4-H

Natural Resource

Club

Soil & Water Science

SOIL & WATER SCIENCE

The Soil and Water Science curriculum is for youth who enjoy learning about science and two important natural resources: soil and water. Level 1 introduces basic terms and concepts. Activities focus on understanding important soil and water processes. Level 2 activities help you put the basic concepts into action to understand more advanced soil and water concepts and interactions with the environment. Level 3 activities are divided into chapters based on how you might use the information you have learned — as a homeowner, resident of a watershed, food and fiber producer (farmer), mayor, teacher, or member of Congress. Level 3 delves deeper into soil and water science concepts, and can prepare you to be well informed and to study these topics at a college or university.

Indiana 4-H Soil & Water Science manuals

(Order from Purdue's *The Education Store*, www.edustore.purdue.edu)

- Level 1, Grades 3-5, 4-H-1027
- Level 1, Facilitator's Guide, 4-H-1027a
- Level 2, Grades 6-8, 4-H-1028
- Level 2, Facilitator's Guide, 4-H-1028a
- Level 3, Grades 9-12, 4-H-1029
- Level 3, Facilitator's Guide, 4-H-1029a

Invited Speaker Suggestions

A variety of people in your county may be able to talk to youth about soil health, erosion, and water (quality and quantity).

- Local Soil and Water Conservation District employee, http://iaswcd.org/contact-districts.html
- Ag Business and Science Teacher who competes in the Soils Career Development Event
- Local Master Gardener, ask for a recommendation from your Extension Office
- County Ag & Natural Resources Extension Educator to talk about soil health
- Local Farmer to talk about the importance of soil health

Resources

- Indiana 4-H Soil & Water Webpage: www.ydae.purdue.edu/natural_resources/, click on Soil & Water Conservation
- NRCS Web Soil Survey, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
- Indiana Association of Soil and Water Conservation Districts, http://iaswcd.org/
- Indiana's Water Riches (4-H 882, for upper elementary students) newsletters: Unit 1, Unit 2, Unit 3, Unit 4, Unit 5.
- Insects as Bioindicators of Water Quality
- Proper Disposal of Unwanted Medicines - Educational activities for high school students. Manual, Website
- IDNR Water Webpage: www.in.gov/dnr/water/
- IDNR Education Programs (including Project Wet and Hoosier Riverwatch), www.in.gov/dnr/fishwild/7543.htm

4-H/FFA Soils Career Development Event

(middle and high school aged youth)

Youth who like to compete with others might enjoy participating in the 4-H/FFA Soils Career Development Event (CDE). The Soils CDE teaches youth to recognize important soil and landscape properties and to consider these properties in deciding how to use soils without harming them. Youth will learn about soil physical properties and corresponding best use management practices for farmland use and/or home site development.

Teams compete in their Area CDE by judging four soil pits (two focusing on agriculture and two focus on onsite wastewater disposal). Winning teams may advance to the Indiana Soils CDE, generally held the 4th Saturday in October. Contact your county Extension Educator for the date of your Area contest.

Activities

The following activities are from the Level 1 Indiana 4-H Soil and Water Science manual.

Pages	Activity Objectives	Materials Needed	Time (min.)
Water Erosion			
7-8	Youth learn about different types of erosion and how runoff can erode soil.	Copies of pg 7, box for soil, soil, jar, sprinkling can, quart jar, old book	30
Life in the Soil			
13-16	Youth learn about the importance of earthworms and how they help make organic matter (OM).	Copies of pp 15&16, 8 jars, earthworms, and other materials listed (pg 13)	30 + weekly checks
Properties of Water			
17-20	Youth learn about water's unusual properties	Glasses, bowl, ice, water, paper clips, fork, string, salt	30
Soil Needs its Space			
25-26	Youth learn how soil holds water.	Glasses, dry soil, masking tape, water	30
Soil Texture			
33-36	Youth learn about soil texture. Younger youth will need additional guidance, perhaps from a Junior Leader	Copies of pp 34-36, paper lunch bags, paper towels, 3 soil, and various test items.	45
The Water Cycle			
37-40	Youth study the water cycle and investigate evaporation.	Copies of pg 38, a plastic cup, ruler, and pencil.	30

WATER EROSION

Why are we losing topsoil?

INTRODUCTION

Soil erosion is the wearing away of land surface by water, wind, or ice. Geologic erosion happens *slowly* over time. Accelerated erosion happens much faster, and human activities usually cause it. Water and wind cause most of the erosion in the Midwest. Water erosion occurs when raindrops hit soil particles hard enough to dislodge them and wash them downslope. The splash erosion activity shows how water erosion begins. In this activity you will learn some erosion terms and demonstrate how soil erosion occurs.

TOOL KIT #1

☐ Pencil

- Unscramble the letters below to identify types of erosion.
- Indicate the type of erosion shown in Figure 1.

