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ACTIVITY 3.1

Unit Word Search

aeration
arthropods
bacteria
climate
ecosystem
eluviation
erosion
fertile
fungi
humus
inorganic
nematodes
organic
protozoa
soil horizons
soil taxonomy
symbiotic
tillage
topography
topsoil
yield

G U G Y G T A X E C V G B F H T E P U H S S
N O I S O R E R L L T O P S O I L R P U E E
C J B W F G B I T C I S N P J Y U O R M D G
L I O A A U M R I H N T O X I S V T I U O D
N X N L C A N T P O R G R E V F I O C S T W
W W L A T T O G Z V R O L E C J A Z I B A I
Q I S E G I E I I A F D P N F G T O N N M Z
T W Q O B R R R P S P A W O Q G I A A Z E M
L C Q M Z O O H I X H V P U D S O T G N N C
P U Y K H P Y N C A R A J C P S N K R Y O B
A S I L P L M P I M G Y L F M N I V O Y I O
U L I Y S O O J L Q C Y I J S O E U R H L X
X O B W T L S M L W F W R F I N H A C O D T
S F S J E Z S O I L T A X O N O M Y P P J Z
Y S U M E T S Y S O C E A E R A T I O N V O

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ACTIVITY 3.2

Dark Days on the Prairie – Diary Entry

Introduction

What do you think of when someone mentions the "Dust Bowl"? If you are like many people, you immediately think of Oklahoma and clouds of dust covering the sky. The Dust Bowl did affect the Oklahoma panhandle, as well as surrounding states. During this period, some people left the state while others stayed and "toughed it out." For those who stayed and tried to keep their farms, it was a difficult time. The Dust Bowl emphasized just how important soil is to sustaining agriculture; without productive soil farmers could not grow crops.

In this activity, you will read the background information on the Dust Bowl and then write an entry in a diary as someone living through that period in our history. Be creative and think of the struggles that they had to endure on a daily basis.

Background

The Dust Bowl covered 150,000 square acres in the Oklahoma and Texas Panhandles, southeastern Colorado, northeastern New Mexico and southwestern Kansas. The worst of the dust storms swept over southwestern Kansas. Yet many people only think of Oklahoma when they think of the Dust Bowl. In fact, only a small part of Oklahoma—the Panhandle—was affected by the Dust Bowl. The Oklahoma Panhandle is the driest part of Oklahoma,

In 1924 there was a prolonged drought. World War I had just ended a few years before and had disrupted agricultural production in Europe. To make up for food shortages caused by the war, the US government encouraged farmers all over the United States to plant crops "from fence to fence." The shortages also caused the price of wheat to go up; so planting wheat became a very profitable business. Landowners in the Oklahoma Panhandle and all over the Southern Plains plowed up the ground cover and planted winter wheat. With large areas of plowed land having no grassroot system to anchor it, the topsoil of the Oklahoma Panhandle simply blew away. The dust storms and sand storms buried roads and houses. Clouds of dust reached as far east as Washington, DC.

In response to the disaster, the federal government created the Soil Erosion Service and the Civilian Conservation Corps to recover the land. Today the Natural Resources Conservation Service helps farmers and others keep land productive.

On the following page, write a diary entry of one day in the life of someone struggling to live through the Dust Bowl.

Diary Page

Name _____ Date _____ Hour _____

ACTIVITY 3.3

Making a Soil Profile

Student Materials

Clear plastic cups (8 oz.)
Plastic spoons
Permanent marker
Edible items to represent the soil horizons and organisms
- Examples:
  - Jawbreakers
  - Crushed chocolate cookies
  - Pudding (chocolate/vanilla)
  - Sprinkles
  - Gummy worms
  - Coconut (green colored)
  - Various candy bars or candy-coated chocolate broken into pieces

Procedure

1. Gather all needed materials.
2. Determine what materials best represent the various soil horizons.
3. Starting at the bottom of the cup, make layers to represent the soil horizons.
4. Using a marker, label the soil horizons on the outside of the cup.

