KNOW YOUR ROCKS
THIRD - FIFTH

Earth Science TEKS

Third Grade:	3.7A, 3.7D
Fourth Grade:	4.7A, 4.7B, 4.7C
Fifth Grade:	5.7A, 5.7D

Vocabulary

conglomerate, decomposition, deposition, dull, erosion, fossils, granite, inorganic, limestone, luster, natural resources, nonrenewable, organic, product, properties, renewable, rock, rough, sandstone, sediment, sedimentary, shale, shiny, smooth, soil, texture, weathering

Pre-Show Activity

Pre-Show Lesson: Rocks

Post this question on the board: "What are rocks used for?"

Materials:

Per class:	Sample of granite, shale, conglomerate, sandstone, and limestone
Per group:	100 ml of builder's sand, 100 ml of gravel, 100 ml of potting soil, 100 ml of water, an empty water bottle with lid
Per student:	Copy of *Is it a Rock?* (Appendix A-1), hand lens, soil sample, newspaper

Procedure:

1. Give students the following checklist and tell them to mark the items that they think are rocks. You may need to have pictures of some of the items that they may not be familiar with.

2. Go over the following information (you may want to write it on an anchor chart):

   The definition of a rock is that it is a solid, made of one or more minerals and was created by nature. The objects that are not actually rocks on the list are the concrete playground, brick, asphalt, glass, and cement block. These items are made from rocks but they have other materials in them. They are not formed through a natural geological process. The iron ore is a rock with a lot of iron in it. The granite countertop was formed through a natural geological process. Man just cut it and polished it. No new material was added to it. This is the same with the marble tile, the limestone wall and the gravestone. Coral is organic. It was once living, so it is not a rock. Dried mud is also not considered a rock yet because it takes long periods of geological time for mud to turn into the sedimentary rock called shale (you may want to show kids an example of shale).

3. Give each group a container of soil and hand lenses. Students may want to put down newspaper to keep their area clean. Students should make observations in their science notebook drawing and listing properties of the soil ingredients (Appendix A-2). Students should tell if each ingredient is a rock or not. Review properties that they should be looking for. You may want to create an anchor chart with these.

   Color: brown, gray, tan, white

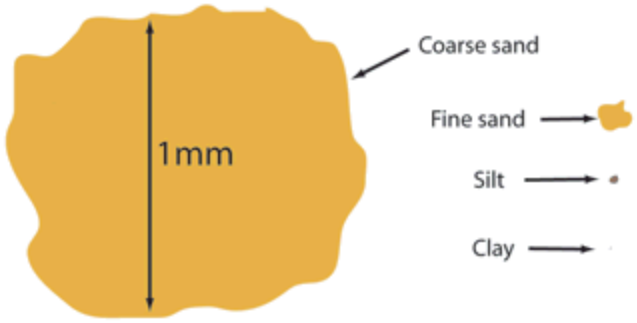
   Shape: round, square, oval, triangular, irregular

   Size: small like a penny, or medium like a fist. Just saying small or medium doesn't give enough information. Students should give a frame of reference or a measurement.

   Texture: rough or bumpy, smooth

   Luster: shiny, dull

4. Discuss with students that soil is made of organic (living) and inorganic (nonliving) matter. The organic matter is the dead leaves, twigs, bugs, etc. that they see. The inorganic matter is rocks and minerals. They are just different sizes of rocks. Clay has the smallest particles, like pieces of dust. Silt is the next largest. The largest particles are called sand. They get their names by their size, not by what they are made out of. Create a chart like the one below. Because of their size, all of these are called sediment. Sediment is small pieces of rock, like clay, silt and sand. Students should also be aware that air and water are part of soil.



Graphic Source: Department of Primary Industries

5. Give each group 100 ml of builder's sand, 100 ml of potting soil, 100 ml of gravel and 100 ml of water. You may want to have students measure these themselves so they get practice using a beaker or graduated cylinder. They will also need an empty water bottle with lid and a funnel. Discuss how all of these materials (besides the organic matter in the potting soil) came from rocks being eroded or broken into smaller pieces: sediment.
6. Students will use a funnel to put 100 ml each of sand, soil and gravel into the bottle. Add 100 ml of water to the bottles. Put the lids on the bottle and shake. Shaking the bottles represents what moving water does on Earth, moving sediment around and causing erosion.
7. Set the bottle on the table so that the sediment can settle. While you are waiting, you may want to have students predict what they think it is going to look like and explain. After a couple of minutes have passed, students will record changes to the bottles in their science notebooks. They should draw what the contents of the bottle look like and label it. They should see that the gravel is on the bottom, the sand is next and the soil is on top.
8. Remind students that all three materials are rocks and all are sediments. The only material that is not rocks is the organic material in the soil.
9. Discuss with students why and how the sediment layered (density). This is a model of sedimentary rock formation.
10. Distribute sedimentary rock samples: conglomerate, sandstone, limestone and shale.
11. Ask students to try to identify which layer is most like each sample. Remind students that it took hundreds to thousands of years for these rocks to form. Conglomerate is most like the bottom layer, sandstone and limestone are most like the middle, and shale is most like the top layer. Ask students what effect the organic matter could have on the rock cycle. Remind students that fossils made from organic matter are found in sedimentary rock.

