



Dynamic Earth Snapshot: Our Ever-Changing Planet

Pre and Post Lesson Material

Thank you for participating in the Newark Museum of Art's remote learning experience. To help form connections, supplemental materials are provided to enhance your students learning experience. Each activity includes instructions and the aligning curriculum standards.

VIRTUAL INSTRUCTIONAL DISCUSSION

During this time the instructor will utilize the PowerPoint slides with images from the Dynamic Earth gallery to guide student centered discussions, guided questioning, and active discovery. Students will observe images of natural science objects and understand how forces of change shape our world. With instructor guidance they will learn how to slow down and take a deeper look at authentic objects and explore the diversity of biomes to appreciate the changing face of our planet, Earth.

EXTENSION ACTIVITY

To reinforce the instructor guided student virtual discussion, students can create models of sedimentary and metamorphic rocks. In the virtual presentation, students will learn how to reproduce forces that are part of the processes that our natural world undergoes in creating different types of rock.

For those who do not have Playdoh to make the models of rocks, here is an easy to make recipe:

Homemade No-Cook Activity Dough

*Gluten free recipe – substitute 1/2 cup cornstarch and 1/2 cup corn flour (masa) for every 1 cup of flour. If you want multiple colors, halve or quarter the amount of ingredients and make smaller batches for each color.

Ingredients:

1. 2 cups flour + 1 cup additional flour if dough is too wet*
2. ½ cup Salt
3. 6 Tablespoons lemon juice or white vinegar
4. 1 cup Water
1. 1 Tablespoon cooking oil
2. Food coloring (if desired)

Instructions:

1. Set aside additional 1 cup of flour for kneading the dough.
2. Mix 2 cups of flour and the other dry ingredients together in a bowl.
2. Add oil, water and food coloring (if desired).
3. Mix together thoroughly.
4. Knead until smooth and elastic. Add the additional flour or corn flour mix as necessary.
5. Storage – store in airtight container or plastic storage bags with the air squeezed out.
6. Keep in refrigerator when not in use. Allow to come to room temperature and knead before use.



PRE AND POST LESSONS

MAKE A SEDIMENT JAR

Lesson: Students will explore the deposition of materials found in soil to create sediments. Students will try their hand at recreating the layering effects that occur during the formation of sedimentary rocks.

MAKE A BIOME DIORAMA

Lesson: Students will create a diorama of one of the major biomes on Earth. The biomes can be assigned by the instructor, if necessary. Students examine the diversity of their assigned biome and compare it to others in class. They will also explore how changes in their biome affect the life that calls it home.

MAKE A SEDIMENT JAR

INSTRUCTIONS

Students will examine the processes by which sedimentary rocks form. They will study the process of deposition firsthand by making a sediment jar utilizing easily found material.

LESSON OBJECTIVES

Through pre and post visit activities, students will be able to...

- Compare the different stages that occur during the formation of a sedimentary rock
- Observe how different materials naturally layer themselves based on density and size
- Create a log of their observations of different samples for comparison

COMMON CORE STANDARDS

Science: 2-ESS1-1 (ESS1.C), 4-ESS1-1 (ESS1.C)

BACKGROUND

Sedimentary rocks are formed through five processes: weathering, erosion, deposition, compaction, and cementation.

Weathering is the breaking down of rocks, soil and the minerals that make up the rock through direct contact with rain, wind, plants and animals. Weathering occurs in place, which means that the material doesn't move. An example of weathering is a large rock that has split into two or more pieces due to the freezing and melting of water located in its cracks.

Erosion occurs when natural forces like water, wind, ice and gravity wear away rock and soil. Erosion goes one step further than weathering in the fact that it moves the broken material (sediment) to another location via the natural forces listed above. An example of erosion is the Colorado River forming the Grand Canyon in the southwestern U.S. over millions of years.



In deposition, the largest pieces of sediment are deposited first. The layers above contain smaller and smaller particles going from rock (largest) to sand to silt to clay to humus, which is a layer of decaying material. The amount of each type of sediment determines what type of soil you have. An example of a depositional landform is a sand dune on a beach.

Compaction is the process where lower layers of sediment are squeezed and pushed down by pressure from the weight of upper layers of sediment. This results in a flattening of the layer and an increase in its density, since the molecules of the material are forced closer together. Deltas and mud flats are examples of where compaction occurs.

Cementation is the hardening and sticking together of compacted sediments by mineral matter seeping into the porous spaces in compacted sediments. This is the last stage in the formation of sedimentary rock. Think of it like glue getting into the empty spaces between marbles in a jar. When the glue sets, it will hold the marbles in place.

If desired, the instructor can have students create a storyboard depicting the five processes of sedimentary rock formation.

In this activity, students will be exploring the deposition stage of sedimentary rock formation.

