

Kindergarten Grade Unit Sedimentary Rocks Unit

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Unit Overview

Rocks are made of two or more minerals. Rocks can change form through geologic processes. Sedimentary layers form on top of the Earth's crust through wind and water erosion of sedimentary, metamorphic and igneous rocks. The sedimentary layers we observe today are the result of the erosional processes that have carved out the landscape over long periods of time.

Rocks also serve many specialized purposes. These purposes are determined by their characteristics. In this unit, students will be observing and exploring the hardness of rocks; using their senses to explore similarities and differences among several specimens of sedimentary rocks; observe and describe how sedimentary rocks are formed; and explain how sedimentary rocks are used in our past and present day societies.

Unit Objectives Benchmarks and Standards Addressed

1. Students will identify, through observation and discussion, similarities and differences among sedimentary, metamorphic and igneous rocks. (MT Science *Standard 4 Benchmark 2*)
2. Students will identify, through observation and discussion, how sediments are carried in water and deposited. (MT Science *Standard 4 Benchmark 1-2*)
3. Students will draw a picture to illustrate how sediments are carried in water. (MT Science *Standard 4 Benchmark 1-2*)
4. Students will describe characteristics of sedimentary rocks. (MT Science *Standard 4 Benchmark 2*)
5. Students will write one characteristic they observed for each sedimentary rock. (MT Science *Standard 4 Benchmark 2*)
6. Students will identify characteristics that make sandstone and limestone good for building. (MT Science *Standard 4 Benchmark 2*)
7. Students will identify two ways sedimentary rocks are used. (MT Science *Standard 4 Benchmark 2*)
8. Students will identify characteristics of sedimentary rocks that are good for grinding into paint. (MT Science *Standard 4 Benchmark 2*)
9. Students will identify characteristics of rocks that would be good to draw pictographs on. (MT Science *Standard 4 Benchmark 2*)
10. Students will describe how Native American tribes used sedimentary rocks to make pictographs. (MT Science *Standard 6 Benchmark 1*)

Time/Scheduling

2 weeks will be needed to complete this unit.

Materials/Resources

- Samples of sedimentary, igneous and metamorphic rocks
- Stream table
- Sand
- Stream table journal paper
- Several sedimentary rock specimens
- Sedimentary rock characteristic activity sheet
- Sandstone rock specimens
- Limestone rock specimens
- Access to the internet and YouTube
- <http://www.youtube.com/watch?v=RVZ6mUffJgw> – How toothpaste is made
- <http://www.youtube.com/watch?v=Qh3akdtynGY> – Crushing of calcium carbonate
- <http://www.youtube.com/watch?v=PKFHn7IRnwg> – Limestone quarry blast
- Pictures of limestone and sandstone in nature along with homes and buildings.
- <http://www.youtube.com/watch?v=0MFI-NjRixo> – Pictograph Cave State Park
- <http://www.youtube.com/watch?v=-F089tvSlNk> – Pictograph caves
- paint, preferably rock that has been ground into powder that could be mixed with water
- paper
- pictures or pictographs, such those on <http://geology.com/articles/petroglyphs/more-pictographs.shtml>

Lesson #1 – Rock Observations

Summary of the lesson

In this lesson, students will use four senses (not taste) to sort and orally share the similarities and differences they discovered in the rocks they observed.

Grade level

Kindergarten

Approximate time required/scheduling considerations

Day 1 – 40 minutes (watch video, make rock observations, group discussion)

Day 2 – 35 minutes (rock sorting, one-to one conferences, taking pictures of rocks)

Day 3 – 35 minutes (cut and paste rock pictures, group sharing/discussion)

Lesson objectives and Benchmarks and Standards Addressed

Students will identify, through observation and discussion, similarities and differences among sedimentary, metamorphic and igneous rocks. (MT Science *Standard 4 Benchmark 2*)

Resources/materials needed

- Samples of sedimentary, igneous and metamorphic rocks
- computer with internet access
- projector to allow entire class to see/hear YouTube video
- chart paper and pens
- digital camera and printer
- student rock journals

Teacher preparation

1. Preview the rock cycle video on YouTube at <http://www.youtube.com/watch?v=EcfstbQyrzU>
2. Gather rock samples that students will examine
3. Get a digital camera to take pictures

Background information needed to teach the unit

The teacher should understand the differences between sedimentary rock types in order to assist students as they try to differentiate between the rocks. Sedimentary rocks are formed by the breakdown of other rocks into particles and these particles are then stuck together to form new rocks. Sedimentary rocks could have mineral grains stuck together (like sand), they may contain fossils and most have even color/mineral distribution.

Procedure

Day 1

1. Share with students that today they are going on a mission. Show the first 18 seconds of the rock cycle video. Pause and read the mission.
2. Continue to watch the video until you have watched the first 60 seconds. Stop the video and ask students, “Does anyone know the name of the kind of scientist that studies rocks?” If no one answers correctly, share that it is a geologist. Share, “Today we are going to be a

geologist. What do geologists do? That's right, study rocks. Today you will get to observe with your sense of sight, use your sense of touch, and even your sense of smell, to learn about the rocks in the science center. After centers, you will share your observations with the class. At the centers, look at how these rocks are the same or how they are different."

3. Students proceed to their small group work centers to carry out rock observations and explorations.
4. The teacher leads a whole group discussion during which students share their observations of the rocks. Teacher records students' observations on chart paper.

Day 2

1. Students are put in small groups. The students sort rocks "however they want" and then take a picture of their sort.
2. Students then conference one-to-one with the teacher and share why they sorted their rocks the way they did. Students take a second picture of their sorts and then the teacher prints out the students' pictures.

Day 3

1. Students cut and glue pictures of their sorts into their rock journal.
2. Students will share their rock journals, explaining how and why they sorted the rocks the way they did.

Formative assessment

Assessments will be done informally as students are observing, sorting rocks, one-to-one conferencing and sharing their rock sorts.

Summative assessment

There is no summative assessment in this lesson.

Lesson #2 – Sedimentary Rock Formation

Summary of the lesson

In this lesson, students observe, by means of a stream table experiment, how water moves and deposits sand and rocks.

Grade level

Kindergarten

Approximate time required/scheduling considerations

During one school day – 50 minutes

Lesson objectives and Montana Science Standards and Benchmarks addressed

1. Students will identify, through observation and discussion, how sediments are carried in water and deposited. (MT Science *Standard 4 Benchmark 1-2*)
2. Students will draw a picture to illustrate how sediments are carried in water. (MT Science *Standard 4 Benchmark 1-2*)

Resources/materials needed

- Stream table
- Sand
- Small rocks
- Stream table journal paper (Appendix A)

Teacher preparation

Put sand (and other materials) in the stream table.

Make copies of the stream table journal paper for each student in the class.

Background information needed to teach the unit

Sedimentary layers form on top of the Earth's crust through wind and water erosion of sedimentary, metamorphic or igneous rocks. In this lesson, students are observing how water carries sediments down a stream and deposits them. The deposits then build-up or layer upon each other and become compressed, forming sedimentary rocks.

Procedure

Part 1 - stream table demonstration

1. Have students predict what will happen to the sand and the rock in the stream table.
2. Class observes stream table in action (with water flowing).
3. Discuss observations as a class.
4. Compare stream table observations to what is happening in rivers or mountain streams.

5. Students draw stream table observations on stream table journal paper.

Part 2 – whole class debriefing

1. The teacher reviews students' stream table observations.
2. As a class, discuss how this pertains to rocks.
3. The teacher introduces the words "sedimentary erosion," and explain that what they observed in the stream table is how sedimentary rocks are formed.
4. The teacher shares examples of sedimentary rocks and puts them in the science center for future student observations.

Formative assessment

Students will complete the stream table journal paper and explain what they are drawing.
Students will be given a yes if they can verbalize how water carried, or moved the sand.
Students will be given a no if they cannot verbalize how water carried or moved the sand.

Summative assessment

Students will be informally evaluated during classroom predictions and discussions.

Lesson #3- Sedimentary Rock Characteristics

Summary of the lesson

Students will have the opportunity to explore several different sedimentary rocks. After exploration, students will describe and write about some of the characteristics they observed in sedimentary rocks.

Grade level

Kindergarten

Approximate time required/scheduling considerations

30 minutes (exploring rocks, describing their observations)

Lesson objectives and Montana Science Standards and Benchmarks addressed

1. Students will describe characteristics of sedimentary rocks. (MT Science *Standard 4 Benchmark 2*)
2. Students will write one characteristic they observed for each sedimentary rock. (MT Science *Standard 4 Benchmark 2*)

Resources/materials needed

- Six sedimentary rock specimens (you may have more than one of each of the six rocks, depending on class size)
- Sedimentary rock characteristic activity sheet (Appendix B)

Teacher preparation

Familiarize yourself with the sedimentary rock specimens.

Set the rocks up either in stations or at a central location that students could gather them from to study and then return later when finished.

Make copies of the sedimentary rock characteristic activity sheet.

Background information needed to teach the unit

Sedimentary layers form on top of the Earth's crust through wind and water erosion of sedimentary, metamorphic or igneous rocks. In this lesson, students are observing and describing the results, or the formation of sedimentary rocks. Recall from Lesson #1 that characteristics of rocks are the result of how they formed.

Procedure

1. Working in small groups give students about 15 minutes to explore the various sedimentary rocks, encouraging them to verbalize and describe their observations.

2. Gather the class back together and complete the activity sheet as a group. Hold up the first rock sample and have students fill in the first box on the activity sheet. Encourage students to recall and then verbalize characteristics about the rock you are showing them.
3. Then students will draw the rock and then write (to the best of their ability) a characteristic for the rock. For Kindergarteners, this might be the first sound they hear, “b” in the word bumpy, for example.
4. Follow the same procedure for the remaining five rocks.

Formative assessment

Students will be informally evaluated during classroom exploration of sedimentary rocks as the teacher circulates through the room listening to student comments and discussing their findings.

Summative assessment

Students will complete the sedimentary rock characteristic activity sheet. This is done as a whole group activity, so student’s comments and any discussion that takes place will also be evaluated, informally.

Lesson #4 – Uses of Sedimentary Rock

Summary of the lesson

In this lesson, students will view video and pictures of how sandstone, mudstone, limestone, and the calcium carbonate found in limestone are used today.

Grade level

Kindergarten

Approximate time required/scheduling considerations

30 minutes

Lesson objectives and Montana Science Standards and Benchmarks addressed

1. Students will identify characteristics that make sandstone and limestone good for building. (MT Science *Standard 4 Benchmark 2*)
2. Students will identify two ways sedimentary rocks are used. (MT Science *Standard 4 Benchmark 2*)

Resources/materials needed

- Sandstone rock specimen
- Limestone rock specimen
- Access to YouTube
- Projector or Smartboard so students can see/hear videos
- <http://www.youtube.com/watch?v=RVZ6mUffJgw> – How toothpaste is made
- <http://www.youtube.com/watch?v=Qh3akdtynGY> – Crushing of calcium carbonate
- <http://www.youtube.com/watch?v=PKFHn7IRnwg> – Limestone quarry blast
- Pictures of limestone and sandstone in nature and in homes/buildings.

Teacher preparation

Collect sandstone and limestone specimens

Watch videos on YouTube (or locate other relevant videos)

Collect several pictures of limestone and sandstone

Background information needed to teach the unit

Sedimentary layers form on top of the Earth's crust through wind and water erosion of sedimentary, metamorphic or igneous rocks. Sedimentary rocks are used for a variety of

purposes. Coal is used to make electricity, sandstone and limestone are used in the construction of homes and building, and the calcium carbonate in limestone is used in toothpaste.

Procedure

1. The teacher shows a specimen of sandstone. The class discusses how this rock might be used. Some guiding questions could be: “What purpose would this type of rock have? Why or why not would this be a good use?”
2. The teacher shows pictures of how sandstone is used in buildings.
3. The teacher shows specimen of limestone. The class discusses how this rock might be used. Some guiding questions could be: “What purpose would this type of rock have? Why or why not would this be a good use?”
4. The teacher shares pictures of limestone in nature.
5. The teacher shares pictures illustrating how limestone is used in buildings and homes.
6. The teacher shares pictures of limestone with veins of calcium carbonate.
7. The teacher shares the following video from YouTube:
 - a. <http://www.youtube.com/watch?v=PKFHn7IRnwg> – Limestone quarry blast
 - b. <http://www.youtube.com/watch?v=Qh3akdtynGY> – Crushing of calcium carbonate
 - c. <http://www.youtube.com/watch?v=RVZ6mUffJgw> – How toothpaste is made
8. Have students draw three ways sedimentary rocks can be used.

Formative assessment

Students will be informally evaluated during classroom discussion and journal time.

Summative assessment

During journal time, students will draw three pictures to illustrate how sandstone, limestone, or the calcium carbonate found in limestone, can be used.

Lesson #5 – Traditional Uses of Sedimentary Rock

Summary of the lesson

In this lesson, students will use rock that has been ground into powder and mixed with water to paint a picture.

Grade level

Kindergarten

Approximate time required/scheduling considerations

30 minutes

Lesson objectives and Montana Science Standards and Benchmarks addressed

1. Students will identify characteristics of sedimentary rocks that are good for grinding into paint. (MT Science *Standard 4 Benchmark 2*)
2. Students will identify characteristics of rocks that would be good to draw pictographs on. (MT Science *Standard 4 Benchmark 2*)
3. Students will recall how Native American tribes used sedimentary rocks to make pictographs. (MT Science *Standard 6 Benchmark 1*)

Resources/materials needed

- Sandstone and limestone rock specimens
- Access to the internet and YouTube
- <http://www.youtube.com/watch?v=0MFI-NjRixo> – Pictograph Cave State Park
- <http://www.youtube.com/watch?v=-F089tvSlNk> – Pictograph Caves
- paint, preferably rock that has been ground into powder that could be mixed with water
- paper
- pictures of pictographs, such as those at <http://geology.com/articles/petroglyphs/more-pictographs.shtml>

Teacher preparation

Collect sandstone and limestone specimens

Find videos on YouTube, or other relevant videos about pictographs

Collect several pictures of pictographs

Background information needed to teach the unit

Sedimentary layers form on top of the Earth's crust through wind and water erosion of sedimentary, metamorphic or igneous rocks. Sedimentary rocks are used for a variety of purposes. Native Americans ground sedimentary rocks into a fine powder and used it as paint. Limestone and sandstone were both used as the canvas for many pictographs. Pictograph Caves State Park is one site where pictographs can be viewed first hand. It is important to note that there is controversy regarding the teaching of pictographs, which are considered sacred by many tribes and their members. Before teaching any lessons on pictographs, please check with your tribe's culture committee or elders on how best to share this information with your students.

Procedure

1. The teacher shares samples of sandstone, limestone, and chalk rock (or a rock that could easily be ground into powder and used for painting). Discuss with students how Native Americans might have used these rocks long ago.
2. The teacher shares with students that softer rocks, such as chalk rock, was often ground into a fine powder and mixed with water and used as paint.
3. The teacher shows pictures and or videos of pictographs such as:
 - a. <http://geology.com/articles/petroglyphs/more-pictographs.shtml>
4. The class discusses what is in the pictographs and why they might draw them. Also discuss how people are unsure of their exact meaning, because they were drawn long ago. Many scientists study them today. These scientists are called archeologists.
5. The class views and discusses the YouTube video(s) of Montana's own Pictograph Cave State Park.
 - a. <http://www.youtube.com/watch?v=0MFI-NjRixo> – Pictograph Cave State Park
 - b. <http://www.youtube.com/watch?v=-F089tvSiNk> – Pictograph caves
6. Ask students to create a pictograph similar to what they just observed using paint and paper.
7. After the paintings have dried, have students share their pictographs telling what they drew and why they chose to draw it.

Formative assessment

Students will be informally evaluated during classroom discussions and when they share their pictograph.

Summative assessment

During journal time, students will draw three different ways that rocks can, or have been used.

Appendix A – stream table journal

Name _____

Appendix B – Sedimentary Rock Characteristics Activity Sheet

Sedimentary Rocks Descriptions

Name _____

1.	2.	3.
4.	5.	6.