Drawing by J. Harsh

FIGURE 1. Erosion

Scrambled Letters	Type of Erosion	Definition
LYGLU		A channel worn in the ground by running water after it rains. Gullies are deep enough that they are not smoothed over by normal tillage.
LIRL		A very small channel only a few inches deep, caused by runoff water.
STEEH		A thin layer of soil removed by runoff.
HSPLAS		Large raindrops loosen small particles of soil from the surface.
SATMRE AKNB (two words)		A running stream undercuts into stream banks, leaving "shelves" of soil that then collapse into the stream bed.

TOOL KIT #2

- ☐ Small shallow box lined with plastic or a two-liter bottle cut in half
- ☐ Soil from garden or flower bed
- ☐ Heavy-duty aluminum foil to make a spout
- ☐ Sprinkling can, at least 1 quart; half gallon is better
- ☐ Wide-mouth quart canning jar
- ☐ Book or piece of wood, about 1 inch thick

Make IT WATER EROSION IN A BOX

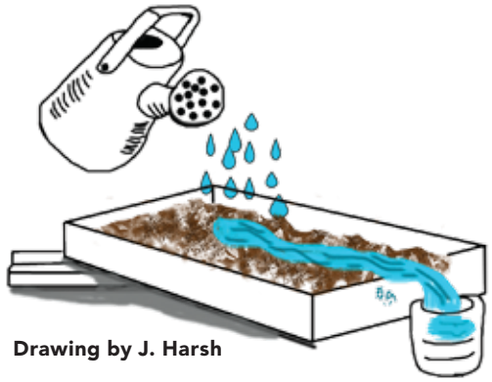
- Line the box with plastic to hold soil.
- Fill the box with soil from a garden or flower bed.
- Construct a foil spout to collect water at one end of the box.
- Set the box on a table with the spout extending over the edge of the table.
- Place the jar under the spout.
- Place the 1-inch book or piece of wood under one end of the box to give it a slope.
- Fill the sprinkling can with water.
- Hold the sprinkling can approximately 1 foot above the box and pour the water steadily onto the soil in the box.
- Continue to pour water until the jar is at least half full of runoff water.

ANSWER THE QUESTIONS

- Did the soil get washed out of the bottom of the box?

  ☐ Yes ☐ No

  If yes, you observed **gully erosion**.
  If no, continue.



Drawing by J. Harsh

- Did the water make small channels in the soil surface?

  ☐ Yes ☐ No

  If yes, you observed **rill erosion**.
  If no, continue.

- Did the water remove a smooth, even portion of the soil without creating small channels?

  ☐ Yes ☐ No

  If yes, you observed **sheet erosion**.
  If no, continue.

  Did you observe more than one type of erosion? If so, what did you see? _____

  _____

  _____

LIFE SKILLS

- Acquiring knowledge
- Following procedures
- Completing a project/task

chat

Share What Happened: What type of soil erosion did you observe?

Apply: How might soil erosion be reduced?

Generalize to Your Life: Why is it important to prevent soil loss?

LIFE IN THE SOIL

Do insects, bugs, and worms have a purpose in the soil?

INTRODUCTION

Soil has four main parts, or components: air, water, **organic matter (OM)**, and **minerals**. In this activity you will conduct an experiment to observe the importance of earthworms on soil formation. You will compare the effects of adding earthworms to soil with a **control** soil that does not have earthworms.

TOOL KIT

- ☐ Eight one-quart jars
- ☐ Four quarts of a dark loamy soil (topsoil)
- ☐ Organic matter like bread, fruit, vegetable scraps, etc.
- ☐ Water
- ☐ Masking tape
- ☐ Marker
- ☐ Eight rubber bands
- ☐ Eight squares of cheesecloth or pieces of nylon
- ☐ Eight labels made with masking tape and markers
- ☐ 16–24 earthworms; dig up your own or buy fishing worms

  Note: Keep the earthworms in the dark (covered with paper), so they think they are in the ground.
- ☐ Life in the Soil worksheet

  Included in this activity

  Copy if you wish

DO IT

Assemble materials needed and read the instructions.

- Label the jars.

  Jar 1 – soil only (control)

  Jar 2 – soil, earthworms

  Jar 3 – soil and water (control)