MATERIALS

Clear plastic or glass jar or tall container, with a lid

Soil

Shovel or trowel

Water

Small rocks (if available)

Sand (if available)

Plain paper or small journal

Observation record template (included in lesson)

Pencil

Ruler

DIRECTIONS

Find a place to dig up some soil but make sure it is okay to take it from that place. Try to choose a spot that will have various kinds of soil. A garden wouldn't necessarily be a good location. You can collect soil from various spots and create multiple sediment jars to examine different samples. You can leave plant debris in the soil if you like.

Fill your jar or tall container halfway with soil.

Add enough water to your jar to fill it almost to the top.

Place a lid tightly on your container and shake. If you do not have a lid, stir the mixture with a stick or long spoon. Make sure to mix thoroughly.

Watch the sediments fall.



Allow the container to sit undisturbed for at least a day. Check every hour or two to see how the material in the jar has changed. Measure the thickness of each layer you observe. Record your observations in a small journal or on the observation sheet template provided.

After a day, repeat the experiment with the same soil but add in some sand and/or small pebbles (if available). You may have to carefully pour out some of the water in the jar before adding in the sand/pebbles. If sand or pebbles are not available, you can repeat the experiment by trying soil from another location. Be sure to mix the materials well again and record a new set of observations in your journal or on a new observation sheet.



MAKE A SEDIMENT JAR OBSERVATION SHEET

NAME: _____

DATE: _____

CIRCLE WHICH MATERIALS YOU'VE PUT IN YOUR CONTAINER

SOIL

WATER

SAND

PEBBLES/SMALL ROCKS

OBSERVATIONS:

TIME OF OBSERVATION	NUMBER OF LAYERS SEEN	DESCRIPTION OF EACH LAYER (WHAT DOES IT LOOK LIKE? WHAT COLOR DO YOU SEE?)	THICKNESS OF EACH LAYER (MEASURE IN INCHES)



MAKE A BIOME DIORAMA

INSTRUCTIONS

Students will create a tabletop diorama of one of the major biomes on Earth. They are given the opportunity to explore forest, freshwater, marine, grassland, tundra or desert. Using natural and human-made materials, students will be able to create realistic scenes of their assigned biomes.

LESSON OBJECTIVES

Through the pre and post visit activities, students will be able to...

- Locate their biome on a world map and understand how natural resources in that area influence the life that lives there.
- Model a biome based on individual or group research and interpretation.
- Analyze various biomes and discuss similarities and differences between them.

COMMON CORE STANDARDS

Science: 2-LS4-1 (LS4.D), 3-LS4-3 (LS4.C)

BACKGROUND

A diorama is a miniature three-dimensional representation of a scene using figures and a painted background. A biome diorama includes visual information of flora and fauna and the environment in which they are found.

According to NASA, there are seven distinct biomes on Earth. They are Tundra, Shrubland, Rainforest, Grassland, Desert, Temperate Deciduous Forest and Coniferous Forest.

The NASA Mission: Biomes is a great website for student research on their assigned biomes. It also has various extension activities and teacher resources that correspond to this activity and to the Dynamic Earth Snapshot lesson.

<https://earthobservatory.nasa.gov/experiments/biome>

MATERIALS

Plain paper

Colored paper (if available)

Rocks (if available)

Sand (if available)

Cardboard

String

Invisible tape

Markers

Scissors

Map of world with biomes highlighted (see NASA website included in this activity)

Magazines or digital images



Shoebox or cereal box – if no box is available, students can make a box out of thick paper or make a flat surface on which they can build their biome.

INSTRUCTIONS

Begin by choosing a box or building a surface that you will use for your biome diorama. Take the lid off the shoebox or have an adult help you in cutting around one of the large sides of the cereal box so you can fold it down and out to easily see inside. This will give you a large background scene and a wide flat surface for your biome.

Design a background for your biome. This can be done directly on the inside of the box or on loose plain paper. Start by sketching the basics of your background (i.e. horizon, mountains, trees, sand dunes, etc.). If a student is assigned an aquatic biome, they can create a horizon that shows where the surface of the water is or make a completely underwater biome. Use markers to color in the specifics.

Add a ground cover for your biome. Be sure to match the ground cover to the biome. For example, a desert biome would have sand and rocks as the ground cover. If natural materials are not available, have students create artistic representations of ground cover for their biome.

Each biome will have specific plant and animal life. This is where students can get creative. Use images from magazines, digital media or create your own artistic versions but be sure they match your biome. Think about where these animals would live in your biome and, perhaps, create an action scene. Students should choose 3 – 4 animals that they think are important for their biome since they won't be able to represent every animal that lives there.

Once their biome is done, students should write a fact sheet about their biome and include the following:

Student's name

Name of the biome

Where it's found in the world

Description of the climate (temperature ranges, rainfall, etc.)

Plants and animals they chose to represent the life found in their biome and why they are important.

Have students share their biomes with the class. Discuss as a class any similarities or differences they notice between the biomes presented. Ask students what they think would happen if the environment/climate in their biome changed. How do they think the animals and plants would be affected?