today’s immigrants with those faced by immigrants in Utah’s history.</td>
<td></td>
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</tbody>
</table>
Lesson Title: Utah Events Timeline

SS Standard II, Objective 2

Implementation Time: 60 minutes

Media Resources Needed: This is the Place! A Crossroads of Utah’s Past by Pat & Will Bagley

Resources Needed: Utah classroom timeline

Materials Needed: 1 piece of poster board-sized white butcher paper for each group; markers, crayons, colored pencils

Procedure:

1. Divide students into small groups of no more than five students. Introduce the text structure of This is the Place! and read the first three pages out loud. Show students the pages 1957-10,000 B.C., focusing their attention on what the children in the left hand corner are doing/saying. Explain that the circled picture is important to the storyline.

2. Give each group a date (1957, 1945, 1918, 1896, 1885, 1869, 1858, 1847, 1827, 1540, and 10,000 B.C) and a copy of the book. Explain that each group is going to do more “digging” to find information on their two pages that addresses the essential question.

3. Pass out a poster-board sized piece of white butcher paper to each group. Instruct groups to place their date at the top of the page (as a title) and to choose 3-5 of the most important events from their year to illustrate and to write one-sentence captions for. Allow students time to be creative.

4. Bring the class together and allow each group to present their poster to the class, teaching their classmates about their findings. Have each group place each
poster above/below the classroom Utah timeline and talk about why these dates might be particularly important to Utah.

5. Read the last two pages of the book out loud to the class and show the final picture. Explain to students that, like the layers of earth in the illustration, Utah’s history is layered and that many different groups of people have contributed to our state’s story.

Assessment:

Assign students to reflect on current human-caused events that are shaping/will shape Utah’s history. Draw a picture symbolizing what a fourth grader in 100 years might find if they were “digging around” in Utah’s past and assign students to write a caption, following the examples in the Bagley book.
Lesson Title: Explorers

SS Standard II, Objective 2

Implementation Time: 60 minutes

Media Resources Needed: The Lost Lake by Allen Say; Utah Atlas: Geography and History by Cliff B. Craig and M. Elijah Carr (classroom set or document camera)

Resources Needed: “Utah’s Explorers & Trappers – Questions & Answers”; graphic organizer (attached)

Procedure:

1. Direct (or project) students’ attention to pages 30-31 in the Utah Atlas. Have students trace the trapper and explorer routes with their fingers, noting dates and where routes overlap. As a class, make inferences about how trappers and explorers used each other’s maps and routes to further explore Utah.

2. Read The Lost Lake to the class. Discuss how modern day exploration compares with early exploration of Utah. What were the contributions of early explorers? Direct students’ attention to pages 22-23 in the Utah Atlas, noting the names of mountains, rivers and lakes. Compare the location of these landforms with the trapper and explorer routes and make inferences about who named many of Utah’s landforms and the origin of their place names.

3. Discuss the influence of explorers on the cultural development of Utah and complete the graphic organizer as a class. Add appropriate additional details and information by adding lines on the graphic organizer (see example) as needed.
Assessment:

Divide students into pairs and have them choose an explorer/trapper. Using the Utah Atlas, have students trace the explorer/trapper’s route, mountains, rivers, lakes, other explorers/trappers, wildlife, and American Indians the explorer/trapper may have encountered (refer students to pages 18 and 29).

Extension:

Assign students to conduct and present research on an assigned trapper/explorer (see attached sheet).
1. **Who were Fathers Dominguez & Escalante: Why did they come to Utah?**
   (They were Catholic priests in charge of a Spanish expedition in 1776. They were looking for a rout to get from Santa Fe, New Mexico, to Monterey, California. They also wanted to send missionaries to teach and to convert the Indians to Christianity.)

2. **How might Utah be different today if Dominguez and Escalante had returned to Utah or sent Spanish missionaries?** (They would have built Spanish missions and schools. We would have more Spanish institutions and customs.)

3. **If you were to travel by land from Santa Fe, New Mexico to Monterey, California today, what route would you take?** (It would use much of the same trail that Fathers Dominguez and Escalante sued.) **Compare your route today with the route taken by the Spanish Fathers.**

4. **How did the Lewis & Clark Expedition to the west coast of the United States in 1804 help open up the later fur trapping and trading business?** (They returned to the east with reports of numerous beavers and other fur game.)

5. **Why were mountain men hired by the fur companies to trap for them?** (Mountain men were rugged, used to living outdoors, and knew the territory where the fur animals were to be found.)

6. **What were some of the dangers mountain men faced while trapping?** (They faced wild animals, unfriendly Indians, and exposure to the elements.)

7. **Why furs were so valuable: Why did the fur trapping era come to an end?** (The beaver hat was in great demand in Europe and America. The silk hat became popular and the beaver fur supply became depleted at about the same time.)
8. **What was a rendezvous?** (It was a big get together of mountain men, trappers, traders, and Indians. Hundreds of men met in a predetermined place to trade furs for supplies brought form the east. They also traded stories, renewed friendships, and had contests such as wrestling, horsemanship, and shooting matches.)

9. **Why were government surveyors sent west?** (They were trained in surveying, mapping, or scientific study of plants and animals. They took maps and reports back to the government and to the people in the East. They paved the way for further westward expansion.)

10. **Who were some of the famous mountain men? Government explorers?** (Mountain Men: Jim Bridger, Jedediah Smith, Etienne Provost, Peter Skene Ogden. Government Explorers: John C. Fremont, John Wesley Powell.)

Based on information from *Historic and Physical Utah* by Paul Thompson with permission of Utah Idaho Supply-Map World.

Brief biographies and pictures of Utah explorers can be found in *Historic Figures of Utah* by Paul Thompson, pp. 34-31
Explorers, Trappers and Mountain Men Come to Utah

- Made maps used by other groups that came to Utah
- Held rendezvous (Northern Utah, Bear Lake)
- Era 1820's to 1830's
- Named rivers, lakes and mountains
- Often lived off the land
- Lived with many dangers
- Learned American Indian culture
- This was their occupation, came to make money
Explorers, Trappers and Mountain Men in Utah
(Teacher Background Information)

1. **Why did they come?**
   (Adventure, money – fortune, fame, occupation)

2. **What were some of their traditions and cultural contributions?**  While they explored the land, looking for beavers, they gave names to rivers, lakes, and mountains. They made trails, and when they returned to the East, they helped spread news about the West. Once a year they met at a rendezvous. They traded and bought supplies. It was like a big party, they would gamble, tell stories, eat, drink, have races and contests, and talk about their adventures. Often friendly Indians would come as well.

3. **What was their shelter, food, clothing, and arts like?**
   They lived off the land. They wore buckskin boots, or moccasins, some wore leggings, coats and hats. They liked to tell stories and talk about their adventures.

4. **Interesting facts and questions:**
   - They faced wild animals, starvation, thirst, unfriendly people, and exposure to the elements.
   - They had rendezvous which they still hold today.
   - They made different kinds of traps.
   - They made use of all resources around them.
   - Many of them married Indian women.
   - Most hunted for about fifteen years and then became ranchers or farmers.
   - Most died from old age at around 64 years. They lived longer than most Americans at that time.
Extension Research Project
Explorers, Trappers and Mountain Men in Utah

You are expected to answer 1 or 2 sample questions and do 1 project to share with the class.

Sample Questions:
- What skills did they need?
- What supplies and clothing did they need for survival?
- What kind of danger did they face?
  Tell about the rendezous they held.

Teach the class/assign research on one or two of the following historical figures:
Jedediah Smith
Etienne Provost
Louis Vasquez
James Baker
Jim Bridger
Peter Skene Ogden
James Beckworth

Ideas for Projects:
- Draw a poster of a trapper or a mountain man and his clothing.
- Compare cooking today with how a trapper or mountain man cooked.
- Write a poem or song about a trapper or mountain man.
- Teach your classmates how beef jerky is made.
- Draw a picture of make a model of a trap they might have used.
- Share a tall tale, or make one up to tell the class.

Use by permission from Vickie Ahlstrom
Lesson Title: The Pioneer Experience

SS Standard II, Objective 2

Implementation Time: 60 minutes


Resources Needed: classroom set of atlases/overhead projection of p.48-49; pioneer journal scenarios; student pioneer journal entry; “Pioneer Experiences” graphic organizer

Procedure:

1. To activate students’ background knowledge about pioneers, write the word PIONEER on the board and ask students to write down everything they know about the word/topic (30 seconds). Share ideas.

2. Show a short DVD clip of pioneers heading west (3-4 minutes is adequate to give students a strong visual context). Explain that the term “pioneer” has different meanings, including: 1. One who ventures into unknown or unclaimed territory to settle. 2. One who opens up new areas of thought, research, or development. Direct students to pages 48-49 in the Nystrom Atlas of Our County’s History and familiarize them with the text structure on these two pages. Help students navigate through the information as they read the graphs, maps, and other information on the pages.

3. Explain that today students are going to be discovering what it would be like to travel west as a pioneer in the 19th century. They will be using their reading, inferring, and predicting skills during this activity.

4. Divide students into eight cooperative groups. Each group needs a copy of the book/pages from the book and each student needs a copy of the group scenario. Instruct students to follow the instructions on their scenario and to respond to the questions in a journal entry written from the point-of-view of a 19th century
allow students to discuss the reading and questions, but each student should create his/her own journal entry and illustration.

5. Jigsaw the groups so that each new group has a representative from each of the scenarios. In the numerical order of the scenarios, have students read their scenario and share their responses to the questions. Each student should be given a total of 2 minutes to share and answer questions from their group mates, creating an oral pioneer journal. As students listen to their classmates, they should complete the “Pioneer Experiences” graphic organizer, recording clues, facts, hints or evidence supplied by the group mates that support the conclusion: pioneer life was difficult but exciting.

6. Collect and compile student journal entries or allow students to “publish” their entries in a class journal for display.

Assessment:

Assign students to use the clues, facts, hints, and evidence collected on their “Pioneer Experiences” graphic organizer to write their own conclusion about the pioneer experience. Students can use their conclusion as the topic sentence and their clues, facts, hints, and evidence to write supporting sentences in a well-developed paragraph of 5-8 complete sentences.

Extension:

Assign students to pretend they are a pioneer child who entered the Salt Lake Valley in the summer of 1847 with the first group of pioneers. Write a letter “back home” to grandparents telling them about the trip west and your arrival in the Salt Lake Valley. Require students to include what they saw along the way, what other people were doing and what they were like, what friends they made, what they ate, where they slept, and how they felt when they reached their destination.
Pioneer Journal Scenarios

Scenario #1: Read aloud pages 18-22 in If You Traveled West In A Covered Wagon to the class.

Date: April 20, 1852
You are leaving Independence, Missouri to travel to Oregon. Describe who is traveling with you in your covered wagon. What supplies are you taking? Why are you going?

Scenario #2: Read aloud pages 24-28 in If You Traveled West In A Covered Wagon

Date: April 26, 1852
Today you crossed the Missouri River. How did you do it? Did your animals make it safely?

Scenario #3: Read aloud pages 33-35 in If You Traveled West In A Covered Wagon

Date: May 8, 1852
You’ve had a problem that has delayed the progress of your wagon train. Choose one of the following and describe what happened and how you solved it:
• Mud was so thick that the animals and wagons were sinking.
• The dust was so thick you couldn’t see where you were going.
• Someone on one of the other wagons has cholera and cannot keep traveling.

Scenario #4: Read aloud pages 46–48 in If You Traveled West in A Covered Wagon

Date: May 22, 1852
Your group met some friendly Native Americans who you traded some things with. Describe what you traded and what you got from them. How did you feel when you first saw the Indians, and how do you feel now?

Scenario #5: Read aloud pages 64–65 in If You Traveled West In A Covered Wagon

Date: June 2, 1852
It took your wagon train 43 days to reach Fort Laramie, which you left just yesterday. What did it look like? Who was there? What did you do while you were there?