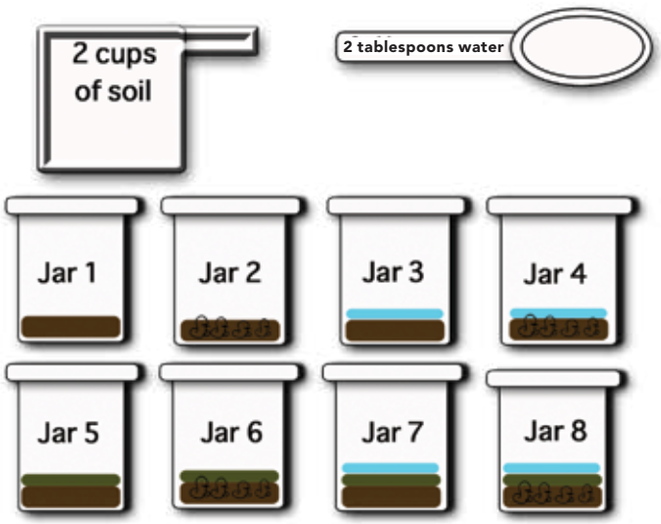
  Jar 4 – soil, water, and earthworms

  Jar 5 – soil and organic matter (control)

  Jar 6 – soil, organic matter, and earthworms

  Jar 7 – soil, water, and organic matter (control)

  Jar 8 – soil, water, organic matter, and earthworms



Drawing by J. Harsh

- Put two cups of soil in each jar.
- Add two tablespoons of water to each jar labeled "water."
- Add one cup of organic matter to each jar labeled "organic matter."

  To make comparisons, each jar has the same kind of organic matter.

  Mark the level of organic matter on each jar with the masking tape and marker.
- Add 4–6 earthworms to each jar labeled "earthworms."
- Cover each jar with the cheesecloth or nylon and secure with rubber bands.
- Store the jars in a cool, dark place such as a basement, tool shed, or garage.
- Complete section 1 of the Life in the Soil worksheet.
- Check the jars marked "water" to be sure the soil remains moist throughout the experiment.

  Add one to two tablespoons of water, if needed. The soil should be moist but with no ponded water in the jar.

  Do not add water to the other jars.
- Record your observations weekly for four weeks in section 2 of the Life in the Soil worksheet.
- Complete section 3, final observations, in the Life in the Soil worksheet.

LIFE SKILLS

- Acquiring knowledge
- Keeping records
- Thinking critically

Share What Happened: What effect did the earthworms have on the organic matter?

Apply: What is the benefit of earthworms on the soil?

Generalize to Your Life: How might earthworms improve your garden, landscape, or lawn?

DIG DEEPER

Use the scientific method to do more experiments.

- Earthworms help break down organic matter, which becomes nutrient-rich soil (compost). After determining which jars or jars had the best conditions for composting, decide what other factors you might want to investigate, and repeat the experiment. These factors might include the kind of soil texture (sandy or clayey), different organic matter (leaves or grass clippings), or different organisms.
- Make a composting area in your backyard or on your school grounds to handle kitchen scraps — do not include meat or bones because they attract animals — and yard waste like grass clippings and leaves. Stir the mixture occasionally to speed plant breakdown. After several months you will have compost, which helps improve soil workability, keeps weeds down, adds nutrients, and helps keep yard and kitchen waste out of landfills!

LIFE IN THE SOIL WORKSHEET

SECTION 1: Fill in this part when you set up your experiment.

Name _____

Starting Date _____

Conditions where the jars are stored

- Light conditions: _____
- Temperature conditions: _____

What do you think will happen to the soils without water added?

What do you think will happen to the organic matter without earthworms?

What do you think will happen to the organic matter with earthworms?

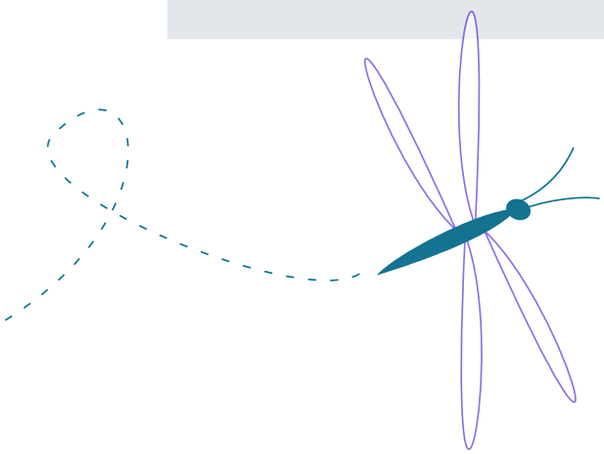
Do you expect that the earthworms will die in any of the jars? If so, which jar(s)?

Do you have any other predictions or questions?

SECTION 2: Complete this section beginning one week after experiment gets started.

Date	Observations
Date	Observations
Date	Observations
Date	Observations

SECTION 3: Final observations	
Date	**Description of each jar:**
	Jar 1 (soil)
	Jar 2 (soil and earthworms)
	Jar 3 (soil and water)
	Jar 4 (soil, water, and earthworms)
	Jar 5 (soil and organic matter)
	Jar 6 (soil, organic matter, and earthworms)
	Jar 7 (soil, water, and organic matter)
	Jar 8 (soil, water, organic matter, and earthworms)
Which jar had the biggest loss of organic matter?	
Which jar has the most live earthworms?	
Which jar do you think has the healthiest soil?	