Questions

1. What did you choose for each horizon? _____

_____

_____

_____

2. Do you think the soil profile you created represents a good or poor soil for agriculture? Explain.

_____

_____

_____

Name _____ Date _____ Hour _____

ACTIVITY 3.4 LET IT SETTLE

Student Materials
Large (quart sized) jar with lid
Soil samples
Washable marker
Water
Ruler

Procedure

1. Gather all needed materials.
2. Fill your jar half full with water.
3. Add soil until the water level is nearly to the top of the jar.
4. Cover tightly with the lid and shake.
5. Place the jar on a level surface and allow the particles to settle. This may take a few minutes to a few days.
6. Using a washable marker, mark the soil layers and the top of the water being careful to not disturb your soil layers. The coarsest particle (sand) will be at the bottom with the finest (clay) being at the top.
7. With the ruler, measure the height of the water from the table surface. Measure the height of the soil levels.

   Soil Height _____ Clay _____ Silt _____ Sand _____

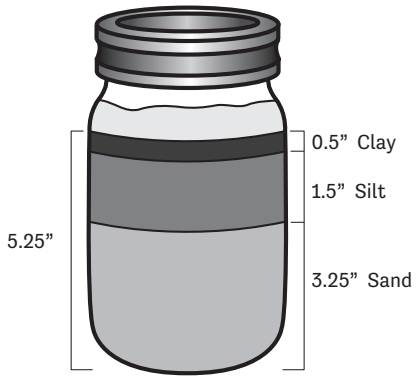
8. Calculate the percentage of clay, silt and sand compared to the total amount of soil.

Example: To find the percentage of each, divide the height of each soil layer by the total height of soil. Multiply your decimal answer by 100 to determine the percentage. Your percentages should total approximately 100 when added together.

Clay $\frac{0.5}{5.25} = 0.095 \times 100 = 9.5\%$

Silt $\frac{1.5}{5.25} = 0.286 \times 100 = 28.6\%$

Sand $\frac{3.25}{5.25} = 0.619 \times 100 = 61.9\%$



9. Using the soil textural chart, match the percentages of clay, silt and sand to determine the soil texture. The soil in this jar is most likely a sandy loam.

   Clay = 9.5% **Silt** = 28.6% **Sand** = 61.9%

Soil Textural Chart			
	% Clay	**% Silt**	**% Sand**
Loam	20	40	40
Silt Loam	15	60	25
Silt	5	85	10
Sandy Loam	10	20	70
Loamy Sand	5	10	85
Sand	2	3	95
Clay Loam	35	35	30
Clay	60	20	20

10. By looking at your soil jar, what texture do you predict your soil sample to be?

    _____

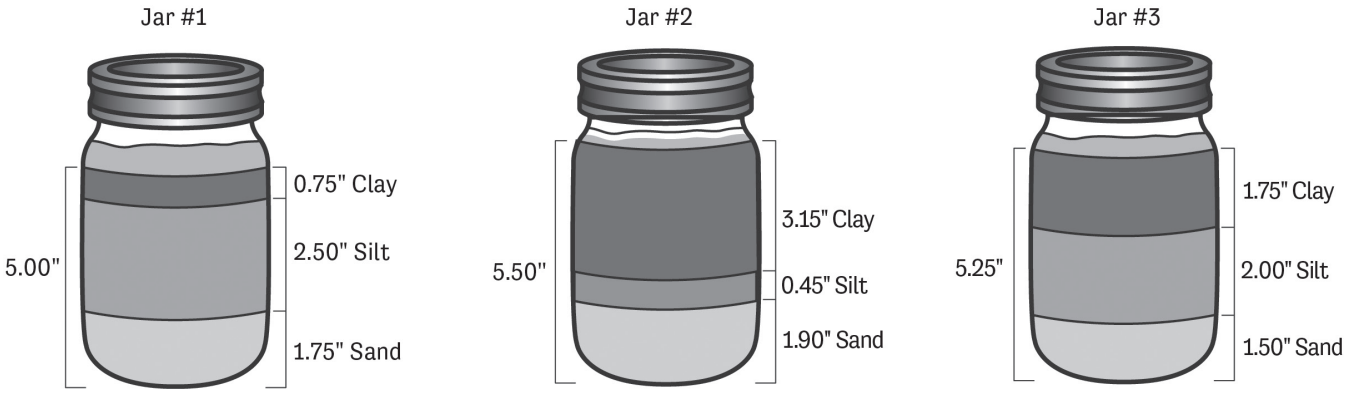
11. Why do you make this prediction? _____