Scenario #6: Read aloud pages 66–68 in If You Traveled West In A Covered Wagon

Date: June 19, 1852
It’s hot! You made it across the mountains at South Pass, but your oxen are weary. Tell what this part of the journey was like. You had to discard something from your wagon to lighten the load for your oxen. What was it? Why did you choose that?

Continued on next page...
Pioneer Journal Scenarios continued...

Scenario #7:  Read aloud pages 69-71 and then 54-57 in *If You Traveled West In A Covered Wagon*

Date:  July 4, 1852
You left Steamboat Springs yesterday. Today you stopped traveling a little early because it is a special holiday. Describe what you did at Steamboat Springs and how you celebrated the holiday.

Scenario #8:  Read aloud pages 44-45 in *If You Traveled West In A Covered Wagon*

Date:  September 13, 1852
One of the women on another wagon was very sick and refused to go any further. You helped cheer her up by making a fire even though you were out of wood. How did you do it? How do you feel now that you are only days away from the end of your journey? You will have traveled 2,000 miles to Oregon City!
Graphic Organizer: Inferring

PIONEER LIFE WAS DIFFICULT BUT EXCITING
Inferring

To obtain meaning or a conclusion not specifically stated from facts, clues, hints, and evidence.

Strategy:
1. Investigate for clues, facts, hints, or evidence.
2. Select clues, facts, hints, or evidence.
3. Record.
4. Interpret clues, facts, hints, or evidence.
5. Draw a conclusion.
6. Record conclusion.
7. Graphic organizer.

Graphic organizer:
Lesson Title: The Utah War

SS Standard II, Objective 2

Implementation Time: 45 minutes

Media Resources Needed: *Camp Floyd and the Mormons: The Utah War* by Donald R. Moorman, Gene A. Sessions (optional teacher reference only); *Utah Atlas: Geography and History* by Cliff B. Craig and M. Elijah Carr

Resources Needed: “snippets” on the Utah War; cause-effect graphic organizer; cause-effect graphic organizer (example)

Materials Needed: paper, pencils

Procedure:

1. Begin by passing out the cause-effect graphic organizer. Ask for eight students to volunteer as readers. Give each student a snippet (with number and text) and instruct them to stand and read their snippet when you say their number. You may want to give students time to read their snipped and ask you questions/for clarification. Depending on the needs of your students, you may want to project a visual copy of the snippet for students to look at while it’s being read aloud.

2. Write “The Utah War” on the board and ask students to write the same as the title of their graphic organizer. Ask students to share their thoughts about what they think the so-called “Utah War” it was about.

3. Explain that in 1848 (refer your Utah timeline), one year after the pioneers entered the valley, the United States fought a war with Mexico, the result being Utah became part of the United States of America. Utah was no longer part of Mexico and the Mormon settlers, who left the United States because of religious persecution, once again found themselves living in the United States. However, Utah was still not a state. *(Read Snippet #1)*
4. Explain that soldiers were sent to Utah because many Americans thought Mormons were not loyal citizens and that the army needed to enforce U.S. territory laws (project map on page 32 of the *Utah Atlas*). In **1850**, Howard Stansbury lead the first U.S. military expedition to Utah followed by Edward J. Steptoe in **1854** (refer to your timeline). (Read Snippet #2 and Snippet #3) In **1857** (refer to your Utah timeline), Albert Johnston’s Army was sent to Utah to put down the supposed Mormon “rebellion” that has been reported and to keep watch on the Mormon settlement. (Read Snippet #4) Because Mormons had experienced persecution in Illinois and Missouri, Mormons were afraid and many fled their homes in northern Utah, including Salt Lake City, and moved south. (Read Snippet #5) The Mormons waited to see what the army would do. When Johnston’s army marched through Salt Lake in the spring of **1858** (refer to your timeline), they found it almost deserted. The Mormons were planning to set fire to the city if the soldiers decided to attack. (Read Snippet #6) The “Utah War” ended when President Buchanan granted Mormons a “free and full pardon.” Once they understood that Johnston’s Army was not going to hurt them, the Mormons returned to their homes. The soldiers stayed for a long time, establishing Camp Floyd and, later, Fort Douglas. During the Civil War **1861-1865** (refer to your timeline), additional soldiers came to protect the telegraph lines. (Read Snippet #7) Thus began a military presence in Utah that still exists today and, having put fears of Mormon rebellion to rest, the Utah Territory moved closer to becoming a state.

5. Introduce the cause-effect graphic organizer and model for students. Allow students to finish the graphic organizer in cooperative groups; however, each student should complete his/her own sheet.

**Assessment:**

Distribute a 3” X 5” index card to each student and assign them to write a short summary of the Utah War, including details from their graphic organizers. Summaries must be clear and concise and must fit on only one side of the index card. On the other side of the index card, assign students to write one sentence describing the significance of the “Utah War” in Utah’s history.
Snippets

#1  Brigham Young took advantage of congressional indecision over the fate of the Mexican Cession and gave notice that the Saints claimed the intermountain country as their own. By the spring of 1949, a convention was called to form the “State of Deseret”… – Moorman & Sessions, page 6

#2  After ten years in the distant desert (1847-1857), impoverished by drought, pestilence, and death, whether at the hands of the Indians or nature, the Mormons transformed the harshness of the frontier into an American saga. – Moorman & Sessions, page 3

#3  The long struggle for statehood began in 1850 when Congress refused to ratify the constitution of the new State of Deseret as well as the vast areas claimed by its supporters. – Moorman & Sessions, page 7

#4  (President) Buchanan had decided to settle the Mormon question by appointing not only a new governor, but also a complete slate of non-Mormon officials who were to be escorted into the territory by the army.” – Moorman & Sessions, pages 17-18

#5  Brigham Young weighed three possible courses of action – stand and fight, allow the army to occupy the territory, or abandon the territory to the army, leaving behind the labor of 10 years.” - Moorman & Sessions, page 18

#6  “There shall not be one building, nor one foot of lumber, nor a stick, nor a tree, nor a particle of grass and hay that will not burn, left in reach of our enemies.” Brigham Young, July, 1857

#7  (In 1860) President Buchanan announced that he would hand Utah back to the Mormons by reducing the troop strength of the Department of Utah from thirty-four companies, composed of slightly more than two thousand men, to eight companies, totaling less than three hundred soldiers… General Johnston was the first soldier to leave Utah under the withdrawal orders. – Moorman & Sessions, pages 272-273
Cause and Effect Chart: The Utah War

EXAMPLE

**Cause**

Utah becomes part of the United States after the Mexican-American War (1848), only one year after Mormons arrive.

**Effect**

U.S. military expeditions to Utah begin. Johnston’s Army is sent to Utah by the U.S. Government to enforce territorial law (1857).

**Effect**

Mormon settlers are afraid of more persecution, flee from the northern settlements and plan to burn Salt Lake City. Once they realize the Army is not there to hurt them, Mormons return to their homes.

**Effect**

Johnston’s Army sets up Camp Floyd to keep watch over the Mormons until President Buchanan pardons Mormons in 1860. Small military presence remains in Utah.
Cause and Effect Chart

Cause

Effect

Effect

Effect
Lesson Title:Endangered Species

SC Standard V, Objective 2

Implementation Time: 60 minutes (if done in class, could be homework)

Media Resources Needed:
Internet access or library books on Utah’s endangered species
List of Utah’s Threatened and Endangered Species (included in lesson)

Materials Needed:
Poster paper
Colored pencils, crayons, markers
-or-
Computers with PowerPoint

Procedure:
1. Create a poster board or computer presentation to explain what you have learned about an endangered plant and animal you have researched. You may make a drawing of your species, or you may include a photograph
2. Tell about your species (what it looks like, why it is endangered, and what makes it important).
3. Describe the steps that are being taken to protect the species you have chosen.
4. Share your presentation to with your class.

Assessment:

Check each poster or presentation to see that it answers each of the 4 required elements.

Extension:

Have students write a letter to their government representative about what is being done to preserve threatened and endangered species in Utah.
### Utah’s Threatened or Endangered Species (Source: US Fish and Wildlife)

<table>
<thead>
<tr>
<th>Status</th>
<th>Species listed in this state and that occur in this state</th>
</tr>
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<tbody>
<tr>
<td>E</td>
<td>Ambersnail, Kanab (<em>Oxyloma haydeni kanabensis</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Chub, bonytail entire (<em>Gila elegans</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Chub, humpback entire (<em>Gila cypha</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Chub, Virgin River (<em>Gila seminuda (=robusta</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Ferret, black-footed entire population, except where EXPN (<em>Mustela nigripes</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Flycatcher, southwestern willow (<em>Empidonax traillii extimus</em>)</td>
</tr>
<tr>
<td>T</td>
<td>Lynx, Canada lower 48 States DPS (<em>Lynx canadensis</em>)</td>
</tr>
<tr>
<td>T</td>
<td>Owl, Mexican spotted (<em>Strix occidentalis lucida</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Pikeminnow (=squawfish), Colorado except Salt and Verde R. drainages, AZ (<em>Ptychocheilus lucius</em>)</td>
</tr>
<tr>
<td>T</td>
<td>Prairie dog, Utah (<em>Cynomys parvidens</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Sucker, June (<em>Chasmistes liorus</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Sucker, razorback entire (<em>Xyrauchen texanus</em>)</td>
</tr>
<tr>
<td>T</td>
<td>Tortoise, desert U.S.A., except in Sonoran Desert (<em>Gopherus agassizii</em>)</td>
</tr>
<tr>
<td>T</td>
<td>Trout, Lahontan cutthroat (<em>Oncorhynchus clarki henshawi</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (<em>Canis lupus</em>)</td>
</tr>
<tr>
<td>E</td>
<td>Woundfin except Gila R. drainage, AZ, NM (<em>Plagopterus argentissimus</em>)</td>
</tr>
</tbody>
</table>

### PLANTS

<p>| E      | Bear-poppy, dwarf (<em>Arctomecon humilis</em>)                 |
| E      | Bladderpod, kodachrome (<em>Lesquerella tumulosa</em>)          |
| E      | Buttercup, autumn (<em>Ranunculus aestivalis (=acriformis]</em>) |
| E      | Cactus, San Rafael (<em>Pediocactus despainii</em>)             |</p>
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<thead>
<tr>
<th></th>
<th>Botanical Name</th>
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<tbody>
<tr>
<td>1</td>
<td>Cactus, Siler pincushion (Pediocactus (=Echinocactus,=Utahia) sileri)</td>
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<tr>
<td>2</td>
<td>Cactus, Uinta Basin hookless (Sclerocactus glaucus)</td>
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<tr>
<td>3</td>
<td>Cactus, Winkler (Pediocactus winkleri)</td>
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<tr>
<td>4</td>
<td>Cactus, Wright fishhook (Sclerocactus wrightiae)</td>
</tr>
<tr>
<td>5</td>
<td>Cycladenia, Jones (Cycladenia jonesii (=humilis))</td>
</tr>
<tr>
<td>6</td>
<td>Daisy, Maguire (Erigeron maguirei)</td>
</tr>
<tr>
<td>7</td>
<td>Ladies'-tresses, Ute (Spiranthes diluvialis)</td>
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<td>8</td>
<td>Milk-vetch, Deseret (Astragalus desereticus)</td>
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<td>9</td>
<td>Milk-vetch, heliotrope (Astragalus montii)</td>
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<td>10</td>
<td>Milk-vetch, Holmgren (Astragalus holmgreniorum)</td>
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<tr>
<td>11</td>
<td>Milk-vetch, Shivwits (Astragalus ampullarioides)</td>
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<tr>
<td>12</td>
<td>Milkweed, Welsh's (Asclepias welshii)</td>
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<tr>
<td>13</td>
<td>Phacelia, clay (Phacelia argillacea)</td>
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<tr>
<td>14</td>
<td>Primrose, Maguire (Primula maguirei)</td>
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<tr>
<td>15</td>
<td>Reed-mustard, Barneby (Schoenocrambe barneyi)</td>
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<tr>
<td>16</td>
<td>Reed-mustard, clay (Schoenocrambe argillacea)</td>
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<tr>
<td>17</td>
<td>Reed-mustard, shrubby (Schoenocrambe suffrutescens)</td>
</tr>
<tr>
<td>18</td>
<td>Ridge-cress, Barneby (Lepidium barneyanum)</td>
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<tr>
<td>19</td>
<td>Sedge, Navajo (Carex specuicola)</td>
</tr>
<tr>
<td>20</td>
<td>Townsendia, Last Chance (Townsendia aprica)</td>
</tr>
</tbody>
</table>
Essential Question #3:

How do weather and weather patterns affect different aspects of life in Utah?

