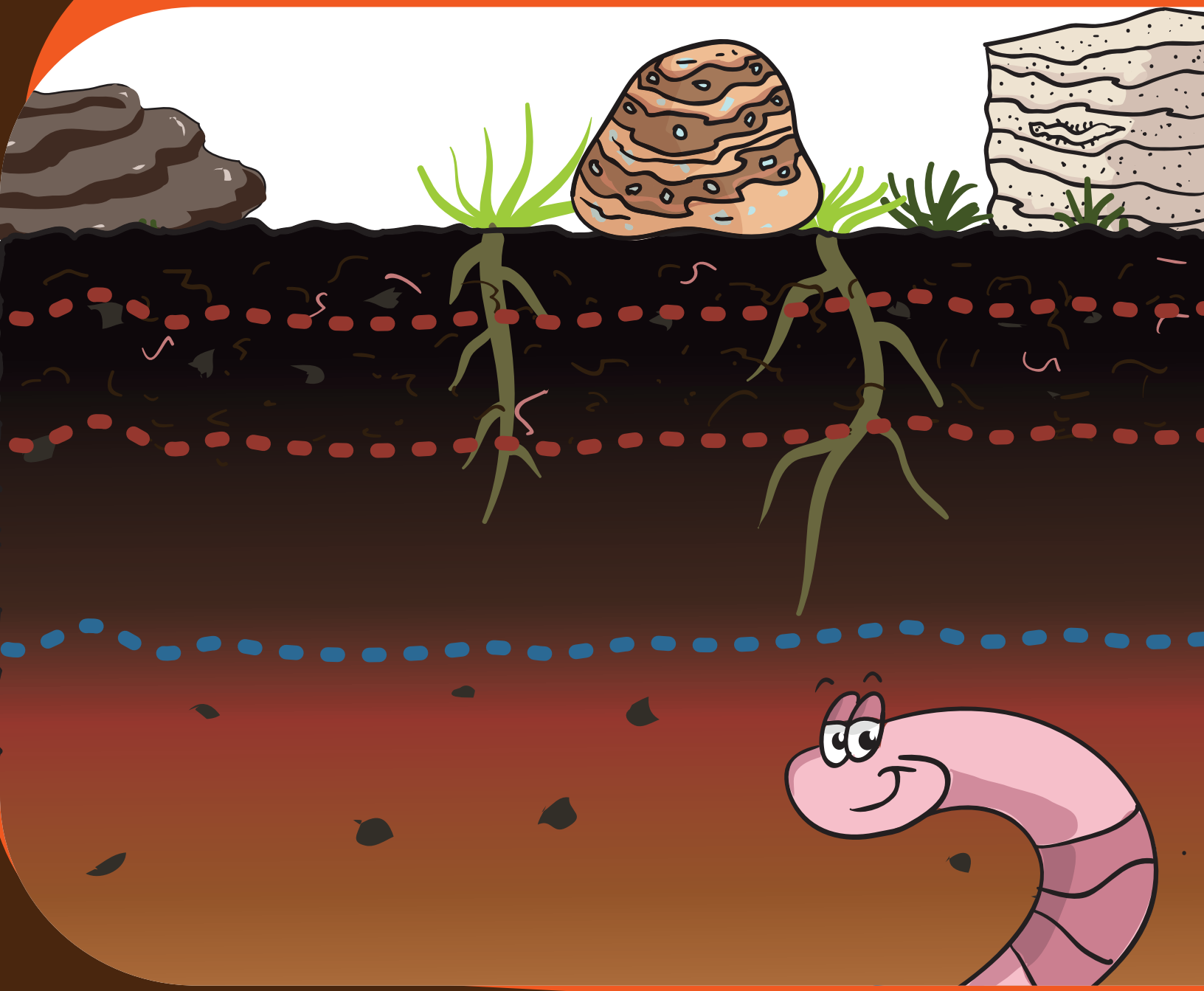
Can You Dig It:

Rocks and Soil

2nd GRADE



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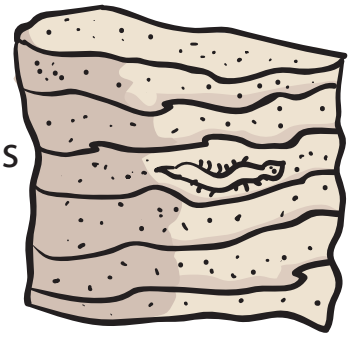
Certificate of Completion

TYPES OF ROCKS

Did you know there are different types of rocks?

Sedimentary Rock

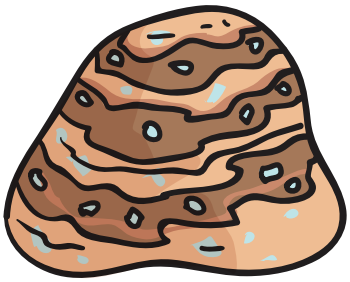


This type of rock is made out of sand, shells, pebbles and other materials. Together, these particles are "sediment". Slowly the sediment gathers up in layers. Over time it turns into rock! Fossils are usually found in this type of rock.