12. In small groups have students discuss whether soil is a renewable or nonrenewable resource, and explain their conclusion. Then, ask them about rocks. If your students are not familiar with the terms renewable and nonrenewable, you will need to give them the definitions.

    Renewable Resources: resources that nature can replace in a short period of time.
    Examples: wind, water, plants, etc.

    Nonrenewable Resources: resources that take nature thousands to millions of years to replace.
    Examples: coal, oil, natural gas, diamonds, etc.

There is some debate about whether soil is a renewable or a non-renewable resource. The students should know that the state recognizes soil as renewable and rocks as non-renewable.

Post-Show Enrichment Activities

Activity One: Rock Cycle Game

*All of the graphics for this game were taken from Microsoft Office

Materials: Instructions for each station (Appendix A-3), file folders, dice, students worksheets (Appendix A-4 and A-5)

Set-Up: To set up the game, you will need to create five stations: sedimentary, sediment, igneous, metamorphic and magma. Attach a copy of each station's instructions (using a paper clip) to a file folder. Instructions are provided in Appendix A-3. Stand each file folder up at a different location in the room and put a dice in front of it.

Procedure:

In this game, students will model the dynamic processes that happen to rocks as they pretend to be a rock and move through the rock cycle.

1. Students will choose a station to start at and move through the rock cycle according to the roll of the die and the directions posted at each station. As they move through the cycle, they will need to record their movements on the Rock Cycle Data Sheet available in Appendix A-4.
2. Each student will start at one of the five stations. On their Rock Cycle Data Sheet they will record the name of the station where they started.
3. Students will roll the die at the station and record what happened to them in the next column. They will follow the directions on the station card according to their roll.
4. Once they get to the next station, they will continue to record the information for that station. If they stay at that station, they will still record it for the next round. Students are to imagine that 200,000 years have passed between each round. Record this in the time passed column. Students will go a total of eight rounds. Since they are acting as rocks, they should not be talking.
5. When students finish, they will discuss the activity in small groups. How were their travels similar and different from others in their group? Then they can make a rock cycle diagram depicting their travels, available in Appendix A-5.

Activity Two: Crystals Experiment

New mineral crystals are always forming both at the surface and deep within the Earth. Most mineral crystals grow from molten rock deep within the Earth. As magma cools, many crystals

form simultaneously and crowd into one another, producing irregular shapes. In a granite slab, quartz and feldspar crystallize to form speckled granite.

Students will model the formation of mineral crystals.

Materials: 250 m beaker, Epsom salt, scissors, black construction paper and a lid from a large jar.

Procedure:

1. Cut a circle from the black paper that will fit inside the lid. Place the paper in the lid.
2. Fill the beaker with 250 ml of water.
3. Add 60 ml of Epsom salts to the water and stir.
4. Pour a thin layer of the mixture into the lid.
5. Allow the lid to stand undisturbed for one day.

Results:

> Long needle-shaped crystals should form on the black paper. The Epsom salt molecules move closer together as the water slowly evaporates from the solution. The salt molecules begin to line up in an orderly pattern and form long needle like crystals, then stack together like building blocks and the shape of the molecules determines the resulting shape of the crystals.

Students may want to vary this experiment by testing different solids; salt versus sugar or Epsom Salt versus Kosher Salt, etc.

<u>Activity Three: Rock Walk</u>

Materials: Science notebooks or columned worksheets, writing utensil.

Procedure:

1. Students will create a three column chart in their science notebooks. The labels should be “Rocks”, “Products Made From Rocks” and “Other” or “No Rocks”.
2. Students will go on a walk around the school filling out their data charts. They should walk both inside the school and outside the school to look for objects. You may want to let students include anything that is made from minerals in the rock column also. This would include: TVs, computers, rugs, windows, telephone, walls, faucets, etc. Even notebook paper is made with minerals in it.