Lessons:

- Basic Cloud Types
- Weather Instruments
- Weather Lab
- Severe Weather

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<thead>
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<tr>
<td></td>
<td>Standard II</td>
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<tr>
<td></td>
<td>1a identify</td>
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<tr>
<td></td>
<td>basic cloud</td>
<td></td>
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<tr>
<td></td>
<td>types including cumulus, cirrus, stratus clouds</td>
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<td></td>
<td>1b observe,</td>
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<td>measure, and</td>
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<td>record data</td>
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<td>elements of</td>
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<td>weather over</td>
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<td>time including</td>
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<td>precipitation,</td>
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<td>air temperature,</td>
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<td></td>
<td>wind speed and direction,</td>
<td></td>
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<tr>
<td></td>
<td>and air pressure</td>
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<tr>
<td></td>
<td>1c investigate evidence that air is a substance</td>
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<td></td>
<td>1d compare the components of severe weather phenomena to normal weather conditions</td>
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<tr>
<td></td>
<td>2a observe and record effects of air temperature on precipitation</td>
<td></td>
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<tr>
<td></td>
<td>2b graph recorded data to show daily and seasonal patterns in weather</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2c infer relationships between wind and weather change</td>
<td></td>
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<tr>
<td></td>
<td>3a identify and use the tools of a meteorologist <em>(examples may include: measure rainfall using rain gauge, measure air pressure using barometer, measure temperature using a thermometer)</em></td>
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4th Grade

Unit 3: Cause & Effect: Utah's People, Ideas and Events

Science & Social Studies Interconnections: A Thematic Approach
Essential Question #3: How do weather and weather patterns affect different aspects of life in Utah?

Lesson Title: Basic Cloud Types

SC Standard II, Objective 1

Implementation Time: 45 minutes

Media Resources Needed:
Video: The Water Cycle and Clouds (eMedia online)
Sci-Ber Text 4th grade

Materials Needed:
Poster paper
Colored pencils
Cotton balls
Glue

Procedure:
1. Divide students in groups of four. Have each group be responsible for giving the information about the 4 types of clouds. The information can be read in the Sci-Ber Text (online).

2. Show the video The Water Cycle and Clouds. Have students write two questions before watching the video. Then have them watch for answers to their questions. Discuss which cloud types produce what weather.

3. Give each student a piece of paper 24 x 12. As a class, mark and label various elevations (5,000 ft. increments). Draw in King’s Peak (Utah’s highest elevation). Have students use cotton balls or colored pencils to make the various types of clouds at the different elevations and glue them to the paper.
**Assessment:** Demonstrate knowledge of types of clouds and the weather associated with each type of cloud by making the cloud chart. Note: you could watercolor wash the sky scene (background) first, then place clouds on.

**Extension:**
1. Instruct students to cut cloud pictures out of magazines and make individual cloud charts or a class cloud chart.
2. Pull pictures of clouds off the Internet and classify.
Key for the Sketch of King’s Peak

25,000 ft.  
Cirrus  
Fair Weather

20,000 ft.  
Rain, brief but heavy

15,000 ft.  
Cumulus  
King’s Peak 13,000 ft.

10,000 ft.  
Fair weather

Cumulonimbus

5,000 ft.  
Rain, snow, fog, thunderstorms

Stratus
Lesson Title: Weather Instruments

SC Standard II, Objective 1

Implementation Time: Two 45 minute periods

Media Resources Needed:
Optional video, Forecasting and Weather Instruments (eMedia, online)

Materials Needed: Instrument Instruction sheets, “Atmosphere and Weather” See following pages for materials needed. Materials should be grouped into areas by instruments to be made. Each group makes two of the same type of instrument.

Procedure:
1. Optional: Show the video Forecasting and Weather Instruments and discuss.
2. Discuss the function of each of the 5 weather instruments: barometer, thermometer, rain gauge, anemometer, and wind vane.
3. Discuss what weather balloons are used for (wind speed). Create charts that name each instrument and list their function with the students.
4. Assign each student (or group) one of the four weather instruments to construct.
5. Place the weather instrument outside near the classroom. Having multiple instruments allows you to collect more date. If it is not possible to leave the instruments outside, consider putting the instruments in a box and taking them out and in when needed.
6. Keep the instruments for use with the “Weather lab” lesson.

Assessment: Students will describe their instrument and its function to the class.
THERMOMETER
Measures temperature

Materials:
1 small empty water bottle
red food coloring
rubbing alcohol (you can use water, but alcohol works better)
scissors
narrow drinking straw (transparent is best)
clay
index card

Procedures:
1. Pour the rubbing alcohol into the bottle, filling it ½ full.
2. Put a few drops of red food coloring into alcohol.
3. Put the straw completely into the bottle.
4. Seal the top of the vial with clay so no air can get in and the alcohol cannot spill out.
5. Tape a card to the drinking straw.
6. Wait one hour.
7. Mark the height of the temperature on your card.
WIND VANE
Measures wind direction

Materials:
directional compass
cup full of sand
pencil with rubber eraser
straw
push-pin
marker
tape
2 file cards
scissors

Procedures:
1. Cut two triangles, one a little larger than the other, out of file cards.
2. Cut a slit in each end of the straw.
3. Put the triangles in the slits in the straw.
4. The larger triangle should be at the back with the point inserted into the straw.
5. The triangle at the front should be inserted with the point facing outward.
6. Push the pencil into the cup of sand.
7. Insert the push-pin in the center of the straw and into the eraser on the pencil.
8. Using the marker, write the directions, N, S, E, and W on the cup.
9. Use the compass to position the wind vane so the “N” points north.
10. After measuring and recording the wind direction, ask students if they see a connection between the weather and the wind direction.
ANEMOMETER
Measure wind speed

Materials:
4 paper cups
1 paper plate
red paper
stick or dowel
hammer
straight pin
tape

Procedures:
1. Tape red paper around one cup
2. Tape the four paper cups to a paper plate.
3. Fasten the paper plate to the top of the stick by hammering a pin at the center.
4. Blow on one of the cups. The plate will turn. The harder the wind blows, the faster the wind measurer will turn.
5. You can tell how fast the wind is blowing by counting how many turns the red cup makes in one minute (the unit is turns per minute)
BAROMETER
Measures air pressure

Materials:
empty baby food jar  scissors
plastic drinking straw  transparent tape
3 x 5 index card  pencil
large, deflated balloon  rubber band

Procedure:
1. Cut a large circle from the deflated balloon.
2. Stretch the balloon circle tightly over the mouth of the baby food jar.
3. Hold the balloon circle in place with the rubber band, being sure the piece of balloon is stretched tightly.
4. Cut the drinking straw in half, making a point at one end of the straw.
5. Tape the uncut end of the straw to the middle of the balloon circle, using a small piece of tape.
6. Place the baby food jar barometer on a level surface in a location where it can remain undisturbed.
7. Set the index card in an upright position (vertical) as close to the pointed end of the barometer’s straw as possible, without actually touching the straw. (Try taping the card to a wall and setting the barometer as close to the wall as possible.) Using a sharpened pencil, make a small line on the index card at the level of the point of the straw.
8. Check the barometer regularly, carefully marking any changes in the level of the straw on the index card.
RAIN GAUGE
Measure Rainfall

Materials:
plastic bottle
small rocks
marker

Procedure:
1. Use a marker to mark 10 millimeters apart from the bottom up.
2. Place rocks in bottom of bottle for weight to stabilize gauge.
3. Pour water into the gauge up to the first mark.
4. Record rainfall daily (each mark is 10 millimeters of rainfall).
5. Dump water and refill to first mark at the end of the day to start over.
Lesson Title: Weather Lab

SC Standard II, Objective 1

Implementation Time: 10-15 minutes per day for two to three weeks.

Materials Needed:
Student weather instruments from previous lesson
Today’s Weather (get online from a local news station)
Weather Graphing Sheet
Student Question Sheet

Procedure:
1. Tell students you are going to give them some folklore weather sayings. If they think the statement is true, they should put their thumbs up. If they think the statement is false, they should put thumbs down. Check after you read the statement to see if most voted true or most voted false.
   - When a rooster crows at night, he tells you that a rain’s in sight.
   - When squirrels lay in a big store of nuts, look for a hard winter.
   - If a groundhog sees its shadow on Groundhog Day, there will be six more weeks of winter.
   - If a turkey’s feathers are unusually thick by Thanksgiving, look for a hard winter.
   - The wider the black bands on woolly bear caterpillar, the colder the winter will be.
   - When the ants travel in a straight line, expect rain. When they scatter, expect fair weather.
   - When you see a beaver carrying a stick in its mouth, it will be a hard winter. You’d better go south.
   - When a cow bellows three times without stopping, a storm will come hopping.
2. Tell students that all of the statements are false. Ask if they have heard any others. (Red sky at night, sailors delight. Red sky in the morning, sailors take warning.)

3. Complete the weather lab and have students collect data from the instruments. Complete the weather graphs that follow this lesson. Have student teams (2-3) go out and make readings onto the “Weather Graph” sheet. Have students record findings on board. Have all students record data in journals. Update classroom graph daily. Have students keep their personal journals up to date.

4. Check current weather information on the Internet.

5. Discuss the graph every 2-3 days. Instruct students to begin to predict the weather based on the patterns they have observed. Compare predictions with what really happens.

6. Compare weather observations with seasonal weather patterns.

7. Discuss and evaluate the accuracy of weather forecasts.

Assessment: Collect and grade journals. Have students complete the graphs and answer the questions on the student sheet.
Student Sheet

Name _____________________________________________

Use the instruments to measure weather components. Remember what each instrument measures:
Thermometer: temperature
Barometer: air pressure
Wind Meter: wind speed
Rain Gauge: amount of precipitation
Cloud chart: cloud type

<table>
<thead>
<tr>
<th>Day</th>
<th>Temperature</th>
<th>Air pressure</th>
<th>Wind speed and direction</th>
<th>Amount of precipitation</th>
<th>Cloud type and % of sky covered</th>
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</table>
Student Sheet

Name ______________________________________

1. Which day had the highest temperature? Lowest?

2. Which day had the biggest change in weather?

3. Did you see any weather components the day before that helped to predict the change of weather for that day?

4. Which weather component seems more important to your comfort?

5. Describe the weather components on a day you enjoy.

6. Using your measurements, what do you think the weather will be tomorrow?
Graphing Weather
Make a bar graph that shows the temperature for each day of the week. Label the temperature on the left side of the graph and the day at the bottom of the graph.

Percentage of Cloud Cover
For each day, make a bar graph that indicates what percent of the sky appeared to be covered in clouds (0%, 20%, 40%, 60%, 80%, 100%). Label the percent on the left of the graph and the day on the bottom.
4th Grade
Unit 3: Cause and Effect: Utah's People, Ideas and Events

Essential Question #3: How do weather and weather patterns affect different aspects of life in Utah?