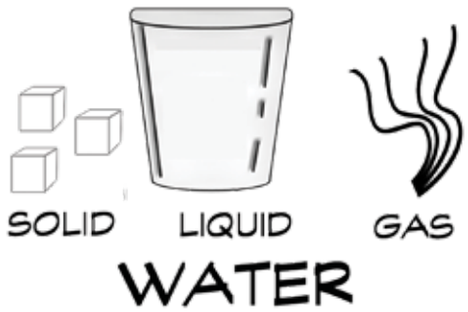
PROPERTIES OF WATER

What are some of the properties of water?

INTRODUCTION

Water has some interesting properties. It boils at 212°F and freezes, or changes from liquid to a solid, at 32°F. Water exists in one of three phases:

- **solid** (snow and ice)
- **liquid** (rain)
- **gas** (invisible water vapor)



Drawings in this activity by J. Harsh

Water has a skin-like property called **surface tension**. Surface tension allows things like bugs and leaves to float on it. Water's **melting point**, the temperature at which it changes from a solid to liquid, is the same as its freezing temperature, 32°F. Adding minerals like salt can change this value.

In this activity you will study how salt affects water's melting point and how water can be pulled from the air.

TOOL KIT #1

- ☐ Two drinking glasses or jars, 16 ounces or larger
- ☐ Tray of ice
- ☐ Tap water
- ☐ Two atmospheric thermometers (optional)

  An atmospheric thermometer gives outdoor temperature readings, unlike a thermometer that reads your body's temperature.

Complete the Properties of Water worksheet as you do this activity.

- Enter the date.
- Fill one glass with cool water.
  Fill the other glass with warm water.
- Add three ice cubes to each glass.
- Record the start time.
- Answer Question 1.
- Let the glasses sit on a table for 30 minutes.
- Enter Time 2.
- Answer Questions 2–5.

PROPERTIES OF WATER WORKSHEET

Experiment _____ **Date** _____ **Start Time** _____

Question 1 How many phases of water could you see when you filled the first glass?

Time 2

Question 2 Was there water on the outside of either glass after you filled the second glass?

☐ Yes ☐ No

Question 3 If you saw water on the outside of the glass, where do you think it came from?

Question 4 What differences did you see and feel between the contents of the two glasses?

Question 5 What other differences can you observe between the two glasses of water and ice?

NOTES:

Share What Happened #1: How many phases of water did you observe?

Apply: Explain how the phases of water allow water to move through the water cycle.

TOOL KIT #2

- ☐ Bowl
- ☐ Water
- ☐ Large and small paper clips or needles of various thicknesses
- ☐ Fork

#2 DO IT

- Fill the bowl with water.
- Place a paper clip or needle across the prongs of the fork.
- Slowly dip the fork into the water until the fork breaks the water surface.
- If the paper clip or needle does not float, use a thinner one.

Share What Happened #2: What happened when you submerged the fork?

Apply: How might insects be like the paper clip or needle in this activity?

TOOL KIT #3

- ☐ An ice cube
- ☐ A 6-inch string or piece of sewing thread
- ☐ A glass of water
- ☐ Table salt

#3 DO IT

- Fill a glass three-quarters full of water.
- Add an ice cube.
- Hang one end of the string over the edge of the glass so that it lies on top of the ice cube.
- Place the other end of the string on the outside of the glass.
- Sprinkle salt over the ice cube and string.
- Let it stand 5–10 minutes.
- Gently lift the string.

Share What Happened #3: Were you able to lift the ice cube with the string?

Apply: Why do you think the string stuck to the ice cube?

CHAT #1–3

Generalize to Your Life: Answer the following questions using your knowledge of the properties of water.

- Your father tells you to be careful as he brings water to a boil to cook pasta. What temperature is the water?
- You notice that water in a puddle outside your house has turned to ice. What is the highest temperature that it could be?
- Why do windows sometimes have moisture on the inside during the winter?
- Why do people often spread salt on an icy sidewalk?

LIFE SKILLS

- Acquiring knowledge
- Thinking critically

DIG DEEPER

- Compare the activities you did with the water cycle processes.

Use a thermometer to record the temperature of the water in each glass every 5 minutes as the ice melts for 30 minutes. Then leave the glasses overnight and record the temperature at least 12 hours later. What did you observe?

Try other materials to test the surface tension of water. Examples: pepper, salt, powdered sugar, granulated sugar, cocoa, flour. Clean the bowl after using each material before trying another one.

Try other types of salt, if they are available to you (kosher, water softener, sidewalk, etc.). How much salt do you need to add to melt the ice cube?

Does stirring make a difference?

Which would freeze first in the freezer, a paper cup with salt water or a paper cup of tap water?

Which feels like it's frozen more solidly, a can of frozen orange juice or an ice cube?

Which would freeze first, a lake or an ocean? Why?