    _____

12. Calculate your percentages using the heights you measured. Compare your percentages to the chart to determine the texture of your soil.

Clay	Silt	Sand	Soil Texture

13. Find the texture of the soil in these jars.



	Clay	Silt	Sand	Soil Texture
Jar #1				
Jar #2				
Jar #3				

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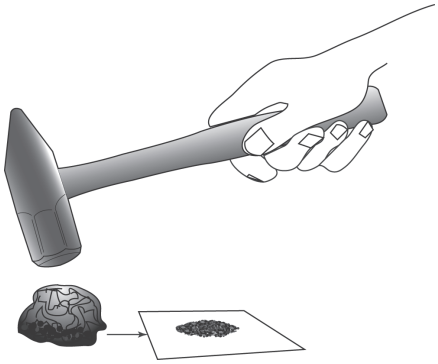
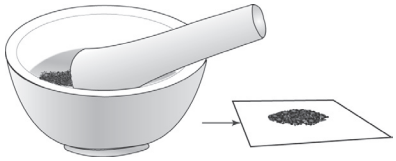
ACTIVITY 3.5 PAINTING WITH SOIL

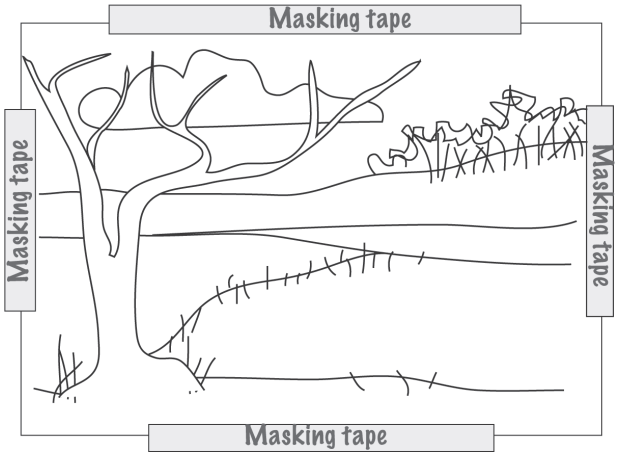
Student Materials
Air dried soil samples of varying colors
Small hammer or mallet
Mortar and pestle
Paper cups
Paint brushes
Clear gloss medium artist acrylic
Masking tape
Water color paper





Procedure

1. Gather all needed materials.
2. Crush the soil samples into pieces with the hammer or mallet.
3. Take the crushed soil and use the mortar and pestle to crush the soil into a powder.
4. Place the various soils in paper cups.
5. Draw your artwork on water color paper with a pencil.
6. Use masking tape to keep your paper flat on a surface.
7. Pour artist acrylic in small amounts into paper cups and add small amounts of the crushed soil samples.
8. Use the paint brushes and sponges to create your artwork.



NOTE: Adapted from NRCS activity "Painting with Soil."

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ACTIVITY 3.6 MUD IN THE WATER

Introduction

Soil is one of farmer's most valuable resources—and it can be washed or blown away, especially if proper conservation efforts are not used. Farmers today follow practices such as no-till farming that help protect the soil. In this activity, you will make a model that shows how soil erosion can occur.