Lesson Title: Severe Weather

SC Standard II, Objective 1

Implementation Time: 40 minutes

Media Resources Needed:
Computer lab with Internet

Materials Needed:
Utah's Amazing Weather reading sheet
http://www.wildwildweather.com/

Procedure:
Pre-Assessment/Invitation to Learn

1. Ask the students these questions: (Have them write the answers in their journals.)
   Have you ever planned an activity and had it ruined by bad weather? What was it?
   What is considered “bad weather”?

2. What type of weather have you seen or heard of in Utah that can be destructive?
   (Introduce severe weather here.)

3. What are things that can be destroyed by severe weather?

4. Have students read the Utah's Amazing Weather sheet. Explain that here in Utah we don't have it as bad as some people who live elsewhere in the country. What severe weather do other states usually encounter that we don't see much at all? (tornadoes, ice storms, hurricanes, etc.)
   Explain that here in Utah our most dangerous weather usually occurs when we have thunder and lightning. Why are thunder and lightning storms dangerous in Utah? (If possible, show some pictures from the Internet of severe weather and its destruction.)
5. Rainstorms in class:

Turn off the lights and have everyone tap one finger on their desks as it starts to rain.
Tap all fingers on the desk so it rains harder.
Have someone switch the lights on and off quickly for lightning.
Add snapping fingers, clapping hands, and stomping feet, as the storm gets worse.
Finally, do the sounds more quietly in reverse, as the storm moves away.

Questions to ask after the storm simulation:
Why are thunderstorms dangerous?
What can happen if you are out in a thunderstorm?
What are precautions that you must take in a thunderstorm?
We can find the answers to these questions on the Internet.

Instructions

1. Today we will be exploring some wild weather information on the Internet. Each student should be given a list of addresses to enter into the computer.
2. Help the students access the Internet sites.
3. If you have access to a projector and an Internet connection, you may do this with the whole class.
4. This activity lends itself to a great discussion.

Assessment:
Review student journal entries to the questions that they responded to during the class discussion or online web assignment.

Extension:
Technology-Students can bookmark the Deseret News website to get daily weather instrument readings. (Standard V)

Use the video, *The Earth in the Universe. Severe Weather: Temperature, Motion, Moisture.* (online, eMedia), and discuss severe weather around the country and if Utah has had this same type of weather. (Standard V)

Language Arts-Read Flash, Crash, Rumble Roll to your class. Have a discussion afterwards. (Standard VII, Objective 2)

Have the students write about an incident they have been through where the weather was severe enough for them to remember. (Standard VIII, Objective 6)

Math-Students can do some graphing and comparisons around the state or country of temperatures, precipitation, climates, etc. (Standard V, Objective 1)
Utah’s Amazing Weather

Utah has a dry climate with mild winters and long, warm summers. Temperatures throughout the state vary. The cooler temperatures are found more in the northeastern part of the state and the mountains. The warmer temperatures are found in the western, central, and southern parts of Utah. Because of the fact that Utah gets less than ten inches of precipitation per year, it is known as a desert. The above scenario makes Utah sound quite boring. But don’t let this fool you. Utah can have very severe weather.

January is usually our snowiest month. Valley storms in January will vary from one inch to eight inches per storm in northern and central Utah. However, there have been times when the storms in the valley have exceeded 12 inches, and snow continues to fall, adding inches everyday. Plus, we can have heavy snowstorms in February, March, April, and even May.

April and May are usually the rainiest month. Storms during these months vary from 1/8 inch to 1/2 inch per storm. But sometimes in April, storms can bring in an inch or more of rain. These storms can even continue to come in May, bringing much more precipitation.

In the summer, even though Utah is very hot and dry, storms may come in, bringing thunder and lightning, wind, and rain. Occasionally, summer cumulus clouds (thunderheads) can gather large amounts of moisture coming in from the south. This moisture brings extraordinarily close lightning with the clouds being so low, heavy winds, hail, and torrents of rain come in. The lightning causes many fires throughout the state of Utah each year. The heavy winds down trees, blow roofs off houses, and blow down a whole crop of wheat or alfalfa. The hail can be the size of marbles, stripping plants of their leaves or breaking the stalks of small new plants. Torrents of rain can cause flash flooding, bringing much water and mud down from the mountains destroying crops, houses, and businesses.

In general our mountains throughout Utah prevent high winds. But, in recent years, we have been reminded that tornadoes have formed from cold down drafts within a small area. Sometimes, winds in Utah preceding a storm can reach from 50 to 80 miles an hour, especially in wind gusts.

Temperatures can exceed 115 degrees Fahrenheit in the summer and get as low as –30 degrees in the wintertime in our cities. Both of these extreme temperatures can kill plants and animals. (The cold temperatures can reach lower than –30 degrees when a wind chill is present.) Weather like this doesn’t happen often in Utah, but when it does, it causes much damage and can be life-threatening.
Essential Question #4:

What are your rights and responsibilities as a member of your community and as a citizen of Utah?

Lessons:

- State and National Symbols
- Rights and Responsibilities
- Creating a Class Bill of Rights

Core Standards

<table>
<thead>
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<tbody>
<tr>
<td>Standard III</td>
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<tr>
<td>☐ 1a identify rights of a citizen (examples may include: voting, peaceful assembly, freedom of religions)</td>
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<tr>
<td>☐ 1b identify responsibilities of a citizen</td>
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<tr>
<td>☐ 1c determine how and why the rights and responsibilities of various groups have varied over time (examples may include: Chinese railroad workers, Greek miners, women, children, Mormons, Japanese-Americans at Topaz, American Indians, African-Americans)</td>
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<tr>
<td>☐ 1d explain how the influence and power of individuals is affected when they organize into groups</td>
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<tr>
<td>☐ 1e describe and model ways that citizens can participate in civic responsibilities</td>
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<tr>
<td>☐ 1f contribute to and practice classroom goals, rules, and responsibilities</td>
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<tr>
<td>☐ 1g recognize and demonstrate respect for United States and Utah symbols including Pledge of Allegiance and flag etiquette</td>
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Science & Social Studies Interconnections: A Thematic Approach
Lesson Title: Weather Forecasting

SC Standard II, Objectives 2, 3
SS Standard I, Objective 3

Implementation Time: a few minutes a few times per day for 5 days in a row.

Materials Needed:
Barometer (made in the Weather Instruments lesson)
Forecasting Chart
Index cards

Procedure:

Background Information:
A barometer is a tool that is used to measure changes in air pressure. There is a relationship between air pressure and weather. Typically, high pressure is associated with nice weather, while low pressure is associated with stormy weather. Patterns in air pressure change can help us predict what the coming weather will be (if air pressure is going up, nice weather is coming. If air pressure is going down, a storm may be coming).

1. Note: It is best to start this activity in the morning so that you can check it a few times during the day. Have students pull out the barometers that they made in the Weather Instruments lesson (or make them again if necessary). Using a new index card taped to the barometer, make a mark where the red liquid is at. Use a source such as a local weather internet site (ksl.com, kutv.com, fox13.com etc...) to find the actual atmospheric pressure for that day at that time. Label the mark on the card with the actual pressure. Use this mark as a reference for the day.

2. Have students record the information on the Forecasting Chart in the morning, at mid-day and at the end of the day. Have them look for patterns in air pressure.
changes (noting if it went up or down). Students should do this every day for 5 days. Have them make a prediction for the weather for the next day.

Assessment:
Have students compare their predictions to the actual weather. Use a local website to find current weather information.
**Forecasting Sheet**

Do as many checks as you can during the day. If you don't get 5 checks in, that is ok.

Day ________________

Starting Air pressure __________

Check #1 ________________am/pm

Air pressure went: Up   Down   Stayed the same

Check #2 ________________am/pm

Air pressure went: Up   Down   Stayed the same

Check #3 ________________am/pm

Air pressure went: Up   Down   Stayed the same

Check #4 ________________am/pm

Air pressure went: Up   Down   Stayed the same

Check #5 ________________am/pm

Air pressure went: Up   Down   Stayed the same

My prediction for tomorrow's weather:
Essential Question #4:  How can data-supported prediction help us plan for Utah’s future?

Lesson Title:  Utah’s Seasonal Weather Patterns

SC Standard II, Objective 2
SS Standard I, Objective 3

Implementation Time:  45 minutes

Media Resources Needed:
Website:  http://www.pgjr.alpine.k12.ut.us/science/james/provo.html

Materials Needed:
Computer lab with internet
Paper (graph paper)
Pencils
Rulers

Procedure:

1. Students will be looking at daily temperature and precipitation data and making charts that represent patterns in seasonal weather patterns.

2. Ask students to describe the weather in Utah during each of the 4 seasons. Students in some parts of the state may note that the weather is similar for much of the year, while other students may notice a distinct difference between each season.

3. Divide students into 12 groups and assign each group a month. Using a chart of daily temperature and precipitation for the most recently completed year, have each group make a line graph and answer the questions on their Seasonal Weather Sheet. (The website listed in the Resource section has great data. To make it easier for students, you might copy and paste the data into an Excel spreadsheet and print out a copy. Since students do not need the “Low Temperature” column, you could delete it from the spreadsheet or draw a line through it).
4. Questions to answer on the Seasonal Weather Sheet:

*How many days had precipitation?*
*How many days had snow?*
*What was the highest temperature?*
*What was the lowest temperature?*

**Assessment:**
Have each group share what they learned with the class. You could have groups tape their graph up to the wall in a long row so that students could see that the temperature lines tend to start low in January and go up until about July and then go back down.

Have students record their results in their journals. Students should notice the pattern that we get more precipitation during the Fall/Winter/Spring and that the precipitation is more likely to be snow during the Winter.
Essential Question #5:

How does Utah’s economy impact life in our state?

Lessons:

- Introduction: Principles of Basic Economics
- Producers and Consumers
- Supply and Demand

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<td>Social Studies</td>
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<tr>
<td>Standard II</td>
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</tr>
<tr>
<td>3a</td>
<td>explain the relationship between supply and demand</td>
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<tr>
<td>3b</td>
<td>describe the role of producers and consumers</td>
</tr>
<tr>
<td>3c</td>
<td>identify examples of producers and consumers in the local community</td>
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<tr>
<td>3d</td>
<td>research the development of Utah’s economy over time</td>
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<tr>
<td>3e</td>
<td>identify the factors which bring about economic changes <em>(examples may include</em>: natural resource development, new technologies, new market development, globalization, global conflicts, education)</td>
</tr>
<tr>
<td>3f</td>
<td>examine how economic development affects communities <em>(examples may include</em>: dams, sports, tourism, power plants, mining)</td>
</tr>
</tbody>
</table>
Lesson Title: Introduction: Principles of Basic Economics

SS Standard II, Objective 3

Implementation Time: 60 minutes

Media Resources Needed: DVD: *Econ and Me* – Consumption and Production (30 min.), *Econ and Me* – Teachers Guide

Resources Needed: newspapers (Sunday ads), T-Chart of Goods and Services

Materials Needed: scissors, glue, large sheet of butcher paper (app. 3’) titled “Goods and Services”

Procedure:

1. Show segment #1 “Consumption” from the DVD *Econ and Me*.

2. Discuss the following questions:
   - What examples of goods did econ show the children consuming?
   - What were some examples of services?
   - What goods and services do you consume?

3. Show segment #2 “Production” from the video *Econ and Me*.

4. Discuss the following questions:
   - What was the economic problem the children had?
   - What makes a good producer?
   - What resources are needed for production?
   Note: More ideas for discussion can be found in the Teacher’s Guide for *Econ and Me*.

5. Ask students to cut out pictures of goods and services that their families consume and pay for themselves (remind them that some services are paid for...
through taxes). Allow students to glue and label their pictures “goods” or “services” on the classroom poster. Display.