DID YOU KNOW?

- Cold air cannot hold as much water vapor as warm air. As water molecules in the gas phase get close to the cold surface of the drinking glass or jar, they condense and turn to liquid.
- Beading of rain is due to surface tension.

NOTES:

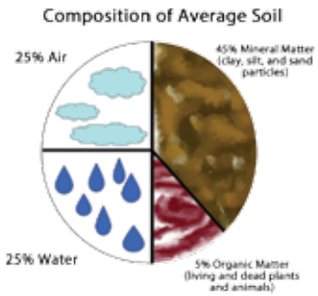
SOIL NEEDS ITS SPACE

Where does rain go when it enters the soil?

INTRODUCTION

Soil has four main parts, or components. Soil is made of **minerals**, water, air, and **organic matter (OM)**. Air is in the pore spaces between soil particles. In this activity you will investigate how water can fill pore spaces in the soil.

TOOL KIT



Drawings in this activity by J. Harsh

- Clear jar or container with lid; a quart canning jar works well
- Second container
- Masking tape
- Water
- Dry soil

  Dig about two cups from your yard or garden.

  Do not dig after a rainfall.
- Ruler and pen or pencil

DO IT

PART 1

- Measure the height of your jar.
- Put a piece of tape on the jar at half the height of the jar.
- Add water to the top of your tape so that the jar is half full.

  Record the water level in Table 1, row 2, column 2 (a).
- Pour out the water into a separate container and save it.
- Add soil to the top of your tape (a).
- Slowly pour the saved water back into the jar of soil.
- Wait 10 minutes to give the water time to enter the soil.
- Record the level of the soil and water in Table 1, row 3, column 2 (b).
- Calculate the pore space in your soil and enter in row 4, column 2 (c):

  Subtract (a) from (b) to calculate how much water entered the soil pores.

TABLE 1. Soil and Water Investigation

Measurement	Height (in inches)
a) Soil height (a)	
b) Water + soil height (b)	
c) Pore space (b-a=c)	

PART 2

- Add water to fill the jar.
- Put the lid on the jar and shake it vigorously for 10–20 seconds.

  Color the jar in Table 2, What I See, to show what the soil/water mix looked like when you stopped shaking the jar (row 2, column 2).

  Describe how the jar looks in row 2, column 3.
- Place the jar with the soil and water where it can remain undisturbed for 24 hours.
- Draw and describe what the soil and water looks like after 1, 2, 3, and 24 hours in the appropriate columns of Table 2

TABLE 2. What I See

Time (hours)	Picture	Description
0		
1		
2		
3		
24		

LIFE SKILLS

- Acquiring knowledge
- Critical thinking
- Completing a project or task

Share What Happened: Was there a difference in the height of the water and the water/soil moisture? How would you explain this?

Apply:

- What was in the pore spaces before the water entered them?
- Why is it important for soil to have pore space?

Generalize to Your Life: How could a pollutant spilled on the grass be transported to drinking water supplies?

DIG DEEPER

- Repeat this activity with soils from different places and/or different lengths of time after a rain. Try to determine which soil has the most pore space (can hold the most water).
- Repeat Part 2 of the activity but take readings every 15 minutes for the first two hours.
- Calculate the volume of water in the soil pore space:

  $h * \prod * r^2$, where:

  - h ~ height of water
  - $\prod$ ~ 3.14159
  - r ~ radius of jar
  - All measurements are made using the same units (inches or centimeters).

SOIL TEXTURE

What can you tell about a soil by the way it feels?

INTRODUCTION

Soil texture is described by the way soil feels when it is slightly wet. Soil texture depends on the different amounts of **sand, silt,** and **clay** it contains. If a soil has a lot of sand, it feels gritty. If it has a lot of clay, it is hard when dry and sticky when wet. Soils with silt are neither gritty nor sticky when wet and might feel like flour. **Loam** soils have equal amounts of clay, sand, and silt. In this activity you will explore how different soil textures feel.

TOOL KIT

- ☐ Six paper lunch bags
- ☐ Marker
- ☐ Paper and pencil
- ☐ Paper towels or hand wipes
- ☐ Three different soils

Six test items from the following list, or similar (about half a cup of each)

- ☐ Baby powder
- ☐ Baking soda
- ☐ Cornmeal
- ☐ Cornstarch
- ☐ Dry Cream of Wheat
- ☐ Granulated sugar
- ☐ Modeling clay
- ☐ Smooth peanut butter
- ☐ Powdered sugar
- ☐ Rice
- ☐ Salt
- ☐ Sand
- ☐ Split peas
- ☐ Wheat flour

#1 DO IT — TEXTURES

- Number the paper bags 1–6.
- Place a half cup of each of your six test items into a paper bag.
- Record the material in each bag in Table 1.
- Ask three people to be "texture testers" and to take a texture test by feeling the items.
- Or, ask your Facilitator to mix up the bags, and you can be a texture tester.