Can you think of a place where this type of rock can be found?

_____

Metamorphic Rock

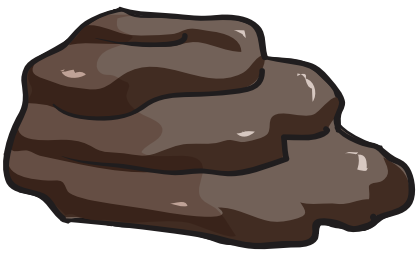


This type of rock is made beneath the surface of the earth. It has ribbon-like layers, caused by the heat. Some of these rocks have shiny crystals on them.

Can you think of a place where this type of rock can be found?

_____

Igneous Rock



This type of rock is made from the lava of a volcano. Deep inside the earth, rocks are melted and become magma. When magma comes out of the volcano, it is called lava. If the lava cools quickly, it will make a smooth and shiny rock. If the lava cools slowly, it will form a rock with tiny holes and gas bubbles in it.

Can you think of a place where this type of rock can be found?

_____

MATCH THE ROCKS

Can you identify the 3 main types of rocks?
Sedimentary, Metamorphic and Igneous

Draw a line to connect the attribute to the correct rock type.

These rocks have small, shiny, or sparkly crystals.

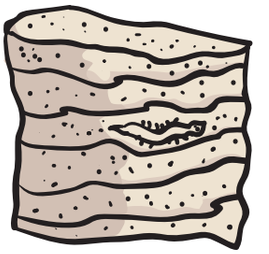
These rocks have fossils or imprints of leaves, shells or insects.

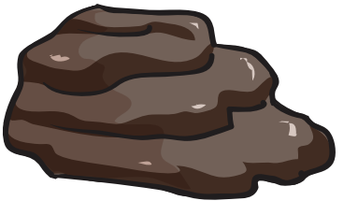
Some of these rocks may have holes like swiss cheese.

Some of these rocks are not rough but smooth and shiny like glass.

These rocks have ribbon like layers.

In these rocks you may see individual stones pebbles or sand grains.





WEATHERING & EROSION

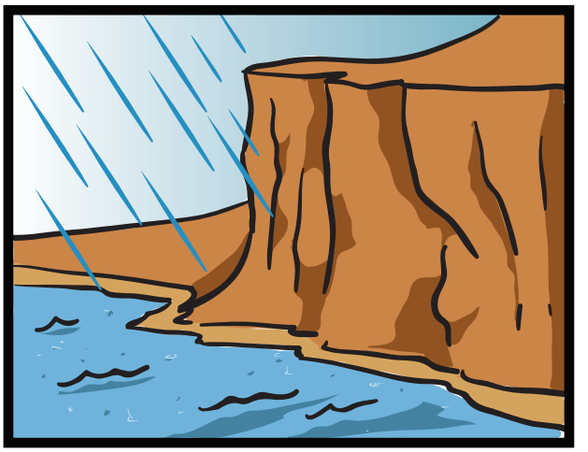
Weathering and erosion work together to change the environment. In nature, large things get broken down into smaller things over time. Boulders become sand and mountains become hills.

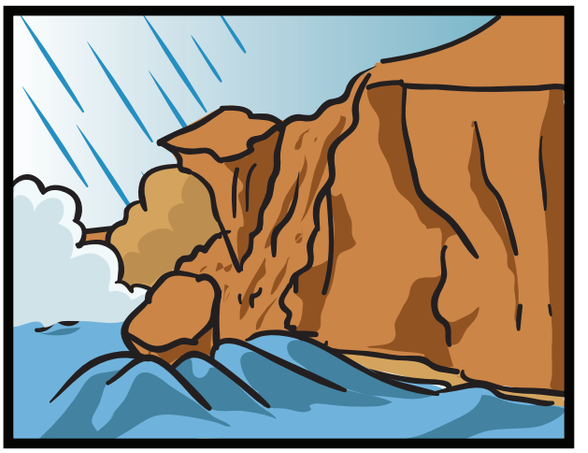
Weathering

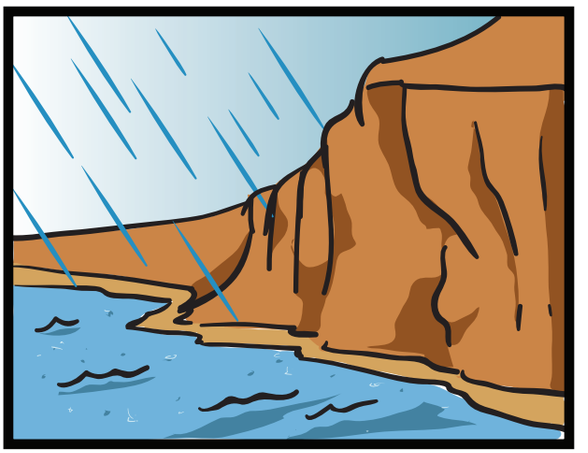
Weathering is what breaks down rocks and boulders and turns them into tiny pieces called sediment. There is no movement in weathering. Weathering can happen for three different reasons: plants and animals, strong weather, or chemical changes in the earth or air.