Assessment:

Use a T-chart and have the students show examples of goods and services their families use.
We are all consumers and producers

<table>
<thead>
<tr>
<th>GOODS</th>
<th>SERVICES</th>
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</table>
Consumer and Producers T Chart - EXAMPLE

We are all consumers and producers

<table>
<thead>
<tr>
<th>GOODS</th>
<th>SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>Beauty Shop (haircuts)</td>
</tr>
<tr>
<td>Furniture</td>
<td>Auto Repair</td>
</tr>
<tr>
<td>Clothes</td>
<td>Garbage Pick up</td>
</tr>
<tr>
<td>Appliances</td>
<td>Water/Gas/Electricity</td>
</tr>
</tbody>
</table>

We are all consumers and producers.
Lesson Title: Producers and Consumers

SS Standard II, Objective 3

Implementation Time: 45 minutes

Media Resources Needed: The Little Red Hen (any version)

Materials Needed: wheat grains (available through USU Ag in the Classroom at http://extension.usu.edu/aitc/); loaf of bread (or picture); word strips for Producer and Consumer; chart paper

Procedure:

1. Arrange students in partners. Pass out wheat gains and have students observe them using their five senses.

2. Show students a loaf of bread. In a class discussion, sequence the steps of how wheat becomes a loaf of bread. Record sequence on board.

3. Read aloud The Little Red Hen. Discuss the steps from the book and compare them to the steps recorded on the board. Make any necessary corrections.

4. Post Producer and Consumer word strips and discuss their meaning. Ask students which category the hen and other animals fit into. As a class, brainstorm and categorize producers and consumers in our community under the word strips (see example).

5. Direct students to act out a producer and consumer pantomime with their partner. For example, a farmer (producer) plants corn and a child (consumer) eats it. One partner acts as the producer while the other acts as the consumer. Give students five minutes to prepare and then have volunteers perform while the whole class tries to guess what they are acting out. The class should also identify which student is the producer and which is the consumer in the pantomime.
Assessment:

Assign students to write a short paragraph describing the relationship between producers and consumers and instruct them to include an example.

Extension:

Assign students to record everything they consumed in one day and then create a short comic strip (with the student as the main character) that illustrates the roles of producers and consumers.
Producers & Consumers in our Community

Producers

Teachers
Dairy Farmer
Police
Firemen
Farmer
Pizza Hut

Consumers

Students
People buying milk
People being protected
People being protected
People who eat
Family eating pizza
Lesson Title: Supply & Demand

SS Standard II, Objective 3

Implementation Time: 45 minutes

Materials Needed: milk, pickle, and egg “What if” statements; three containers (to add interest, place the milk statements into a milk jug with a hold cut opposite the handle; place the pickle statements in an empty pickle jar; place the egg statements in an empty egg crate); Laminated arrow cards

Procedure:

1. Explain the economic concepts of supply and demand to students. *(If the price of a product increases, quantity demanded will decrease and quantity supplied will increase. If the price of a product decreases, quantity demanded will increase and quantity supplied will decrease. The forces of supply and demand determine prices, which are measures of the relative scarcity of different products.)*

2. Divide the classroom into three groups, and give each group a container (egg, milk, or pickle) filled with WHAT WOULD HAPPEN IF… statements.

3. Give each student a laminated “arrow” card.

4. Begin by asking one student in one group to read out-loud the first statement they pull from their group’s container. As the rest of the class listens to the statement, each student is instructed to hold their arrow facing the teacher and responds to the statement by turning their card up or down based on your questions: *What will happen to the supply? What will happen to the demand? What will happen to the price?*

5. The groups and students take turns reading slips from their containers while the class continues to respond with their arrows. By the end of the activity, every student should have a basic understanding of supply, demand, and price. Encourage students to keep their eyes on the teacher so informal assessment
can take place and the teacher can determine who does/does not understand the concepts.

Assessment:

By the end of the activity, every student should have a basic understanding of supply, demand, and price. The teacher can easily determine which students need further practice and can pair them with a partner who grasps the concept for additional practice.

Extension:

Assign students to find examples of products advertised in newspapers, magazines, billboards, online, etc. and explain how the laws of supply and demand apply to the price and availability of the product. Teacher should model beforehand.
For best results, copy arrow cards on cardstock and laminate for future use.
Milk “What if” Statements…

Everyone started drinking orange juice instead of milk.

No one ate in the lunch room or needed milk for their sack lunches.

Fewer people wanted to be dairy farmers.

The government wanted to give everyone free cheese.

There was a chocolate milk drinking contest in Sandy, West Jordan, West Valley, Logan, St. George, Salt Lake City, Murray, Ogden, and Bountiful.

Milk went on sale for .25 cents a gallon.

Ice cream became America’s most popular dessert.

There was a contest where gallon milk lids contained cash prizes.

Milk, instead of soft drinks, was sold at sporting events.

Feed prices for dairy cows went up.
Pickle “What if” Statements...

Cucumbers were found to cure the common cold.

The weather was bad and not many cucumbers were produced.

The honey bees did not pollinate the cucumbers.

People stopped buying pickles and started buying more hot peppers.

Pickle advertisements on television made more people buy pickles.

Fast food restaurants stopped putting pickles on their hamburgers.

Everyone wanted small pickles instead of medium size or large pickles.

Foreign countries started importing pickles at cheaper prices.

There was a shortage of vinegar.
Egg “What if” Statements…

Brown eggs became more popular than white eggs.

Scientists developed an egg without cholesterol.

Scientists developed a process to eliminate salmonella from all eggs.

All the 4th grade classrooms in Utah incubated eggs.

The price of grade “A” eggs was .50 a dozen.

Farmers with small flocks of chickens sold their eggs to grocery stores cheaper than large egg companies.

IHOP stopped offering eggs, pancakes, French toast, and omelets on their menu.

Scrambled eggs became the most popular breakfast food.

“Egg Beaters” egg substitute became more popular than eggs.

Several egg farmers in Utah stopped raising laying hens (egg chickens) and started raising broilers (meat chickens) in their chicken houses.

A disease made all of Utah’s chickens unable to lay eggs.
Enduring Understanding:

Classification and organization of Utah’s ecological and governmental systems help us understand how parts of a whole are interdependent.

Essential Questions

- How does science use classification systems to identify plants and animals in Utah?
- How do Utah’s three different ecological systems differ and what adaptations/behaviors do organisms have to help them survive within their system?
- In what ways has Utah’s system of government changed to meet community needs?
- What are your rights and responsibilities as a member of your community and a citizen of Utah?

Core Curriculum Concepts/Skills: observation, classification, inquiry, cause-effect, interrelationships, prediction, inference, investigation, relationships, rights, responsibilities, representation

### Core Standards

#### Social Studies

Standard III: Students will understand the roles of civic life, politics, and government in the lives of Utah citizens.

- Objective 1: Describe the responsibilities and rights of individuals in a representative government as well as in a school community.
- Objective 2: Analyze the different ways people have organized governments in Utah to meet community needs.
- Objective 3: Investigate the development of the economy in Utah.

#### Science

Standard V: Students will understand the physical characteristics of Utah’s wetlands, forests, and deserts and identify common organisms for each environment.

- Objective 1: Describe the physical characteristics of Utah’s wetlands, forests, and deserts.
- Objective 3: Use a simple scheme to classify Utah plants and animals.

#### Social Studies language students should know and use:
- citizen, civic organizations, allegiance, representative, rights, responsibilities, government

#### Science language students should know and use:
- wetland, forest, desert, adaptation, deciduous, coniferous, invertebrate, vertebrate, bird, amphibian, reptile, fish, mammal, insect, hibernation, migration

**Common plants:** sagebrush, Pinyon pine, Utah juniper, spruce, fir, oak brush, quaking aspen, cottonwood, cattail, bulrush, prickly pear cactus

**Common animals:** jackrabbit, cottontail rabbit, red fox, coyote, mule deer, elk, moose, cougar, bobcat, deer mouse, kangaroo rat, muskrat, beaver, gopher snake, rattlesnake, lizard, tortoise, frog, salamander, red-tailed hawk, barn owl, lark, robin, Pinion jay, magpie, crow, trout, catfish, carp, grasshopper, ant, moth, butterfly, housefly, bee, wasp, pill bug, millipede
Essential Question #1:

How does science use classification systems to identify Utah’s plants and animals?

Lessons:

- Plants and Animal Classification
- Spiders and Insects

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<th>Core Standards</th>
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<td>Social Studies</td>
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<td>Standard V</td>
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<td>3a</td>
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<td>3b</td>
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</table>
Unit 4: Utah Systems: Classification & Organization

Essential Question #1: How does science use classification systems to identify plant and animals in Utah?

**Lesson Title:** Plant and Animal Classification

**SC Standard V, Objectives 3, 4**

**Implementation Time:** 45 minutes

**Materials Needed:**
- 5-10 leaves of each tree listed on the tree key
- Animal Key and Tree
- Animal/Plant Pictures
- Animal Classification Sheet
- Plant Classification Sheet

**Procedure:**

**Background information:** When a scientist discovers a new species of plant or animal, they don’t create their own classification scheme. They will use an existing scheme which was created by grouping plants that share similar characteristics. In this activity, the students will need to make choices between the similarities and differences between their object and the classification scheme.

1. Have the students bring one or two leaves from home. In small groups have the students start classifying the leaves into different groups. Remind the students that they need to look for similar characteristics. The students will need to look at shapes of the leaves, how many leaves are on the stem and if the leaves have teeth or lobes. The students will need to justify their classification scheme and groups. As a class, discuss the students’ classification schemes and reasoning. Discuss that when a new species of plant is discovered the scientist use existing classification schemes. The students will be using some today.

2. Hand out the two different tree keys.
3. Model the process by showing a picture of one of the trees and walking through the choices. Remember to state the similar and different characteristics of the choices given.

4. Start with the tree diagram. Model the steps and tell about the characteristics and decisions you make.

5. Look at the tree key. Explain and draw on the board each of the descriptions of tree. Model the same tree through the different keys. Make sure you write down the steps it took to get the answer: example 1b, 4a, 5a, 6b, 7a (quaking aspen)

6. Divide the students into small groups. Give each group a picture and a sample leaf from the unknown tree and have the students practice determining which tree it is. The students can record their findings on the tree worksheet.

7. After five to ten minutes have the groups rotate the pictures and leaves.

8. When all the groups have seen the pictures and leaves, start a class discussion on the students; findings and processes.

9. ‘In a journal, have the students answer the following question: Journal entry: What is the difference between existing classification schemes and creating your own classification scheme? If you found a new species, what scheme would you use and why should you use it?

**Assessment**
Read notes written in the students’ journals to see if understanding was accomplished
Classifying Utah Animals

Characteristics of the animal ____________________________

List the steps you took on the classification keys. ____________________________

What animal do you think this is? ____________________________

Draw a picture of the animal.

Characteristics of the animal ____________________________

List the steps you took on the classification keys. ____________________________

What animal do you think this is? ____________________________

Draw a picture of the animal.

Characteristics of the animal ____________________________

List the steps you took on the classification keys. ____________________________

What animal do you think this is? ____________________________

Draw a picture of the animal.

Characteristics of the animal ____________________________

List the steps you took on the classification keys. ____________________________

What animal do you think this is? ____________________________

Draw a picture of the animal.
Characteristics of the animal ____________________________________________

List the steps you took on the classification keys. _______________________

What animal do you think this is? _________________________________

Draw a picture of the animal.

Characteristics of the animal ____________________________________________

List the steps you took on the classification keys. _______________________

What animal do you think this is? _________________________________

Draw a picture of the animal.

Characteristics of the animal ____________________________________________

List the steps you took on the classification keys. _______________________

What animal do you think this is? _________________________________

Draw a picture of the animal.

