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Air, Water, and Soil in the Environment Curriculum Map

The lessons and experiments fall under thirteen topics that relate to two aspects of earth science: *Air, Water, and Soil in the Environment.*

The activities have two intentions:

1. to teach concepts related to earth and space science and
2. to provide students the opportunity to apply the necessary skills needed for mastery of science and technology curriculum objectives.

Throughout the experiments, the scientific method is used. In each section you will find teacher notes designed to provide you guidance with the learning intention, the success criteria, materials needed, a lesson outline, as well as provide some insight on what results to expect when the experiments are conducted. Suggestions for differentiation are also included so that all students can be successful in the learning environment.

Introduction, Assessments and Learning Expectations

- At A Glance – List of Skills
- Introduction
- Student Assessment Form
- Teacher Assessment Form

Lesson One: Learning About Air - Part One

Students will learn that air takes up space and that it has mass, identifying these as some characteristics of air.

Lesson Two: Learning About Air - Part Two

Students will learn that air expands and that it can create a force when it is compressed, identifying these as characteristics of air.

Lesson Three: The Movement of Air

Students will learn that air can be seen and felt when it moves.

Lesson Four: Using and Needing Air

Students will learn about the benefits of moving air and that all living things need air to survive.

Lesson Five: What is Water?

Students will explore water through their senses and learn about the three states of water.

Lesson Six: The Water Cycle
Students will learn about the water cycle and factors that affect evaporation rate.

Lesson Seven: Water Facts
Students will learn about the shape water takes, the space it takes up, and its mass, identifying these as some characteristics of water.

Lesson Eight: Waterproof or Waterlogged?
Students will learn about materials that absorb water and the materials that repel water.

Lesson Nine: Needing and Using Water
Students will learn about where water comes from, the water treatment process, their families' usage of water, and ways to reduce water consumption.

Lesson Ten: Soils
Students will learn about the four components of soil and the different types of soil.

Lesson Eleven: Earthworm Invasion!
Students will learn about the benefit of earthworms in making nutrient rich soil.

Lesson Twelve: Erosion
Students will learn about the effects of moving air and water on soil.

Lesson Thirteen: Pollution

Students will learn about how pollution affects the air, water, and soil in our environment.

EROSION

Learning Intention:

Students will learn about the effects of moving air and water on soil.

Success Criteria:

- make predictions about the effect of water and moving air on soil
- describe the effect that water has on different types of soil
- describe the effect that moving air has on different types of soil
- gather data and record observations in a chart
- make conclusions about the effects of water and moving air on soils
- make connections about the effects of water and moving air on soils in the environment

Materials Needed:

- a copy of "Experimenting with Soil Absorption" Worksheet 1, 2, and 3 for each student
- a copy of "Blown Away!" Worksheet 4, 5, and 6 for each student
- samples of soils such as sand, clay, silt, loam, and topsoil (enough for 4 or 5 groups)
- a pan of water, 3 cotton cloths or coffee filters, 3 cups, 3 graduated cylinders, a small garden spade or large spoon (for each group of students)
- an oscillating fan, a table surface, a piece of cardboard (50cm x 100cm)
- pencils, clipboards

Procedure:

***This lesson can be done as one long lesson, or be divided into two shorter lessons.**

1. Explain to students that they will do an experiment to see what effect water has on different types of soils. Give them Worksheet 1. Read through the question, materials needed, and what to do sections with the students to ensure their understanding. Divide students into pairs or small groups. Give them Worksheets 2 and 3, and the materials to conduct the experiment. Students will make and record observations of the effects water has on each of the soils, then make conclusions and a connection.

2. Explain to students that they will do an experiment to see what effect moving air/ wind has on different types of soils. Give them Worksheet 4. Read through the question, materials needed, and what to do sections with the students to ensure their understanding. This experiment may be better to do as a whole class, with teacher as operator of the oscillating fan, and a couple of students assigned to hold the cardboard in place. Gather the materials to conduct the experiment. Give students Worksheets 5 and 6. Students will make predictions, make and record observations of the effects moving air has on each of the soils, then make conclusions and a connection.

Differentiation:

Slower learners may benefit by working as a small group with teacher direction and support in order to produce satisfactory written descriptions of their findings while experimenting with the soils. A further accommodation may be to omit the 'making connections' section on Worksheets 3 and 6. Or, this section could be a discussion item within the small group if time permits.

For enrichment, faster learners could make bar graphs to depict the data that they collected in each experiment.

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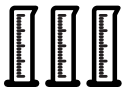
Name:

Experimenting with Soil Absorption

Question: What effect does water have on different types of soils?

You'll need:

- a pan of water 
- 3 graduated cylinders 
- a small garden spade 
- 3 cups 
- 3 cotton cloths or coffee filters 
- soils such as sand, clay, and loam 

What to do:

1. Make a prediction and record it on Worksheet 2.
2. Using the gardening spade, scoop some sand and put it on a cotton cloth. Wrap the cloth. Repeat this step using the clay and then using the loam.
3. Take the cloth wrapped with sand in it, and carefully dip it into the pan of water.
4. Pull the cloth out of the water and let it drip over a cup. Make observations about the amount of water you see dripping from the cloth filled with sand. Draw what you saw in the chart on Worksheet 2.
5. Repeat steps 3 and 4 using the cloth filled with clay, and the cloth filled with loam.
6. Pour the water from each cup into the graduated cylinders. Record the amount of water in each cylinder in the observation chart on Worksheet 2.
7. Make conclusions and connections about the effect of water on each soil type. Record them on Worksheet 3.

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Worksheet 2 Name:

Let's Predict

What effect does water have on different types of soils?

_____

_____

_____

Let's Observe

Cloth filled with sand	Cloth filled with clay	Cloth filled with loam
This is what it looked like when I pulled the cloth filled with **sand** out of the water:	This is what it looked like when I pulled the cloth filled with **clay** out of the water:	This is what it looked like when I pulled the cloth filled with **loam** out of the water:
When I poured the water from the cup into the graduated cylinder, it measured: _____	When I poured the water from the cup into the graduated cylinder, it measured: _____	When I poured the water from the cup into the graduated cylinder, it measured: _____

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Name:

Let's Conclude

What effect did the water have on the cloth filled with **sand**? _____

_____

_____

What effect did the water have on the cloth filled with **clay**? _____

_____

_____

What effect did the water have on the cloth filled with **loam**? _____

_____

_____

Let's Connect It!

If you wanted to stop a river from overflowing, you could place bags filled with soil along the riverbanks. What kind of soil would you use to fill the bags? Explain your thinking.

_____

_____

_____

_____

_____

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Name:

Blown Away!

Question: What effect does moving air have on different types of soils?

You'll need:

- a small garden spade
- a table surface
- 3 graduated cylinders
- a fan
- a piece of cardboard (50cm x 100cm)
- soils such as sand, clay, and loam

What to do:

1. Make a prediction to the question and record it on Worksheet 5.
2. Fill a graduated cylinder with 200mL of sand. Pour the sand out onto the table.
3. Point the fan at the table, opposite from the cardboard. Turn on the fan for 20 seconds. Make sure that the fan moves from side to side.
4. On Worksheet 5, make observations about the amount of sand you see left on the table.
5. Collect the sand that is left on the table back into the graduated cylinder. How much sand was left on the table? Record this on Worksheet 5.
6. Repeat steps 2 through 6, using the other types of soils.
7. Make conclusions and connections about the effect of moving air on each soil type. Record them on Worksheet 6.

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Name:

Let's Predict

What effect does moving air have on different types of soils? _____

_____

_____

_____

Let's Observe

Air moving over sand	Air moving over clay	Air moving over loam
This is what it looked like when the fan blew air over the **sand**:	This is what it looked like when the fan blew air over the **clay**:	This is what it looked like when the fan blew air over the **loam**:
When I collected the leftover sand into the graduated cylinder, it measured: _____	When I collected the leftover clay into the graduated cylinder, it measured: _____	When I collected the leftover loam into the graduated cylinder, it measured: _____

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Name:

Let's Conclude

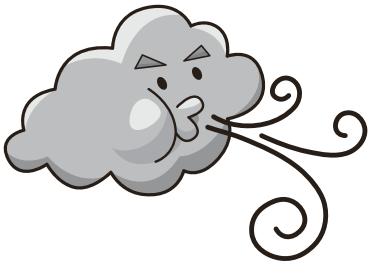
What effect did the moving air have on the **sand**?

What effect did the moving air have on the **clay**?

What effect did the moving air have on the **loam**?

Let's Connect It!

How could this information be useful in our daily lives?



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