  Texture testers should use their non-writing hand to feel the test items.

  They should not look to see what is in the bag.

  Keep the bags upright so the material does not spill.

  Plastic bags can be used inside the paper for sticky items.

  Let the texture testers clean their hand between tests.

  Ask each person to guess what he or she is feeling.

  Record their answers in Table 1.

  Let them know what was in each bag once they are done with the samples.

- Complete the texture test questions on page 35.

  Note for question 3: Common types of soils include sandy soils, clayey soils, silty soils, and loamy soils. Each of these soils has different characteristics as a result of its makeup. Sandy soils feel gritty, clayey soils feel like modeling clay, silty and foamy soils are in the middle. Silt feels like flour, and loam has nearly equal parts of sand, silt, and clay. Circle the soil type that you think is best described by the characteristic listed. Guessing is fine.

#2 DO IT MIX

- Mix a quarter cup of baking soda and one teaspoon of Cream of Wheat.
- Ask your texture testers to feel the mixture and describe what they feel.
- Record their answers in Table 2 on page 36.

#3 DO IT SOILS

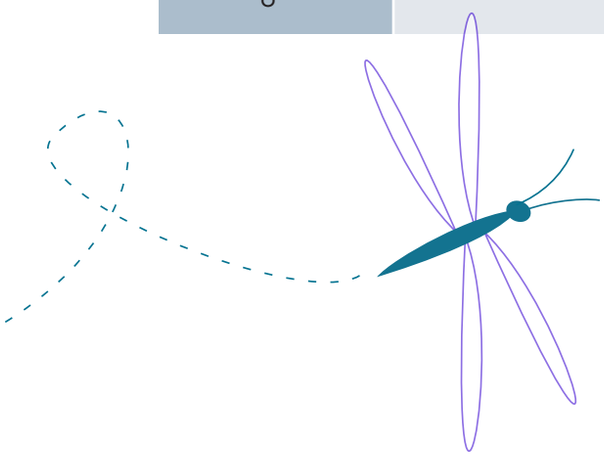
- Number the other bags: soil 1, soil 2, and soil 3.
- Place your three soils in the three bags.

  Ask your texture testers to feel, smell, and carefully observe, and tell you what they find.

  Record their observations in Table 3 on page 36.
- Review the glossary definitions and answer the Chat questions.

TABLE 1. Textures

Bag Number	Item	Guesses		
		Person 1	Person 2	Person 3
1				
2				
3				
4				
5				
6				



TEXTURE TEST QUESTIONS

1. How many correct answers did you receive?_____

2. What percentage of guesses were correct? _____

   Calculate the percentage by dividing the number of correct answers by 18 (the total number of questions) and multiplying by 100. Formula: correct/total * 100.

3. List the item that you had in each bag and write the soil type that it is most similar to.

Bag Number	Item	Soil Type (circle one)
1		sand silt loam clay
2		sand silt loam clay
3		sand silt loam clay
4		sand silt loam clay
5		sand silt loam clay
6		sand silt loam clay

4. Which soil type would you expect to have the following characteristics?

Soil Characteristic	sandy soils	clayey soils	silty soils	loamy soils
Allows root growth most easily				
Could be used for finger painting				
Water would drain through quickly				
Would stick to the bottom of your shoe				

TABLE 2. Mix

Soil	Observations		
	Person 1	Person 2	Person 3
1			
2			
3			

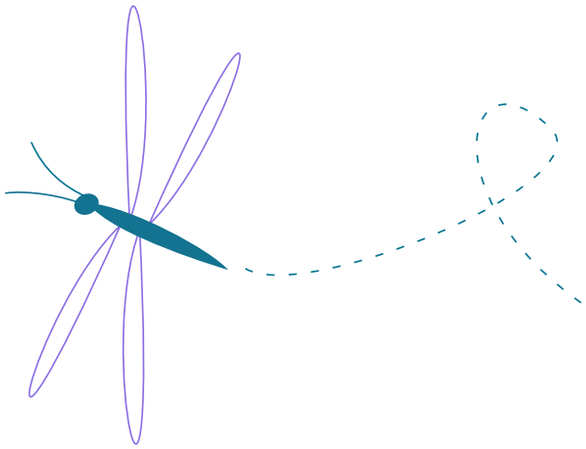
TABLE 3. Soils

Soil	Observations		
	Person 1	Person 2	Person 3
1			
2			
3			

Share What Happened: Were your texture testers able to guess what they were feeling?

Apply: What can the way a soil feels tell you about its water-holding capacity?

Generalize to Your Life: How might soil differences affect someone who is building a house or planting a garden?



THE WATER CYCLE

Where does rain come from? Where does it go?