Characteristics of the animal ____________________________________________

List the steps you took on the classification keys. _______________________

What animal do you think this is? _________________________________

Draw a picture of the animal.
Classifying Utah Trees

Name _______________________

Characteristics of the tree ____________________________

List the steps you took on the classification keys. ____________________________

What tree do you think this is? ____________________________

Draw a picture of the leaf.

Characteristics of the tree ____________________________

List the steps you took on the classification keys. ____________________________

What tree do you think this is? ____________________________

Draw a picture of the leaf.

Characteristics of the tree ____________________________

List the steps you took on the classification keys. ____________________________

What tree do you think this is? ____________________________

Draw a picture of the leaf.

Characteristics of the tree ____________________________

List the steps you took on the classification keys. ____________________________

What tree do you think this is? ____________________________

Draw a picture of the leaf.

Characteristics of the tree ____________________________

List the steps you took on the classification keys. ____________________________

What tree do you think this is? ____________________________

Draw a picture of the leaf.
<table>
<thead>
<tr>
<th>Characteristics of the tree</th>
<th>List the steps you took on the classification keys.</th>
<th>What tree do you think this is?</th>
<th>Draw a picture of the leaf.</th>
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<tr>
<td>Deer Moose</td>
<td>Muskrat</td>
<td>Carp</td>
<td>Rattlesnake</td>
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<tr>
<td>Kangaroo Rat</td>
<td>Beaver</td>
<td>Gopher snake</td>
<td>Lizard</td>
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<tr>
<td>Robin</td>
<td>Barn Owl</td>
<td>Frog</td>
<td>Tortoise</td>
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<tr>
<td>Pinyon Jay</td>
<td>Lark</td>
<td>Salamander</td>
<td>Red-tailed Hawk</td>
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<tr>
<td>Magpie</td>
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<table>
<thead>
<tr>
<th>Bobcat</th>
<th>Grasshopper</th>
<th>Butterfly</th>
<th>Bee</th>
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<tr>
<td>Ant</td>
<td>Moth</td>
<td>Housefly</td>
<td>Wasp</td>
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<td>Cottontail Rabbit</td>
<td>Jack Rabbit</td>
<td>Millipede</td>
<td>Pill Bug</td>
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<td>Elk</td>
<td>Crow</td>
<td>Trout</td>
<td>Catfish</td>
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<tr>
<td>Sagebrush</td>
<td>Pinyon Pine</td>
<td>Fir</td>
<td>Quaking Aspen</td>
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<td>Utah Juniper</td>
<td>Spruce</td>
<td>Scrub Oak Brush</td>
<td>Cottonwood</td>
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<td>Moose</td>
<td>Coyote</td>
<td>Bulrush</td>
<td>Cattail</td>
</tr>
<tr>
<td>Cougar</td>
<td>Mule Deer</td>
<td>Red Fox</td>
<td>Prickly Pear Cactus</td>
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</tbody>
</table>
Animal Key

1a. Six legs.................................................................................................................. Insect
1b. Less than six legs.................................................................................................... go to 2

2a. Four legs.................................................................................................................. go to 3
2b. Two legs.................................................................................................................. go to 6
2c. No legs................................................................................................................... go to 9

3a. Lives on land......................................................................................................... go to 4
3b. Lives in water........................................................................................................ go to 5

4a. Has large upright ears.......................................................................................... Rabbit
4b. Has short upright ears.......................................................................................... go to 8
4c. Has long floppy ears............................................................................................ Dog

5a. Adult has visible tail............................................................................................. Salamander
5b. Adult has no tail.................................................................................................. Frog

6a. Nest on or near water.......................................................................................... go to 7
6b. Nest in tall trees or high cliffs............................................................................ Eagle

7a. Has long legs......................................................................................................... Crane
7b. Has short legs....................................................................................................... Duck

8a. Has antlers............................................................................................................ Deer
8b. Has no antlers..................................................................................................... Fox

9a. Lives within a shell............................................................................................. Snail
9b. Has no shell........................................................................................................ Snake
9c. Has fins and lives in water.................................................................................. Fish
Tree Key for Utah Trees

1a. Trees with needle-like or scaly leaves.......................................................... go to 2
1b. Trees with flat leaves of different widths................................................. go to 2

2a. Have cones and long thin needles............................................................... go to 3
2b. Short, blunt, scaly leaves, berries instead of cones............................. Juniper

3a. Shorter, square needles, not in clusters.............................................. Spruce
3b. Longer needles in clusters............................................................... PIne

4a. Trees with simple, single leaves............................................................... go to 5
4b. Trees with compound leaves............................................................... go to 6

5a. Edges of leaves are toothed................................................................. go to 6
5b. Edges lobed............................................................................................... go to 8

6a. Leaves longer than wide................................................................. Willow
6b. Leaves rounded................................................................. go to 7

7a. Leaf nearly round, white bark on tree.............................................................. Aspen
7b. Leaves triangular in shape, bark rough....................................................... Cottonwood

8a. Fruit is an acorn, lobes rounded............................................................... Oak
8b. Seeds have “wings” lobes are pointed.................................................. Maple

Leaf Characteristics

- Needle-like
- Scaly
- Toothed
- Compound
- Longer than wide
- Flat
- Rounded lobes
- Pointed lobes
Lesson Title: Spiders and Insects

SC Standard V, Objective 4

Implementation Time: 45 minutes

Media Resources Needed:
4th Grade Sci-Ber Text-Insects/Spiders (online or print it out)

Materials Needed:
Spider/insect Venn diagram
Color pencils
Paper

Procedure:
Background for Teachers:
Most students think that a spider is an insect. Spiders and insects are both invertebrate animals. Some invertebrates have a tough covering on the outside of their bodies. This covering is called an exoskeleton. This group of animals is known as arthropods. The characteristics of arthropods include jointed legs and a segmented body. The arthropod group is divided up into different families of insects, spiders (arachnid), millipedes and centipedes and shrimp, lobster and crabs. Insects make up most of this group. Even though spiders are part of the arthropods group, they are very different from insects. Insects have six legs, three main body parts, one or two pairs of wings and two antennae. Arachnids are also arthropods. Spiders, crags, scorpions, and ticks are examples of arachnids. They have eight legs and only one or two main body sections. Most arachnids do not have wings and they do not have antennae.

1. Have students read the information on the Sci-Ber Text page about insects and spiders (online or print it out). As a group or individual, have students fill out the Venn Diagram that shows the characteristics of insects and spiders.
Have students do the Invent an Insect activity listed on the Sci-Ber Text (also printed in this lesson)

**Assessment:** Show the students a picture of an uncommon insect or spider. See if they can follow the same characteristic of classification. A good example would be a scorpion, which is an arachnid. Complete the Venn diagram with the students.
Invent an Insect

*Invent your own personal bug. Remember that all insects have the following parts:*

- **Head** - contains eyes, mouth, and two feelers called antennae
- **Thorax** - the middle section
- **Abdomen** - the end section. This is where the insect digests its food. Sometimes it has a pincher or a stinger.
- **Legs** - all insects have three pairs of legs (six legs in all)

*Draw your bug on a piece of paper. Give your bug a name and then answer the questions.*

1. How does your insect travel? (Does it fly, crawl, swim, or hop?)
2. What does it eat?
3. How does it protect itself? (Can it change colors or does it bite and sting?)
4. What does it like to do during the day or night time?
Essential Question #2:

How do Utah’s three different ecological systems differ and what adaptations/behaviors do organisms have to help them survive within their system?

Lessons:

- Utah’s Environments
- Wetland Adaptation and Migration
- Bird Adaptations and Behavior

<table>
<thead>
<tr>
<th>Core Standards</th>
<th>Social Studies</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard V</td>
<td>1a compare the physical characteristics of Utah’s wetlands, forests, and deserts</td>
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<td></td>
<td>1b describe Utah’s wetlands, forests, and deserts</td>
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<td>1c locate examples of areas that have characteristics of wetlands, forests, and deserts</td>
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<td>1e create models of wetlands, forests, and deserts</td>
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<td>2a identify common plants and animals that inhabit Utah’s forests, wetlands, and deserts</td>
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<td>2b cite examples of physical features that allow particular plants and animals to live in specific environments</td>
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<td>2c describe some of the interactions between animals and plants of a given environment</td>
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<td>2d identify the effect elevation has on types of plants and animals that live in specific wetland, forest, or desert</td>
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<td>4a observe and record the behavior of birds</td>
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<td>4b describe how the behavior and adaptations of Utah mammals help them survive winter</td>
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<td>4c research and report on the behavior of a species of Utah fish</td>
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<td>4d compare the structure and behavior of Utah amphibians and reptiles</td>
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Lesson Title: Utah’s Environments

SC Standard V, Objectives 1, 2

Implementation Time: Two-Three 45 minute sessions

Media Resources Needed:
Utah Atlas: Geography and History by C. Craig and M. Carr
Optional: Bill Nye Wetlands, Bill Nye Deserts, Bill Nye Forest (eMedia)

Materials Needed:
Utah’s Biome Fact Sheets (print from website)
Ecoregion map (in Utah Atlas)
Utah Environments Map
Paper
Colored pencils/crayons
Rulers
Diorama materials (can be provided by student: Shoe box, small models, toy animals etc...)

Procedure:

Day 1
1. Divide students into groups and assign them one of the Utah Biome sections from the Biome Fact Sheet. Have students ready their assigned biome to get the information they will need to complete their assignment.

2. Each group will need to create a diorama with a shoebox and small materials of their assigned biome. The diorama should include plant and animals that would occur there. Each group must also fill out the Information Sheet and then report their findings to the whole class.

Alternative 1: You could have students do a Foldable diorama, using Dina Zike’s
“Four Door Diorama” Using giant paper or poster board will make the Foldable large enough for a group to work with. Instructions on this and many other Foldables: http://historyroom.org/foldable%20pdf.pdf

Alternative 2: If you have access to computers, students could do a PowerPoint or a narrated PhotoStory instead of the diorama.

Day 2
Finish dioramas if more time is needed.

Mapping Utah’s Biomes/Environments

1. On your LCD projector, display the Eco-region map on the wall or whiteboard. Have each group come to the front of the classroom and show where on the map their diorama would best fit in the state of Utah.

2. Have students complete the Utah Environments Map

Assessment:
Check the dioramas for accuracy.

Extension:
Have students do more research online about Utah’s unique environment:

http://www.surweb.org/ls/ls_view.asp?Isid=1167

Show a Bill Nye video on one of the types of environments
Information Sheet

My Environment:

Where in Utah it is located:

List 4 types of animals, plants or insects that live in your environment and explain what adaptations they have that allow the animal able to survive in the environment.

Other interesting facts such as elevation, rainfall, temperature etc…
Utah Environments

1- Mountain Forest
2- Mountain Forest/Dessert Transition
3- Desert
4- Wetland
Lesson Title: Wetland Adaptation and Migration

SC Standard V, Objective 3

Implementation Time: 60 minutes

Materials Needed:
A large area such as a gym, or playing field
10-15 hula-hoops or jump-rope sections
Migration cards Copy each card on cardstock. On the back of each card write a number 1-5)
Cones to mark edges of playing field

Procedure:

Background For Teachers: Migration is a seasonal movement from one area to another, usually a breeding and a non-breeding area. Migration allows birds to take advantage of the seasons. Most migrant birds spend only two to four months of the year on nesting grounds. The majority of the year is spent elsewhere. Not all birds migrate. Some find the resources they need throughout the year; others switch to different food sources as the seasons change, and a few become inactive during lean times.