Activity Four: Rock Classification

Materials: rock kits, hand lenses, rock field guides

Procedure:

1. Give students a set of rocks. You can get some very inexpensive rock kits with identification charts for your classroom. Each kit contains eight small samples of Texas rocks. Contact the Bureau of Economic Geology at the University of Texas at Austin (512-471-7144 or pubsales@beg.utexas.edu).
2. Students will use hand lenses and rock field guides to identify the rocks. They should record observations in a data chart in their notebook.
3. Students can use a piece of unglazed porcelain white tile (or the back of any tile) as an inexpensive streak plate. Students will rub the rock on the plate to test the color of the streak. For older students, you may also get a copy of Moh's hardness scale on the Internet and have students add a column to the chart for that. There are rock identification keys on the Internet.

Rock Drawing	Color	Streak	Luster	Texture	Type of Rock

Activity Five: Rock Art

Materials: coffee can lids, plaster of Paris, newspapers, colorful rocks.

Procedure:

Students will make a useful manmade product; a colorful stone covered hot plate from rocks.

1. Each student will need a coffee can lid or like-sized lid.
2. Set the lid on newspapers to protect your tables.
3. Mix Plaster of Paris to a thick consistency and fill the lid about 1/2 the way up. Work quickly before the plaster sets.
4. Scatter colorful rocks all over the plaster and make sure that it sets evenly and flat. Do not extend the rocks above the lid. You can now allow the hot plate to set before using.

Appendix

A-1

Name _____ Date _____

Is It A Rock?

_____ cement block

_____ brick

_____ granite counter top

_____ marble floor tile

_____ dried mud

_____ limestone wall (like those in the San Jacinto Monument)

_____ concrete playground area

_____ asphalt (tar road)

_____ glass window

_____ coal (fossil fuel)

_____ hardened lava

_____ iron ore

_____ a gravestone

_____ coral

Explain the “rule” that you used to decide if something was a rock or not.

A-2

Soil Particle Drawing	Properties of the Particle	Is it a rock?

A-3

Sedimentary Rock

Roll

1-2 You have been weathered off of a larger rock and are now **sediment**.

3-4 Due to heat and pressure from the Earth, you have changed into a **metamorphic rock**.

5-6 You have been pushed deep into the Earth's crust and have melted into **magma**.

Magma

Roll

Even You have been pushed through a volcano in Earth's crust and have cooled into igneous rock.

Odd You stay in the Earth's mantle as magma.

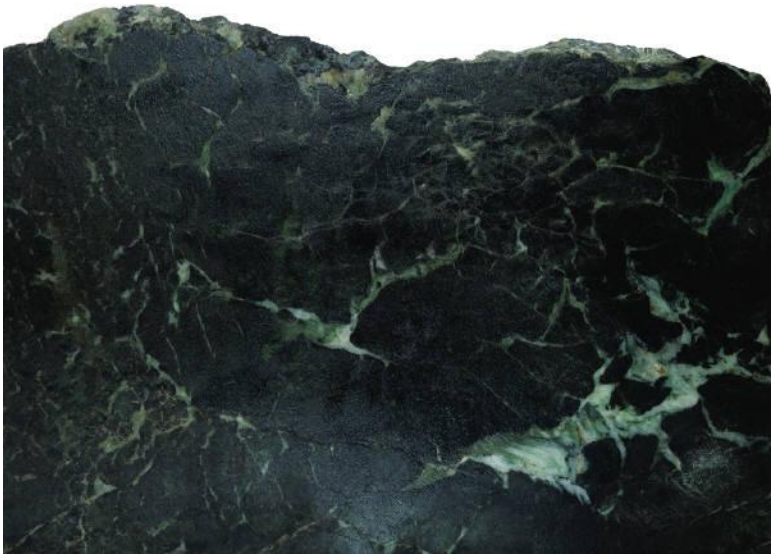
Metamorphic Rock

Roll

1-2 You have been weathered off of a larger rock and are now **sediment**.

3-4 Due to heat and pressure from the Earth, you have stayed as a **metamorphic rock**.

5-6 You have been pushed deep into the Earth's crust and have melted into **magma**.



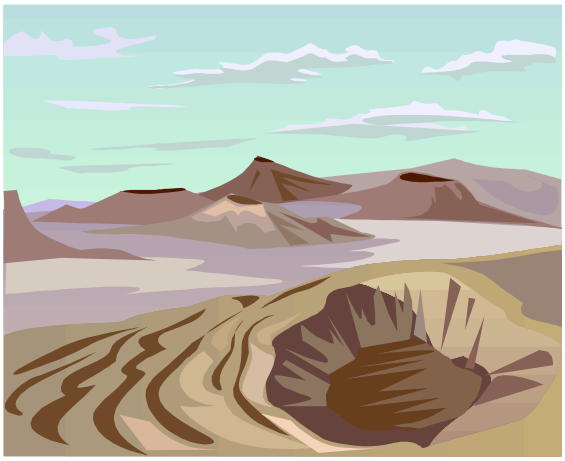
Igneous Rock

Roll

1-2 You have been weathered off of a larger rock and are now **sediment**.

3-4 Due to heat and pressure from the Earth, you have turned into a **metamorphic rock**.

5-6 You have been pushed deep into the Earth's crust and have melted into **magma**.



Sediment

Roll	
1-2	You continue to be weathered and remain as **sediment**.
3-4	Due to pressure from the Earth you turn into **sedimentary rock**.
5-6	You have been pushed deep into the Earth's crust and have melted into **magma**.

A-4

Name _____ Date _____

Rock Cycle Data Chart

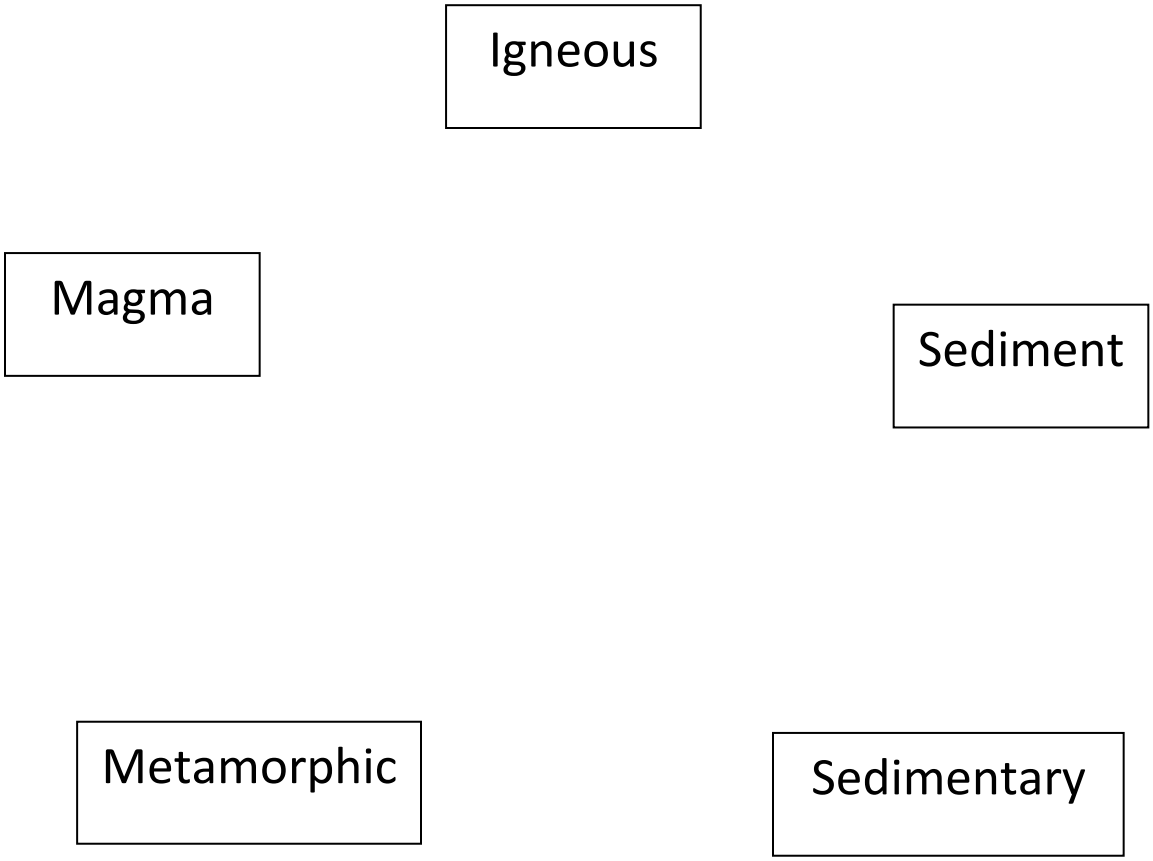
Roll #	Station Name	What Happened?	Time Passed

A-5

Name _____ Date _____

Rock Cycle

Diagram Your Travels as a Rock



Describe the forces that cause the rock cycle.