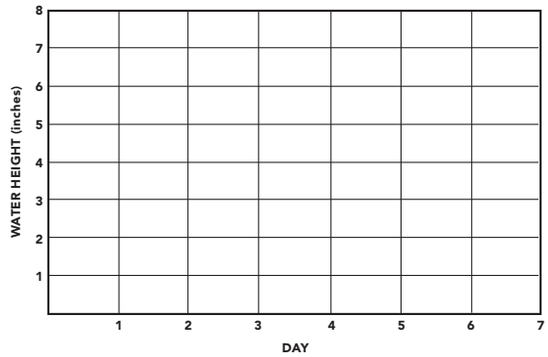
INTRODUCTION

The general term for rain and snow is **precipitation**. Precipitation replaces the earth's **surface water** and **groundwater** supplies. Precipitation is an important part of the **water cycle**, also called the hydrologic cycle. The water cycle is the movement of water from surface and groundwater into the **atmosphere** and back again. Water moves to the atmosphere through **evaporation** of surface water and **transpiration** of water from plants. Water moves from the atmosphere back to surface water and groundwater via precipitation. You are going to conduct an experiment to show how the water cycle works and begin to become familiar with the water cycle words.

TOOL KIT #1

- ☐ Clear plastic cup
- ☐ Ruler
- ☐ Evaporation chart (included)
- ☐ Pencil
- ☐ Marker or crayon
- ☐ Masking tape

Evaporation Chart



#1 DO IT

- Fill the plastic cup with water to about a half inch from the top.
- Measure the height of the water in the cup.
- Place a piece of masking tape at the top of the cup and mark the water level.
- Mark a dot at Day 0 to record the height of the water on the chart.
- Measure and chart the height of the water in the Evaporation Chart for a week. Try to measure the water at the same time each day.
- Connect your daily measurements to create a line graph.