Student Materials

Two solid plastic flower flats
Straw, grass, leaves or other ground cover
2 large watering cans with sprinkler heads
2 buckets
Measuring tape or ruler
Stopwatch
Calculator

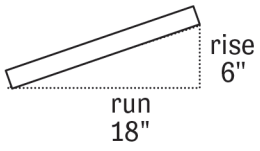
Procedure

1. At the end of each flower flat, cut a notch at one end.

2. Fill each flat with soil. Lightly pack to make firm.

3. Densely cover one soil container with ground cover such as straw. Leave the other soil container bare.

4. Set the container end with the notches on a table and prop the unnotched end of each to create a sloped surface. Measure the slope of the container by dividing the rise of the container by the run while tilted. For example:



Slope $\frac{6}{18} = \frac{1}{3} = .33$

5. Set a bucket below the notches at the end of each container.

6. At a constant rate, pour at least one gallon of water from a height of 12" onto each flat at the same time. Begin the stopwatch as soon as the water begins to pour.

7. Record the amount of time it takes for all of the water to flow out of the container.

8. Repeat the procedure two more times, increasing the slope of the container. Observe the differences in the speed of the water runoff.

	Trial #1	Trial #2	Trial #3
Slope			
Ground Cover (time)			
No Ground Cover (time)			

Discussion Questions

1. How did the ground cover affect the water runoff rate?
2. How does the water in the jars look after it has run through the soil?
3. What does this mean for soil erosion?
4. What happened when the slope increased?
5. Where might you see this in your community? How will it affect the environment?

Activity Extension

Major wind erosion damage occurred as a result of the Dust Bowl in the 1930s. Anytime the wind blows, erosion occurs. The following demonstration will show the affect of wind erosion.

Wind Erosion

1. Cut away one side of the large carton, place a piece of white paper on the bottom of the carton, and pour a pile of very dry soil or sand onto the paper.
2. Turn a fan or hairdryer towards the pile and notice how the particles move. Use a variety of speeds.
3. Add ground cover such as straw to the soil to see its affects on wind erosion.

Discussion Questions

1. What happens to the soil when blown by wind?
2. How did ground cover affect the soil?
3. How did the speed of the wind affect erosion?

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ACTIVITY 3.7

Soil Fact Sheets

Student Materials

Pen or pencil
Paper
Fact sheets on healthy soils
Examples: Oklahoma State University Fact Sheets http://osufacts.okstate.edu
HLA-6005 Mulching Garden Soils
HLA-6007 Improving Garden Soil Fertility
HLA-6014 Making a Compost Pile HLA-6033 Raised Bed Gardening
L-251 Recycling Yard Waste ("Don't Bag It" series)
L-252 Leaf Composting ("Don't Bag It" series)

Directions

Choose one fact sheet or article on soil that interests you. For example, a fact sheet or article on what makes a soil healthy.

Summarize the fact sheet following the guidelines listed below.

- Length should be 1 page
- Title and source of the article
- Summarize at least 3 key points in the fact sheet or article
- Describe the most interesting point to you in the fact sheet or article
- Describe at least 1 point or fact in the article that you were not aware of