Research shows that approximately 75 percent of the bird species in the state of Utah (about 300) are dependent on the corridors of trees and shrubs that grow along streams and rivers throughout the state. Areas like the Jordan River are especially important. Local biologists suspect that about 150 species of birds in Utah absolutely require riparian habitat. If this habitat disappears from our state, these 150 species of birds will disappear with it. In the western United States we have less than five percent of our riparian habitat remaining in its natural condition. Because western riparian habitat is scarce and rapidly becoming more so, wetland areas are of vital importance to breeding and migrating birds. The Jordan River offers a migration and habitat corridor between Utah Lake and the Great Salt Lake, and a biological sanctuary between Utah's western desert and the Wasatch Range. This area is known as the Great Salt Lake flyway, and
is a crucial stopover for hundreds of thousands of migrating birds each season. The Great Salt Lake has been identified as a vital link in an international chain of sites that provide critical habitat for birds.

Pre-Assessment/Invitation to Learn
1. Ask students to imagine that the next time they, or their parent, went to the grocery store, it has disappeared. What would they do? Go to another store? What would happen if the next store they tried has also gone? Where would they get their food? How would this affect their behavior?

2. Because wetlands are so important to birds, they are often called "quickie marts" or places where they can get a "snack" that will help them as they travel. When these areas disappear, it causes problems for them, just like it would for humans if all the grocery stores and "quick stop" places were no longer around. Discuss with the students the importance of wetlands. On a map have the students point out the biggest wetland in the state (The Great Salt Lake). Discuss how transportation and urban development are destroying wetlands. Students should be aware of the importance of wetlands. Make a list of the important reasons on a large piece of paper to be posted in the classroom.

Game Instructions
3. Set up a large area. Have opposite sides of the area represent the bird wintering and summer grounds. The birds must migrate from one end to the other. Place the hula-hoop or jump rope circles between the winter and summer grounds. Each circle represents a wetland. Try to make different size circles that would represent different size wetlands.

4. Tell the students that each of them is a migratory bird and must migrate to their summer/winter grounds. They can only stop in the wetlands. Any other area is unsafe and birds who don’t make it to a wetland die because of lack of food and safety.

5. The birds can fly so far a day. So, the students can only take 5 steps per day of flight. The steps can be as big as they want, but only 5 steps.

6. Each wetland has a card with a description of the wetland. Students will read the card when instructed.

7. Have the entire class go to the area. The key to making this work without losing control is to do one day at a time. As everyone is taking their steps, you will notice some birds change directions because the wetlands are filling up. After everyone has taken their 5 steps, the ones who are not in the wetlands are dead and must line up at the side of the course.
8. Have one bird from each wetland read the migration card. The birds must follow the directions on the card. When all the wetlands have been read, the birds migrate again to the next wetland.

9. When the birds that are still alive reach the summer ground, explain that they will lay two eggs. For each bird in the summer resting grounds, two birds from the sidelines will join the migration. This will give students who died early in the game an opportunity to get back in. The birds can only lay eggs once a year in the summer nesting ground.

10. Now the weather is starting to get cold. It is time to migrate to the winter resting grounds. Repeat the same steps above. You will notice that the birds will start making adaptations so they can avoid the dangerous wetland.

11. After the activity is over, discuss with the students the patterns of migration they took and why they avoided certain wetlands.

12. Have the students write in their science journals the importance of wetlands and how destroying them can hurt the birds and animals.

**Assessment:**
Use the notes made in the students' science journal to see if more understanding is needed.

Let the students create a book about how birds migrate and the importance of wetlands.

Create a graphic organizer to show cause and effect of loss of wetland areas and bird populations in individual student journals (see attached suggestions). Have students write two statements of conclusions they draw from their experience. (Ex: Wetlands are placed where migrating birds can rest and eat during migration. Birds need to have places to stop along their journey to survive.)

Collect journals and evaluate for correct use of science vocabulary, information, and student inferences.
Urban development has taken over your wetland. You are very tired and must find a wetland fast. Since this wetland is destroyed, you must take two steps to find another wetland.

Urban development has taken over your wetland. You are very tired and must find a wetland fast. Since this wetland is destroyed, you must take two steps to find another wetland.
<p>| There have been very heavy rains in this area and the wetland is flooded. There is some food but not a lot. The last two birds to arrive find no food and die. | Boys playing near a stream have spotted you. They decide to throw rocks. The third bird to this wetland is killed. |
| A coyote lies hidden in the brush. The third bird in this wetland is eaten. | Kids playing with matches have started a fire and damaged this wetland. The first two birds that landed here die. The rest must fly away to find another wetland. Take only three |
| A new mini-mall is being built right next to your wetland. People make you very nervous. The second bird here gets tangled up in a plastic bag and dies. | An extra rainy season has let this wetland become a smorgasbord of insects. Eat as much as you like. You may take an extra step on your next turn. |</p>
<table>
<thead>
<tr>
<th>Event</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is an abundance of food in this wetland. You may take an extra step on your next turn.</td>
<td>You land in a wildlife refuge. There is plenty of clean food. Take an extra step on your next turn.</td>
</tr>
<tr>
<td>Urban development has taken over your wetland. You are very tired and must find a wetland fast. Since this wetland is destroyed, you must take two steps to find another wetland.</td>
<td>The state has decided to build a highway through this wetland. This wetland is destroyed and all the animals in this wetland are killed.</td>
</tr>
<tr>
<td>The wetland is polluted causing the aquatic insect population to lower. The birds have less food to eat. Take only 4 steps on your next turn.</td>
<td>The wetland is polluted with toxins. You eat toxic insects and get sick. Take only 3 steps on your next turn.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>You are shot by hunters.</td>
<td>The last bird in this wetland is eaten by a predator.</td>
</tr>
</tbody>
</table>
The wetland is polluted causing the aquatic insect population to lower. The birds have less food to eat. Take only 4 steps on your next turn.

The wetland is polluted with toxins. You eat toxic insects and get sick. Take only 3 steps on your next turn.

You are shot by hunters.

The last bird in this wetland is eaten by a predator.
<table>
<thead>
<tr>
<th>This popular marshy wetland has become polluted by chemicals from the fertilizers local farmers used. It is no longer a safe stopover site.</th>
<th>Some loose dogs from a nearby group of homes have made this area unsafe. If you land here, you will be destroyed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>This wetland has lots of predators. If you land here, you will be eaten by a red-tailed hawk.</td>
<td>A local business accidentally spilled some poisonous materials into the water of this wetland.</td>
</tr>
<tr>
<td>This critical wetland has been drained and filled to build four apartment buildings. There are no plants or water.</td>
<td>Several new housing developments have been built. This wetland is much smaller than it was last year. Only two birds can stop at this site.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Some kids on bikes have flattened areas in this wetland where you stopped to rest and eat. There is no safe place to land.</td>
<td>There is a golf course where this wetland was, and only a small lake remains. Three birds can land in this area.</td>
</tr>
</tbody>
</table>
Essential Question #2: How do Utah’s three different ecological systems differ and what adaptations/behaviors do organisms have to help them survive within their system?

Lesson Title: Bird Adaptations and Behavior

SC Standard V, Objective 2,4

Implementation Time: 1 hour

Media Resources Needed:
Any books on birds
Optional video: Bill Nye Birds (eMedia)

Materials Needed:
Pictures of birds (try websites for pictures)
Paper
Colored pencils/crayons

Procedure:

1. In small groups or as a whole class, have students list the kinds of birds that they are aware of (ducks, eagles, song birds, magpies, chickens etc…). Now have them list the characteristics of the beaks and feet of the birds. Ask students to write in their science journal their response to the question How does the beak or the feet of a bird help it survive?

2. Optional: Show Bill Nye Birds and/or look at various books on birds. Discuss the different adaptations. Have students write additional information into their journal about adaptations of bird beaks and feet.

3. Tell students that they get to Build-a-Bird. Instruct the students to make up their own bird. Instruct the students to describe the types of beaks, feet/talons, feathers that their bird has and why they need those specific physical adaptations. Instruct the students to draw and name their bird. Instruct the students to provide an explanation of the type of habitat where their bird would be found.
**Assessment:** Celebrate with an “aviary” presentation. Instruct the students to show their birds and describe specific characteristics.

**Extension:**
Go out onto the school playground and look for birds. (You could also do this lesson at the Murray Nature Center.) Bring binoculars. Explain to students how to use binoculars. Check the area to see if any birds are around. Find a quiet place to sit and bird watch. Assign a student to take notes and record the types of birds, location, nests, young and behavior of birds. Discuss the physical adaptations of the local bird life.

Review the importance of wetlands for the birds. Migratory birds use wetlands as resting areas during their long migrations. They use the wetlands to rest and eat. Discuss the importance of saving our wetlands. Transportation and urban development are destroying many of our wetland areas.

Visit a bird refuge or sanctuary where students can witness birds in their natural habitat.

Fine Arts/Visual Arts-
Draw or paint from a bird’s-eye view, what the world looks like to a migrating bird. Then have them draw or paint a picture of the world from this angle and, if desirable, include a view of the clouds, wetlands, towns, etc. Encourage students to accurately portray the habitat the bird might pass over, but to use their imagination so that their picture conveys the length of the journey, the altitude the bird flies at, and the feel of the air.

Homework & Family Connections
Encourage families to do a backyard or neighborhood bird watch. Sketch picture of birds that they see and try to identify them.
Essential Question #3:

In what ways has Utah’s system of government changed to meet community needs?

Lessons:

- What is a Constitution?
- Government and Community Needs
- Utah’s Elected Officials

<table>
<thead>
<tr>
<th>Core Standards</th>
<th>Social Studies</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard III</td>
<td>□ 2a identify the forms of government found in Utah in different eras including historic and current American Indian government, State of Deseret, Utah Territory, statehood era, present</td>
<td></td>
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<tr>
<td></td>
<td>□ 2b compare how these governments addressed community needs</td>
<td></td>
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<tr>
<td></td>
<td>□ 2c compare the roles and responsibilities of state, county and local officials</td>
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</tbody>
</table>
Lesson Title: What is a Constitution?

SS Standard III, Objective 2

Implementation Time: 45 minutes

Media Resources Needed: Reference books such as: The Utah Adventure by John McCormick, Encyclopedia

Resources Needed: “Finding Evidence” graphic organizer; “Rights and Responsibilities” list

Procedure:

1. Ask the students what their class would be like without any rules. Expand the discussion to include their school, their city/town, and their state. Focus the discussion to include the need for rules, organizations, and structure as well as individual rights.

2. Explain to the students that they will be studying the Constitution of Utah. Ask students if they know what a constitution is. Ask the students if they are familiar with the various parts of a constitution such as the Preamble, Bill of Rights, Articles, and Sections. Encourage many responses.

3. Pass out resource materials and graphic organizers. Have students research what a constitution is and fill in the graphic organizer.

4. Discuss findings as a class when students have finished their research. Write findings on overhead or board. Discuss with the students why it might be important to have a constitution.

5. Ask the students what rights they have in their family. Find out if there are responsibilities that go along with those rights. For example: Do they play with their friends after school? (Rights) Do they have to do their homework first? (Responsibilities) Brainstorm many different rights and responsibilities.

6. Tell the students that the first part of the constitution is called the “Bill of Rights”. The Bill of Rights was created for the citizens of Utah and the government.
7. Cut up “Utah’s Bill of Rights and Responsibilities.” Put in a container. Have students draw a strip, read it aloud, and decide if it is a right or a responsibility.

Assessment:

Instruct the students to make a T-chart with rights written on one side and responsibilities on the other side. Fill in with the correct information as classmates draw slips, read, and decide. Have students right a statement on the back of their T-Chart about what life might be like without our constitution.
Rights & Responsibilities

**Rights**
Worship in the church of your choice

Say what you believe is right

Print what you want to publish

Own your own home

Go to school

Vote when of age

Have a trial by jury

Don’t have to testify against yourself

Receive protection when needed

Assemble peacefully

**Responsibilities**

Obey laws

Pay taxes

Help correct things you disagree with

Respect the rights of others

Keep informed

Defend your country

Vote in elections
### Statement: WHAT IS A CONSTITUTION?

<table>
<thead>
<tr>
<th>Proof:</th>
<th>Reference:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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<td>3.</td>
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<td>5.</td>
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<tr>
<td>6.</td>
<td>6.</td>
</tr>
</tbody>
</table>
## Finding Evidence

### Statement: WHAT IS A CONSTITUTION?

<table>
<thead>
<tr>
<th>Proof:</th>
<th>Reference:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is an official document.</td>
<td>1. Answers and sources will vary.</td>
</tr>
<tr>
<td>2. Sets rules for government and laws for the citizens</td>
<td></td>
</tr>
<tr>
<td>3. Explains and protects citizens’ rights</td>
<td></td>
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<tr>
<td>4. Patterned after the U.S. Constitution</td>
<td></td>
</tr>
<tr>
<td>5. Explains duties and organization of the government</td>
<td></td>
</tr>
<tr>
<td>6. Written by few, ratified by many.</td>
<td></td>
</tr>
</tbody>
</table>

Reference:
1. Answers and sources will vary.
Lesson Title: Government & Community Needs

Standard III, Objective 2

Implementation Time: 45 minutes

Media Resources:

Resources: THU Government of Utah by Paul Thompson, pp. 30-31

Materials Needed:
- “Cause & Effect” graphic organizer
- “Sequencing” graphic organizer
- “Passing a Bill Into Law” (page 31) handout for each student
- Utah timeline

Procedure:

1. Brainstorms with the class what a law is. (Law=rule of conduct or action established by custom or laid down and enforced by governing authority.)

2. Ask students why they think we need laws. (Answers may include: to keep people safe, to keep the environment clean, protect our property, protect our rights.) List these on the board. Pass out the “Cause & Effect” graphic organizer. After explicit teacher modeling of at least one example, have students list why we have laws on the cause side of the graphic organizer. Discuss the effect these laws have on our community and list these on the effect side of the graphic organizer. Discuss the consequences of breaking the law (jail, prison, fines, probation, community service, license revoked, home arrest, detention).

3. Think-pair-share: Have students silently think of a need in their community and how government might help address the need. Jot ideas down on a scratch piece of paper. Give students 2-3 minutes of “think time” to visualize their immediate community and think of areas of need (littering, unsafe driving, loud music, rundown buildings, unkempt yards, unhealthy lifestyles, etc.). Next, have students turn to a partner and share ideas.
4. Ask students if any of their ideas for address community needs involved passing/enforcing new laws. Introduce the idea of how laws are made. Pass out and discuss “Passing a Bill Into Law.” Using one of the student examples of a law we need but is not yet in effect, model how to fill in the “Sequencing” graphic organizer on how a bill becomes a law. Model for students then have them fill in their own sequencing graphic organizer using their own example.

Assessment:

Using the Utah timeline as a reference, have students reflect on the different ways government has addressed community needs in American Indian cultures, the State of Deseret, the Utah Territory, the statehood era, and preset time. Assign students to select a past era and write a letter from the point of view of a child living in that era that describes a community need and how that need could be or was addressed. The letter should be written to the appropriate authority: tribal leader, the U.S. Congress, Territorial Governor, Brigham Young, etc.

Role – child living in a different era

Audience – appropriate governing authority

Format – letter

Topic – a community need to be addressed
Cause and Effect
Fourth Grade
Unit 4: Utah Systems: Classification & Organizations

Essential Question #3: In what ways has Utah’s system of government changed to meet community needs?

Lesson Title: Utah’s Elected Officials

Standard III, Objective 2

Implementation Time: 45 minutes

Resources: THU Government of Utah by Paul Thompson, pp. 26-28, 32

Materials Needed:
- “Government of Utah” reading (1 per student)
- “Elected Officials Sort” cut and shuffled (1 set/envelope for every group of 3-5 students)
- 3 small sticky notes per student

Procedure:
1. Activate student background knowledge on Utah’s elected officials by asking students who’s who in Utah government. Write the names of elected officials on the board and see how many are familiar to students.

2. Assign students to read “Government of Utah” pp. 26-28, 32. While they read, ask students to write questions they have on their sticky notes and leave them on the page where the questioned occurred to them. After reading, have students share their questions with a partner and try to help one another find the answers. Questions that remained unanswered should be posed to the class for discussion.

3. Explain to students that we vote and elect officials to represent us in State, City, or County positions. This is part of a representative democracy. Describe the differences among the roles and responsibilities for each position in the different levels of government (see list of elected officials).

4. Brainstorm with students the characteristics elected officials should possess to fulfill their roles and responsibilities. These may include: honesty, experience, education (specific to role/responsibilities), good listener, intelligence, interest in the people they serve, fair, integrity, good health.
Assessment:
Divide students into groups of 3-5. Give each group an envelope that contains the words from the "Elected Officials Sort" cut into individual strips and shuffled. Assign students to sort the words into three different categories (students will find the names of the categories among their word strips). As teacher walks around, allow each group to share their results with and explain their rationale. Conduct a whole-class sort while each group corrects any misconceptions.

Extension:
Assign students to research the names and offices of their elected state, city, or county officials. Invite a local elected official(s) to visit your classroom.
Elected Officials Sort

STATE
Governor
Lieutenant Governor
Secretary of State
Attorney General
Senators
Representatives

CITY
Mayor
City Council
Manager

COUNTY
County Commissioners
Surveyor
Sheriff
Auditor
Assessor

Clerk
Recorder
Treasurer
Attorney
Essential Question #4:

What are your rights and responsibilities as a member of your community and as a citizen of Utah?

Lessons:

- State and National Symbols
- Rights and Responsibilities
- Creating a Class Bill of Rights

Core Standards

<table>
<thead>
<tr>
<th>Social Studies</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard III</strong></td>
<td></td>
</tr>
<tr>
<td>□ 1a identify rights of a citizen <em>(examples may include: voting, peaceful assembly, freedom of religions)</em></td>
<td></td>
</tr>
<tr>
<td>□ 1b identify responsibilities of a citizen</td>
<td></td>
</tr>
<tr>
<td>□ 1c determine how and why the rights and responsibilities of various groups have varied over time <em>(examples may include: Chinese railroad workers, Greek miners, women, children, Mormons, Japanese-Americans at Topaz, American Indians, African-Americans)</em></td>
<td></td>
</tr>
<tr>
<td>□ 1d explain how the influence and power of individuals is affected when they organize into groups</td>
<td></td>
</tr>
<tr>
<td>□ 1e describe and model ways that citizens can participate in civic responsibilities</td>
<td></td>
</tr>
<tr>
<td>□ 1f contribute to and practice classroom goals, rules, and responsibilities</td>
<td></td>
</tr>
<tr>
<td>□ 1g recognize and demonstrate respect for United States and Utah symbols including Pledge of Allegiance and flag etiquette</td>
<td></td>
</tr>
</tbody>
</table>
Unit 4: Utah Systems: Classification & Organizations

Essential Question #4: What are your rights and responsibilities as a member of your community and as a citizen of Utah?

Lesson Title: State and National Symbols

SS Standard III, Objective 1

Implementation Time: 45 minutes

Media Resources Needed: computer/LCD projector; A is for Arches: A Utah Alphabet by Becky Hall; Utah Atlas: Geography and History by Cliff B. Craig and M. Elijah Carr

Resources Needed: blank “Official Utah T-Shirt” handouts (1 per student)

Materials Needed: markers, crayons, colored pencils

Procedure:

1. Tell students to stand and face the flag in preparation for the Pledge of Allegiance. Talk about why we stand (respect) during the pledge and why we place our hand on our heart (love, loyalty). Recite the Pledge of Allegiance. Explain that symbols are representations of something else and that the U.S. flag is a symbol, or representation of our country. Afterward, review the symbolism of the U.S. flag – colors, stars, stripes – and ask students to name other symbols of the United States.

2. Project the Utah symbols page on the official Utah website at http://www.utah.gov/about/symbols.html and/or on pages 4-5 of the Utah Atlas. Point out the Utah State flag and state seal and their symbolism. Highlight other Utah symbols as time permits.

3. Read A is for Arches: A Utah Alphabet, stopping to discuss the Utah symbols.

4. Give each student a blank “Official Utah T-Shirt” handout. Assign students to design an official Utah T-Shirt that includes at least five Utah symbols (including colors). Have students cut out their t-shirts for display on a bulletin board or on a “clothesline” strung across the room.
Assessment:

Assign each student to write a paragraph of 5-8 sentences explaining why they chose the symbols/colors on their t-shirt (explanations can be the backside of t-shirts strung on classroom "clothesline").
Official Utah T-Shirt
Lesson Title: Rights & Responsibilities

SS Standard III, Objective 1

Implementation Time: 45 minutes

Media Resources Needed: A variety of picture books (teacher choice) that clearly illustrate responsible behavior. Example: *Peppe the Lamplighter* by E. Bartone

Materials Needed: highlighters (extension only)

Procedure:

1. Demonstrate examples of items that are interrelated and can’t function without both parts (examples: lamp and light bulb, screw and screwdriver, CD and computer). Explain that our rights and responsibilities are like the example(s), they don’t work the way they are supposed to unless both parts interrelate.

2. Teach the definitions of *right* (n) and *responsibility* (n). Explain that in our state and country, like the examples, one cannot exist without the other. Responsible citizens are not only concerned with their rights; they take their responsibilities as citizens seriously as well.

3. As a class, brainstorm a list of our rights and responsibilities as citizens of Utah and the United States. Think about *how* and *why* the rights of different groups of people have changed over time (women, immigrants, children, Mormons, American-Indians, African Americans, and Japanese-Americans at Topaz).

4. Divide students into small groups of 3-5. Explain that each group is going to read a different book and, while reading, look for examples of responsible behavior.

5. Give each group 3 minutes to share examples from their book (each student should participate) with the whole class. After each group shares, compare their examples with the class brainstorm list, adding examples as necessary.
Extension:

Assign students to scan local newspapers (hardcopy or online) for five days and look for examples of *rights* and *responsibilities*. Clip/print articles and headlines and collect them in an envelope/folder. After collecting the envelopes/folders from students, redistribute them to different students and assign them the task of highlighting examples of *rights* (one color) and *responsibilities* (another color) in the unfamiliar collection. Have students summarize an article of their choice that they feel best exemplifies the interrelationship between rights and responsibilities.
Essential Question# 4: What are your rights and responsibilities as a member of your community and a citizen of Utah?

Lesson Title: Creating a class Bill of Rights

SS Standard III, Objective 1

Implementation Time: 45 minutes

Materials Needed: Chart paper

Procedure:
1. Review with students the differences between rights and responsibilities. Explain that they will be writing a class Bill of Rights that describes the rights and responsibilities they have as members of the class community. Ask students to reflect on particular class problems and issues and ways a class Bill of Rights might address such problems.

2. Draw a large T-chart on chart paper. See below.

<table>
<thead>
<tr>
<th>Rights</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>

3. Put students in groups. Have groups brainstorm rights and responsibilities. Ask each group to share one right and one responsibility. Be sure there are no repeats. You may want to have the class vote on the choices. List the items on the chart and hang in the room.
**Assessment:** In groups have the students create a song, poem, jingle, or a rap about rights and responsibilities

**Extension:** Read as a class Utah’s and the United States preamble and create a class preamble.

**Class Bill of Rights – EXAMPLE**

We have the right to be safe.
We have the right to hear and be heard.
We have the right to learn.
We have the right to express our opinion.
We have the right to be treated fairly.
We have the right to be treated with respect.

We have the responsibility to come to school each day ready to learn.
We have the responsibility to obey the rules of the school and classroom.
We are responsible for our own education and school work.
We have the responsibility to participate.
We have the responsibility to respect the rights and differences of others.

**Preamble - EXAMPLE**

We, as students of this class, agree to abide by this constitution to maintain and serve an orderly learning environment.