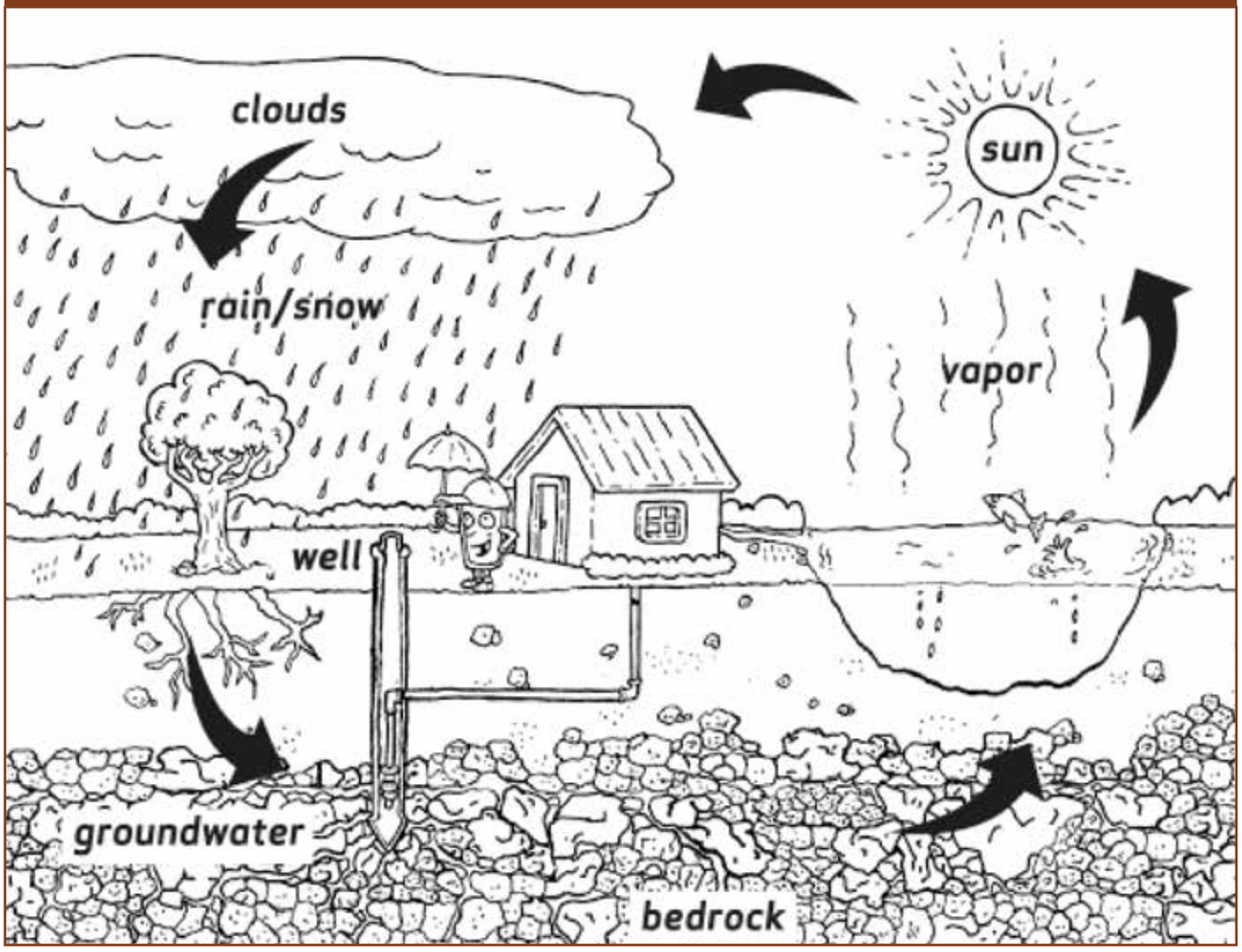
TOOL KITS #2 AND #3

- ☐ Pencil
- ☐ Colored markers or pencils

#2 DO IT

- Study the water cycle picture (Figure 1).
- Match the processes to the definitions in the table on page 38.
- The word bank words are in the glossary.
- Label Figure 1 with the letters (A–G) for the terms in the word bank.

FIGURE 1. The Water Cycle



Source: U.S. EPA "Thirstin's Water Cycle Adventure"

Letter	Definition	Word Bank
	a process in which water changes from a liquid to a gas	A. Condensation
	the process of water entering the soil	B. Evaporation
	a process in which water changes from a gas to a liquid	C. Groundwater
	water that falls from the sky as snow, rain, hail, or sleet	D. Infiltration
	examples include lakes, streams, rivers, and oceans	E. Precipitation
	water found under the surface of the earth	F. Surface water
	a process in which water is released from plants	G. Transpiration

#3 DO IT

The water cycle is usually drawn as a circle, but water can move through the water cycle along many different paths. For example, water can fall on the ocean and then evaporate and return to clouds, where it returns to the ocean in another rainstorm. This can happen again and again with any drop of rain.

- Draw a winter water cycle that includes the landforms and processes where you live.
- Draw a summer water cycle that includes the landforms and processes where you live.

LIFE SKILLS

- Acquiring knowledge
- Using natural resources wisely

chat

Share What Happened:

- Did the water stay at the same height during the week?
- What process in the water cycle is represented by the Do It #1 experiment?
- Explain the water cycle in your own words.

Apply:

- What do you think happened to the water in your experiment?
- What happens to water when it is exposed to sun and wind?

Generalize to Your Life:

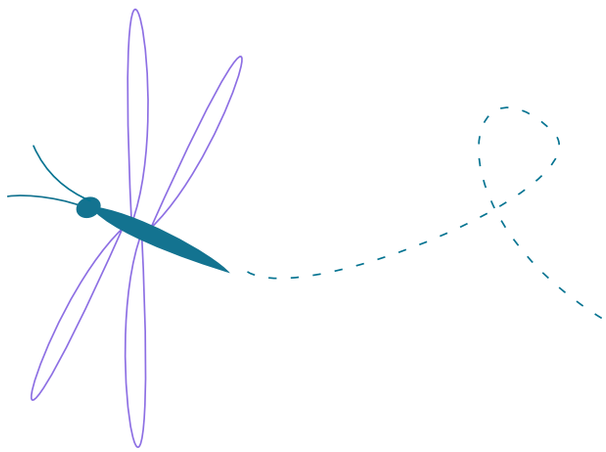
- Why is the water cycle important to plants and animals?
- How can humans have a negative effect on the water cycle?

DIG DEEPER

- Try this experiment at different times of the year. Does the water evaporate faster when the heat is on in your house in the winter, or in the summer? Does the evaporation rate change depending on where you place the cup? Think of other places or times you can try this experiment.
- Create a poster illustrating the water cycle. Name each important event in the water cycle. Explain your poster to your class, your friends, or your 4-H club.

DID YOU KNOW?

- In 20 minutes, one thunderstorm can send down more than 125 million gallons of water! This amount of water would fill 227 Olympic-sized swimming pools!
- The earth has the same amount of water as it did when it was first formed. The water you drink from your faucet today could contain molecules consumed by dinosaurs and plants that lived million of years ago.
- Nearly three-quarters of the earth is covered with water. Most of this water is salt water that cannot be used for drinking or watering crops unless the salt is removed.



CONNECTIONS

- Natural Resource Conservation Service (NRCS) video and poster, www.nrcs.usda.gov/wps/portal/nrcs/detail/national/water/?cid=stelprdb1046868
- Environmental Protection Agency resources:

Games & Activities for Students (Grades K–3), http://water.epa.gov/learn/kids/drinkingwater/kids_k-3.cfm

Games & Activities for Students (Grades 4–8), http://water.epa.gov/learn/kids/drinkingwater/kids_4-8.cfm

www.epa.gov/ogwdw/kids/flash/flash_watercycle.html

NOTES: