



Lesson Four: Mapping in 3-D

Grade Level: 2nd Grade

Time: 2 days: 30 min for Day 1: 30-45 minutes for Day 2

Essential Question: How can we be stewards of Wyoming's public and private lands to benefit current and future generations?

Objectives: Students will:

- Learn how models are used in science.
- Create a model to represent different types of terrain.

Purpose: Students develop a model to understand that Wyoming's terrain makes the state unique.

Required Materials/Resources:

- Terrain Type photos from Lesson 3 (1 set for the class)
- 4 pieces of chart paper
- Tape
- Markers
- Physical Map of Wyoming - (one per student and one for the teacher)
- Student Journals OR notebook or printer paper to make Student Journal pages (one per student)
- Playdough/clay/salt dough (A small amount per student for Day 2: Step 2. For Day 2: Step 4, each small group will need enough to model the terrain on their blank Wyoming map. Since the clay/dough choice might slide off the paper easily, cookie sheets would be helpful to hold the materials.)
- Cardboard sheets to build the models on if teacher wants to keep clay/dough models

- Blank Physical Map of Wyoming - either laminated for students to put the dough on directly or for 2D sketching - (one per small group)

TEACHER NOTE:
Salt Dough Recipe

You will need:

- 1 cup salt
- 2 cups flour
- $\frac{3}{4}$ cup water

Instructions:

1. In a large bowl, mix salt and flour together.
2. Gradually stir in water. Mix well until it forms a doughy consistency.
3. Turn the dough onto a table or counter and knead with your hands until smooth and combined.
4. Make your creations using the salt dough.
5. If you would like these to go home or keep them for a future project, place the salt dough creations into the oven at 325°F. The amount of time needed to bake depends on the size and thickness of the salt dough creations. (Source 3)

Suggested Teacher Preparation:

- Become familiar with the four different types of terrain described throughout the lesson.
- Attach the Terrain Type Photos to the chart paper for Day 1: step 2.
- Find your town's location on the Physical Map of Wyoming.
- Decide whether on Day 2 students will sketch 2D maps or make 3D maps, and prepare your supplies accordingly including laminating the Blank Physical Map of Wyoming for each small group (3D models).
- Make salt dough, if necessary.
- Be able to explain the difference between 2D and 3D.
- Decide whether to keep 3D maps beyond the lesson. If they are being kept, prepare accordingly.
- Assign students to small groups.

Standards:

Science: 2-ESS2-2 (Explicit)

Social Studies: SS2.5.1, SS2.5.2 (Explicit)

ELA: 2.SL.1, 2.SL.2 (Practiced/Encountered)

CVE: CV5.1.4, CV5.3.1 (Practiced/Encountered)

Vocabulary:

- **Forest** - a large area of land covered with trees and underbrush
- **Grassland** - an area of land on which most of the natural plant forms are grasses
- **Lake** - a body of fresh or salt water of considerable size that is surrounded by land
- **Mountain** - a raised area of land higher and steeper than a hill
- **Reservoir** - a natural or artificial place where water is collected and stored for use

- **River** - a large, flowing stream of water (note: creeks and streams are smaller and flow into rivers, but can be used for similar activities)
- **Terrain** - the physical features of an area of land

Instructional Procedure/Steps:

Day 1:

1. Say: **"In our last lesson, we started talking about different terrains. Terrain means the physical features of an area of land. We discussed four types of terrain yesterday: mountains, water, forests, and grassland. In today's lesson, we will explore the characteristics of different types of terrain of Wyoming and build our own scientific models to show these different types of terrain."**
2. Display the four Terrain Type photos with a piece of chart paper attached underneath in different areas of the classroom. Provide each student with a writing utensil (preferably colored markers), and direct students to walk around the room and write what they notice about each type of terrain. Once students have visited all four pictures, discuss as a whole group what the students wrote on each chart. Address any misconceptions. *Students may think that forests and mountains are synonymous.* Use the descriptions below to guide your discussion about the characteristics of each type of terrain.
 - *Mountains (Source 1): They usually have steep, sloping sides and sharp or rounded ridges, and a high point, called a peak. Most geologists classify a mountain as a landform that rises at least 1,000 feet (300 meters) or more above its surrounding area. A mountain range is a series or chain of mountains that are close together. Animals that make their homes in mountains include the following: bears, mountain lions, deer, elk, Bighorn*

sheep, bobcat, chipmunks, and raccoons.

- *Grassland (Source 2): Grassland are land areas that are made mostly of grasses. They do not receive enough rainfall to grow trees like a forest, but they contain lots of grass so they receive more rain than a desert. Grasslands are often used for grazing and farms. Some wildlife that are found in grasslands include the following: pronghorn, prairie dogs, fox, coyotes, rabbits, bison.*
- *Forests: They are areas of land that have a large number of trees, bushes, and other foliage (wildflowers and ground cover) and provide habitat/homes to a wide variety of wildlife. They are often found in mountain areas. Some examples of wildlife that are found in forests include the following: deer, fox, raccoons, elk, woodpeckers, wolves, bears, skunks, woodchucks.*
- *Lakes, Rivers, and Reservoirs: Lakes are large bodies of standing or not moving water that are completely surrounded by land. Rivers are flowing bodies of freshwater that are bigger than creeks and streams. Reservoirs can be natural or man-made and are similar to lakes, but they have dams to control the release of the water to be used in different ways (irrigation, community water needs, etc.) The following are examples that can be found in water areas: fish, turtles, insects, otters, beavers, ducks and other waterfowl, frogs.*

3. Display the Physical Map of Wyoming to the whole class.
Say: **“Different maps show us different information about places. This Wyoming map shows us many different features of Wyoming. In order to understand this map, we need to look at the map key that tells us what each symbol means.”** Give each student a copy of the map and their Student Journals or a

piece of notebook/printer paper for students' journals. Guide them in labeling your town location on the map. Ask: **"What symbols do you see in our area?"** Guide the students to use the map key to discuss the features located close to where they live. When finished, have students put their maps in their journals for the next part of the lesson.

Day 2:

1. Pass out Student Journals, and have students refer back to their Physical Maps of Wyoming to review the previous day's concepts. Ask: **"What symbols do you see on the map? What terrain do you notice on your map?"** Refer to map key for symbols: mountains, water, forests, grassland.

2.  Display a copy of the Physical Map of Wyoming. Say: **"Now that we know the different types of terrain and how to read and use a map, we will create our own scientific model to show Wyoming's unique terrain. Scientists make models to represent many different things. We often can't experience things directly, so a model is a great way to conduct an experiment or work to solve a problem."** Ask: **"What kinds of things could we represent using a model?"** Allow students to respond. Possible responses: *the solar system, a dinosaur, an erupting volcano, jungle/zoo animals, a playground, etc.* Say: **"We are going to use modeling to show the different types of terrain that we could find in Wyoming."**

Pass out a small amount of clay/dough to each student. Say: **"Think about how you could use the clay/dough to model a tall mountain. Once you have an idea, go ahead and create it."** Give students a few minutes to make their model. Once finished, have students share their mountain models with a partner or small table group. Discuss as a whole class the following questions:

TEACHER NOTE:
Day 2 of this lesson calls for students to create a 3D map of Wyoming's terrain using clay/salt dough. If time does not allow for the creation of this type of model, students should sketch a 2D map as an alternative. In order to emphasize the Science and Engineering Practices embedded in the science standard, there will still need to be some discussion of how the 2D model is being created and what is being represented on it.

 In this task, students will be engaged in the higher order thinking skills of application and analysis by manipulating, designing, experimenting, identifying patterns, analyzing patterns, and recognizing trends in terrain.

“How are your models similar and different? How do they provide an accurate representation of a mountain? Why are they tall instead of flat?” Allow students to respond. Repeat this same process by asking the students to make a model for each of the three other types of terrain: a body of water, a forest, and a grassland. Discuss each using the first two questions. *In order to emphasize the Science and Engineering Practice “Developing and Using Models,” it is important during the activity that the teacher is pointing out how students are modeling different features of the terrain.* After students have made all four models, ask: **“How are our 3D models like the actual terrain we are learning about?”** Allow students to respond. *They have the same shape. They suggest the same texture. They provide a visual to allow us to see the terrains’ shapes.*

TEACHER NOTE:
For step 4, it may be easier to assign each member of the group a “corner” of the state to make with their clay/dough. When everyone is finished, the group can then join their pieces together. If time and materials allow, students could each make their own map.

3. Explain the difference between 3D and 2D. Say: **“On the 2D maps, the terrain features were modeled using symbols. 3D maps model the terrain differently.”** Refer back to the displayed Physical Map of Wyoming. Ask: **“Why are models useful?”** Possible responses: *They could see if a mountain range is tall enough to build a ski area, if a river could flood and affect homes, decide if an area is good for farming.*

Assessment:

4.  Have students refer back to their Physical Map of Wyoming. Place students into small groups. Pass out a laminated blank map of Wyoming to each group and enough additional clay/dough to model the terrain on the blank map. Ask: **“How could you use your clay/dough to represent the terrain of Wyoming on this map?”** Allow students to respond. Have students work in their groups and use their dough to make a model of the terrain in Wyoming.



In this task, students will be engaged in the higher order thinking skill of application by designing their models.

5. When all groups are finished making their models, collect them for assessment purposes. *The completed models should illustrate the different terrain in the different, correct areas.* Reconvene the whole group and discuss the following questions:

- **“What do you notice about our terrain?”**
- **“What kinds of terrain do you see?”**
- **“What would happen if we did not have mountains? Bodies of water? Forests? Grasslands?”**
- **“Who would be affected?”**
- **“What will happen to future generations if we did not take care of our terrain?”**
- **“Would others want to come visit our state without our unique terrain?”**

6. For closure, say: **“Such a variety of terrain is not present in every state in our country. Wyoming is unique because of all of the different terrain it has. This allows Wyoming to offer many different things to do in our state. That makes us even more responsible to be stewards of our land. Without our unique, different types of terrain, Wyoming would not be able to offer all of our activities and uses. We’ll explore those ideas more in our next lesson.”**

Credits/Sources:

1. National Geographic Society. (1996-2017). *Mountains*. Retrieved August 8, 2017, from <http://www.nationalgeographic.com/science/earth/surface-of-the-earth/mountains/>
2. Softschools.com. (2005-2017). *Grassland Biome Facts*. Retrieved August 8, 2017, from http://www.softschools.com/facts/biomes/grassland_biome_facts/165/
3. Davis, Janice. Learning4Kids. (2012, December 9). *How To Make Salt Dough Recipe?* Retrieved August 23, 2018, from <https://www.learning4kids.net/2012/12/09/how-to-make-salt-dough-recipe/>