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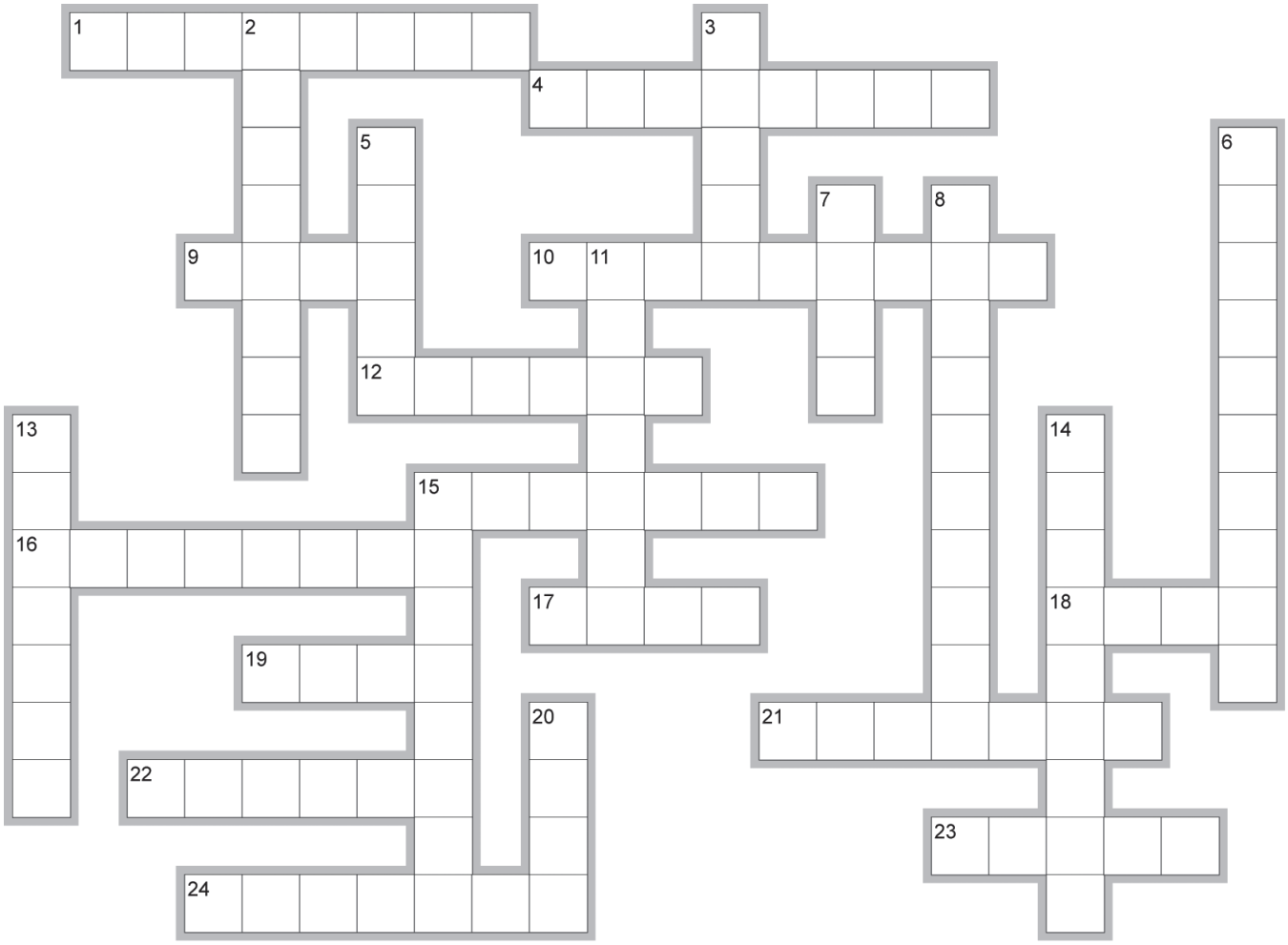
ACTIVITY 3.8

UNIT REVIEW CROSSWORD



Across

1. a primary nutrient for plants
4. pH greater than 7
9. best soil for most agricultural crops
10. composed of high percentage of minerals
12. applied to soil when too basic or alkaline
15. designated by the letter R
16. small, single-celled animals that feed on bacteria
17. smallest soil particle
18. pH less than 7
19. smooth and powdery soil particle
21. removal of the top layers of soil
22. burrowing mammal
23. contains dissolved carbon dioxide
24. weather of an area

Down

2. type of nitrogen fixing bacteria
3. 25% of soil; basic component
5. decayed organic matter
6. millipedes and scorpions
7. largest soil particle
8. method to reduce wind erosion
11. pH of 7
13. productive layer of soil
14. small roundworms that live in soil
15. small, one-celled organisms
20. applied to soil when too acidic