Erosion

Erosion is what moves the soil and tiny rocks that weathering leaves behind. Erosion can happen because of gravity pulling soil downhill, or because of strong weather like rain or wind.







What is happening in this picture? Which part of the scene is "weathering" and which part is "erosion"? What caused the weathering and erosion in this picture?

WEATHERING & EROSION

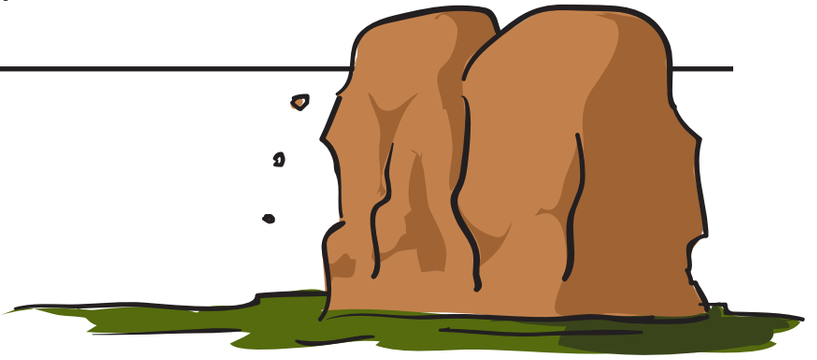
Weathering is what breaks down rocks and boulders and turns them into tiny pieces called *sediment*. There are three main types of weathering.

Types of Weathering

Physical Weathering / Mechanical Weathering is when nature plays a part in breaking down big rocks or mountains. There are no chemical changes in this type of weathering. Can you think of 3 types of weather that could break down rocks and soil into smaller parts?

Chemical Weathering is when chemical reactions break down big rocks or mountains. One example of chemical weathering is acid rain, which happens when gases like nitrogen or sulfur are in the air.

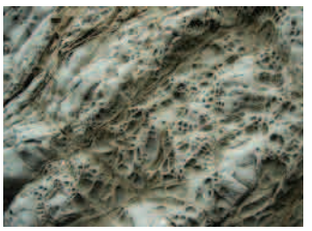
Biological Weathering / Organic Weathering is when living things break down big rocks or mountains. This type of weathering is usually a combination of chemical and physical weathering. Can you think of 3 living things that could break down rocks and soil into smaller parts?



WEATHERING & EROSION

Take a look at the pictures below. Can you tell which type of weathering caused each of these things? Use your knowledge of the different types of weathering to help you make an educated guess for each picture.

Mechanical/Physical



Chemical

Biological

Word Bank

salt crystals	*ants*	*wind*
oxidation(rust)	*Water dissolving minerals*	*bees*

Soil

Let's study the earth by learning about the part of it that we are most familiar with: the ***soil***. Soil is found on the upper-most layer of the earth's crust.

What is soil?

Soil is a mixture of four main ingredients: weathered rock, organic matter, air and water. The weathered rock can be in the form of sand, silt, clay, pebbles or larger rocks. Organic matter can be anything from old leaves, dead animals and plants, to microorganisms—tiny living things, like bacteria. The last two ingredients are air and water. Without air and water, the microorganisms found in soil cannot live, grow, or help dead matter to decay.

Why is soil so important?

Soil is important because it provides a place where organisms and bacteria can live. Plants rely on soil for nutrients, water and mineral salts. Plants in turn provide the oxygen we breathe, the food we eat, the clothes we wear, and the foundation and building materials we use to make our homes. We could not meet our basic needs without soil!

Comprehension: What is the main idea of these two passages?

Soil

Let's study the earth by learning about the part of it that we are most familiar with: the ***soil***. Soil is found on the upper-most layer of the earth's crust.

How is soil formed?

Soil is formed in several ways. The break down, or ***weathering***, of rocks is one way soil is formed. Water, wind and ice also help to create soil. Earth materials are carried by water, wind and ice, and are eventually dropped in places where they settle and mix with other materials to become soil. But the key ingredient to the making of soil is the living and once-living things that are found in it. These living and dead organisms are called ***organic matter***. They turn the sand, silt, and rock pieces into a mixture that is perfect for helping plants and animals to live and grow.

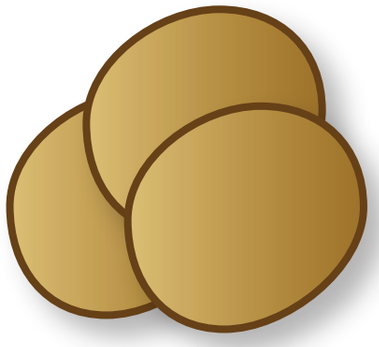
Did you know…
Tiny plants can break down big rocks!

Comprehension: List 5 things that can break down rock into soil.

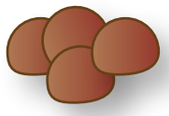
Types of Soil

Soil differs greatly from place to place, but all soil is made up of different amounts of three types of particles: sand, silt and clay.

What are the types of soil particles?



Sand is the largest particle found in soil. When you rub it, it feels rough and gritty. Sand does not have many nutrients, but it dries quickly after rainfall, and it is good for *drainage*, which means it lets water flow through it easily.



Silt is the medium-sized particle found in soil. Silt feels smooth and powdery when dry, and it feels slippery when wet. Silt can be packed down into a crust that makes it harder for water and air to pass through it.

Clay is the smallest particle found in soil. Clay feels smooth and hard as stone when dry, and it feels sticky when wet. While clay can hold many nutrients, it does not allow much air or water to pass through. Too much clay can make the soil heavy and not good for growing plants.

Loam is a mix of sand, silt and clay. It is the best type of soil for growing plants. Loam breaks up easily and holds moisture and nutrients, while still allowing some water and air to pass through.

Types of Soil

Response Questions

Which soil type can become hard as stone when dry? _____

Which soil type dries out quickly after a rainfall? _____

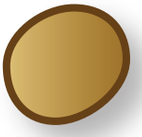
Which soil type would be best for building a structure? _____

Which soil type would a gardener need to break up every now and then to allow more drainage? _____

Which soil type would a cactus do well in? _____

TRY THIS!

Dig down at least six inches and grab a handful of soil. Soak it with water and roll it into a ball in your hand.



Sand

If you cannot make a ball out of it, it is mostly ***sand***.

Silt

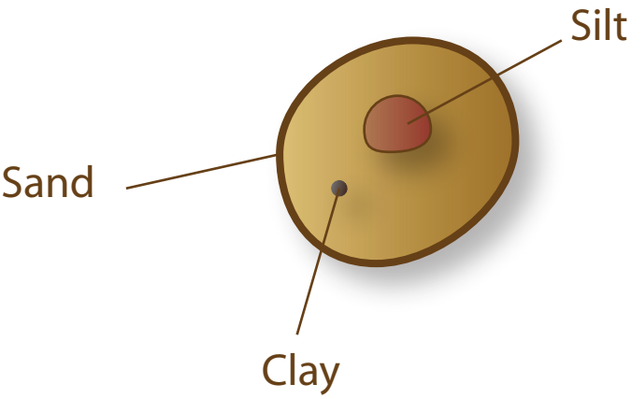
If it forms a loose ball but crumbles when squeezed it is mostly ***silt***.

Clay

If it forms a packed ball and can be reshaped into a snake, it is mostly ***clay***.

Types of Soil Textures

Soil differs greatly from place to place, but all soil is composed of varying amounts of clay, silt, and sand. You can determine the components of soil by feeling its texture, which is based on the size of its particles.



Soil Characteristics

Finish this chart by filling in the textures and sizes for each type of soil particle.

	Clay	Silt	Sand
Texture			
Particle Size			
Advantage	holds onto water and nutrients	allows some drainage and holds nutrients	good drainage, air passes through it easily
Disadvantage	gets heavy with water, hardens when dry	easily packed down, causing less water and air to pass through	does not hold nutrients

Soil Shake Up

You can do a simple shake test to find out how much clay, silt, and sand is in your soil. All you need is ***a jar with a lid***, a handful of ***soil***, and ***water***.

Soil shake-up activity!

Dig down about six inches and grab a handful of soil.

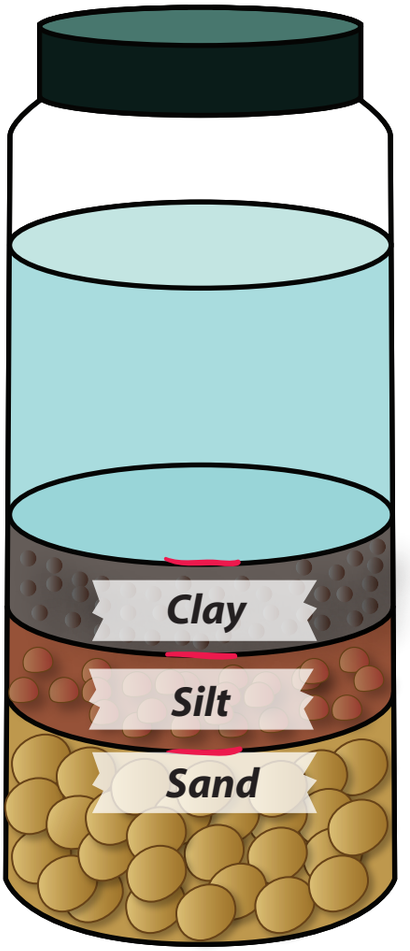
Put the soil into a jar. Fill it to the top with water and close the lid tightly. Shake the jar for a few minutes.

Set the jar down. Look for large particles of sand, which should settle at the bottom of the jar. Mark the top of this layer with a pen or tape.

Wait an hour. Look for a layer of smaller silt particles, which should settle above the sand. Mark the top of this layer.

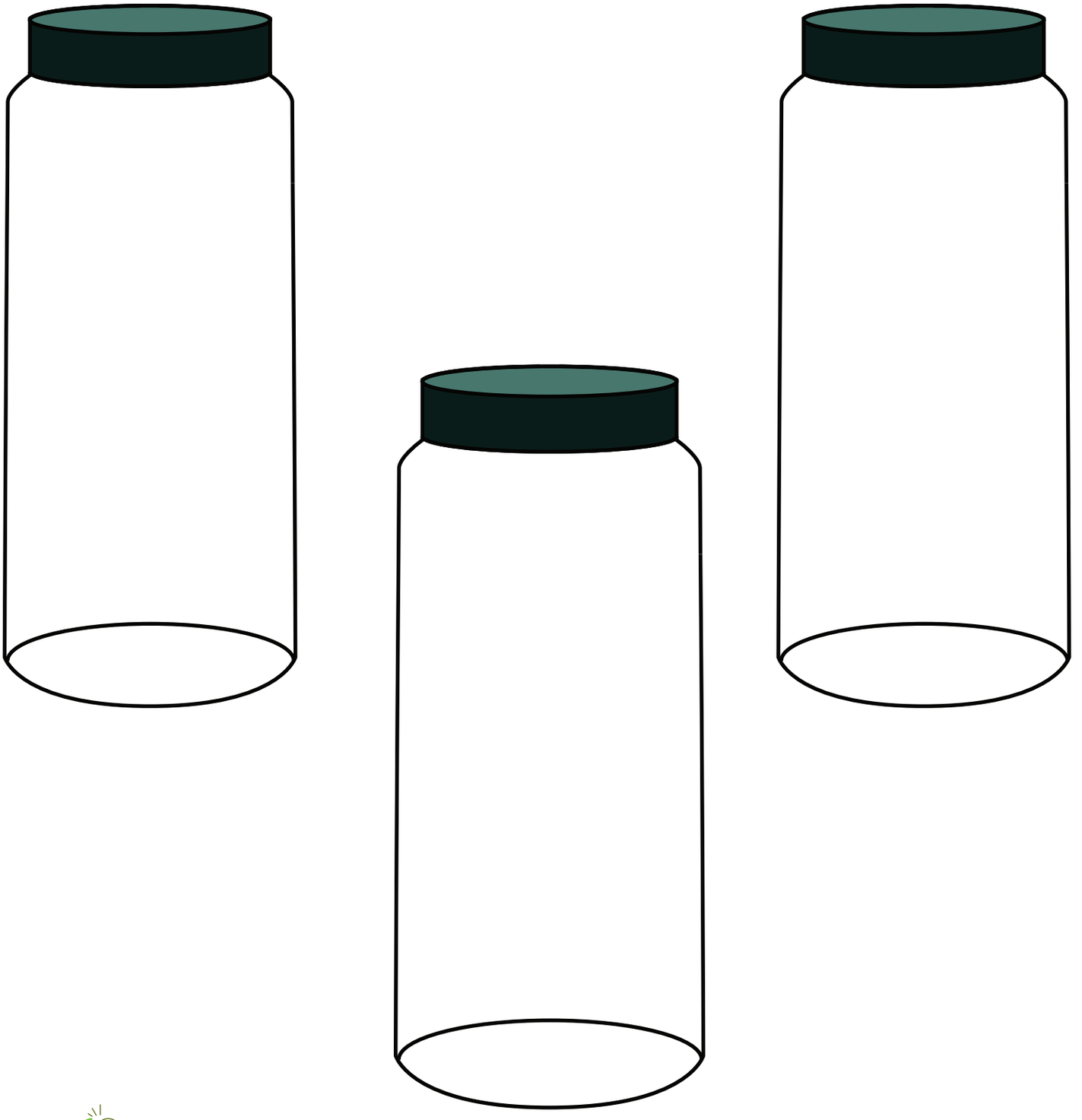
Wait a day and look at the jar again. The water should be clear. Look for a layer of the smallest clay particles to settle on top of the silt. Mark the top of this layer.

The size of the layers tells you how much sand, silt, or clay is in your soil.



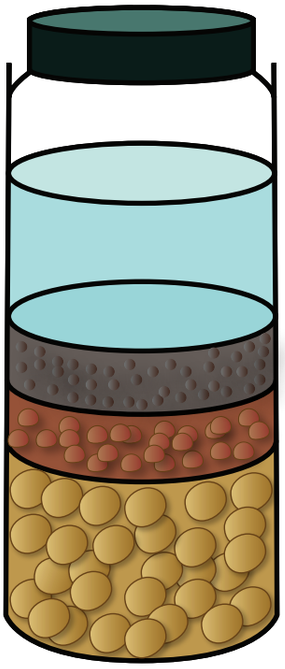
Soil Shake Up

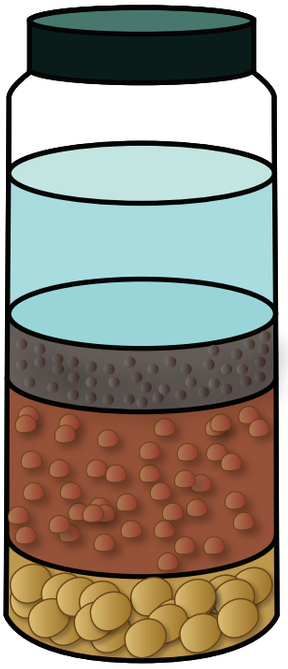
Here are some empty jars to draw your own soil layers.

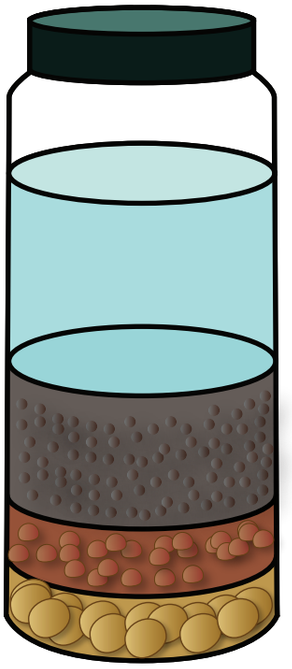


Soil Shake Up

Look at the three sample results below. For each jar, record whether the soil contains mostly ***clay***, ***silt***, or ***sand***.



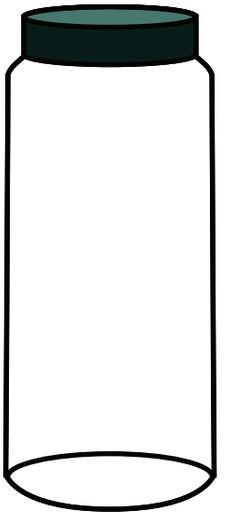




_____ _____ _____

Loam

The best soil for growing is loam. It has equal parts clay, silt, and sand. Draw what the results of the shake test will look like if your soil is loamy.



Soil Layers

Soil is made up of distinct horizontal layers. If you could take an elevator ride through the earth's surface you would pass several distinct layers.

What are the layers of soil?

The ***humus*** is the topmost layer of soil. It contains quite a bit of living material, plants, decaying leaves, needles, moss, and more. This layer is thin and very dark in color.

The ***topsoil*** is the next layer down. It is made mostly of minerals, and most plant roots live here. This layer is also dark in color due to the amount of decaying plant and animal matter.

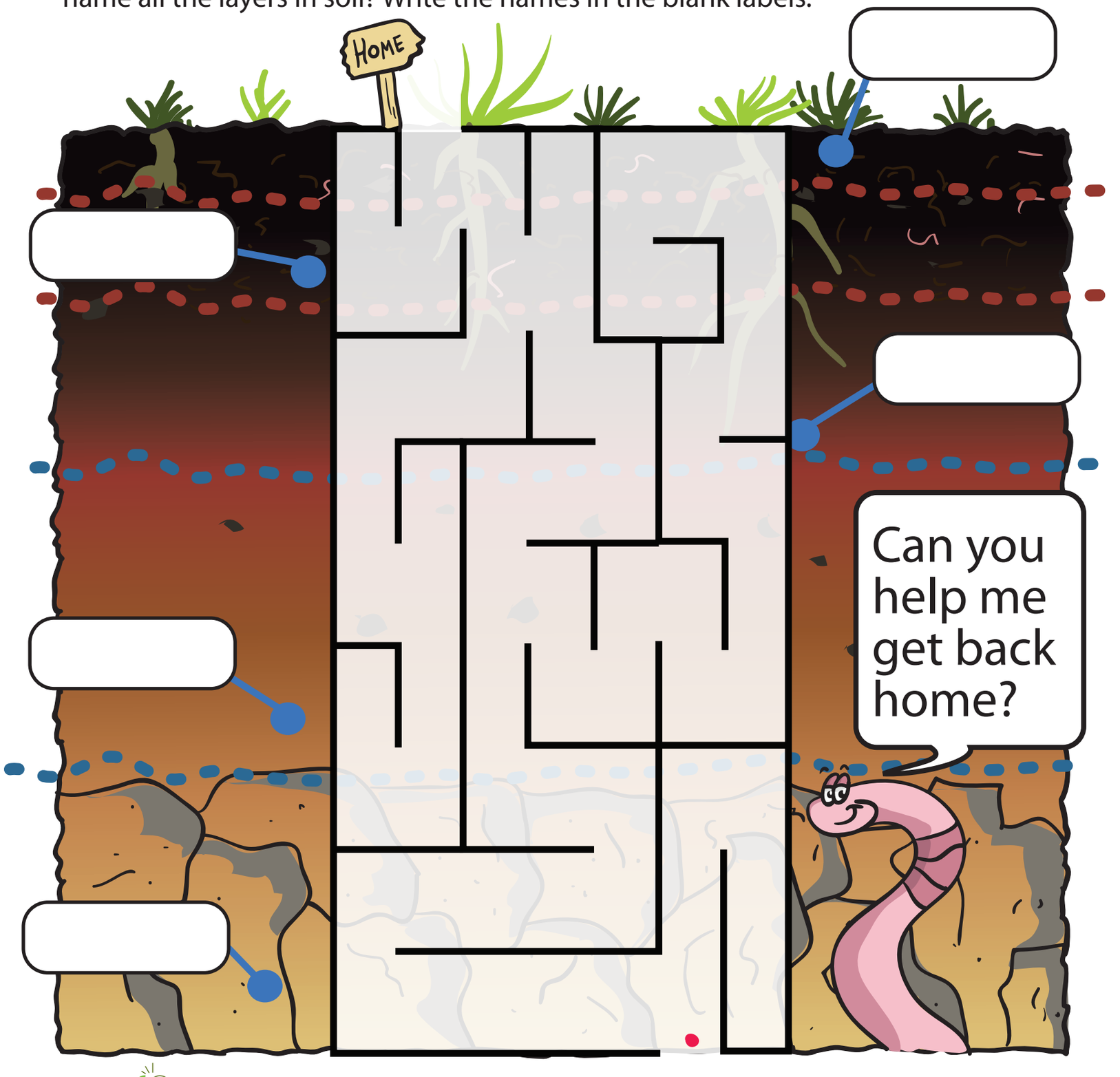
The ***subsoil layer*** is next. It is made of sand, silt and clay that have not been broken down all the way, so it usually has less organic material in it. It is also lighter in color.

The ***parent material*** is the next layer down. It is mostly rock that has been slightly weathered. Not many things live down here, except for the biggest tree roots.

The ***bedrock*** is the lowest layer of soil. It is a solid rock layer.

Soil

Let's play a game! Help Mr. Worm back up to the top, starting at the red dot. Can you name all the layers in soil? Write the names in the blank labels.



Soil

Let's play a game! Can you find all the words about soil? Circle them as you find them. Have fun!

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

Word Bank

Sand Silt Clay Loam Soil Compost Nutrients Organic
Decompose Humus Bedrock Weathering Erosion

COMPOST

What is compost?

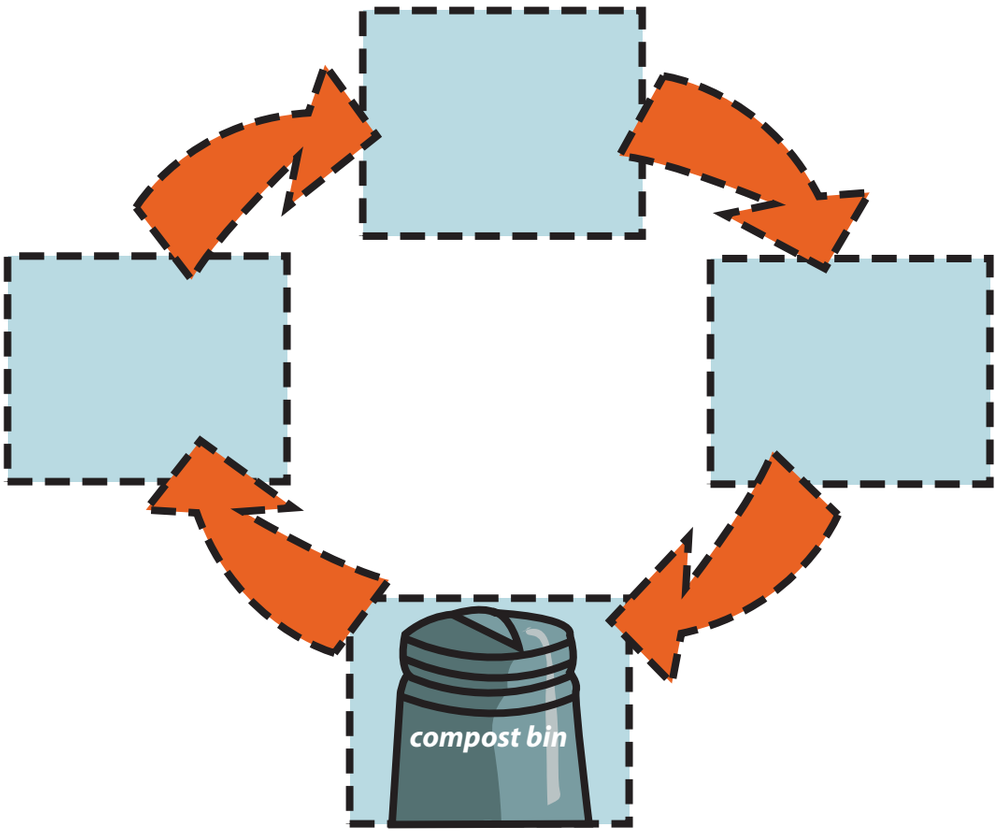
Compost is ***organic*** material that has been ***decomposed***. Organic material is anything from the earth – fruits, veggies, plants, dirt and more. When organic material decomposes, it breaks down into nutrients that fertilize the soil. Some people make their own compost to help their gardens or farm crops grow, but nature also makes its own compost! When plants die or when leaves fall from trees, they form ***mulch*** that protects the soil. Over time the dead leaves decompose into nutrients that feed the new plants. This is nature's way of recycling old materials.

DRAW THE CYCLE - The compost cycle is a type of life cycle, similar to the water cycle. Fill in the pictures to show each step of the compost cycle.

Organic – natural, living matter

Decomposed – when something is broken down into smaller parts

Mulch – a material, such as dead leaves or bark, spread around or over a plant to enrich or protect the soil



COMPOST

Compost is *organic material*—such as leaves, fruits and veggies—that has been *decomposed*, or broken down into smaller parts. Compost helps give nutrients to the soil, and helps make new plants grow. You can recycle leaves and other plant materials at home by setting up a compost bin!

Recipe for Compost

-Brown stuff
-Green stuff
-Air
-Water

The microorganisms (tiny living things, like bacteria or fungus) that recycle leaves and other plant parts need an even mix of brown stuff and green stuff to munch on.

Brown stuff is dead, dried plant parts like leaves and pine needles. Brown stuff is high in the element carbon, which will help provide energy to this mix.

Green stuff is fresh, living parts like grass clippings, kitchen vegetable scraps, weeds and other plants. Green stuff is high in the element nitrogen, which helps produce more protein.

Air and water are two key ingredients to help the microorganisms in the compost to live and work. The material in your compost bin cannot work if it is sealed off from any air or water source.

COMPOST

Good Compost Conditions

Selecting a spot

Find a nice spot in the yard to start your compost pile. It should be out of the way but easy to reach with plenty of room to work around. Some good places would be near your garden or in a back corner of the yard. It is also a good idea to choose a location close to a source of water.

TIP: Some people like to keep a mini compost bin in their kitchen to collect scraps of fruit and veggie peels, eggshells, coffee grounds and other kitchen waste. This is a great way to recycle kitchen trash that you normally throw away!

Building your compost pile

It's easiest to build a compost pile in layers of ingredients. Start with the brown stuff by spreading a layer of old leaves or pine needles about 6 inches thick. Next, add the green stuff, including grass clippings and scraps from your mini kitchen waste bin. Finally, sprinkle a shovelful of soil to add microorganisms into the pile.

Speeding up the process

The microorganisms in the compost take a long time to break down the organic material. If you want faster compost, you can mix the ingredients every few weeks. This is not necessary, but it can help the process.

Your Compost Pile

How big is your pile?_____

What does it smell like?_____

What kinds of things are in your compost?

_____

COMPOST

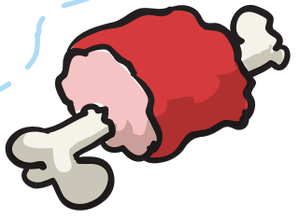
DOs and DON'Ts of Compost

What goes in your compost bin? Cut and paste the materials on page 2, and put them in the appropriate spots on this chart! Can you think of any more materials to add to the chart?

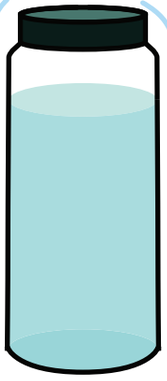
DO put in your compost	DON'T put in your compost

COMPOST

Cut out these items and place them in the correct spots on the chart.



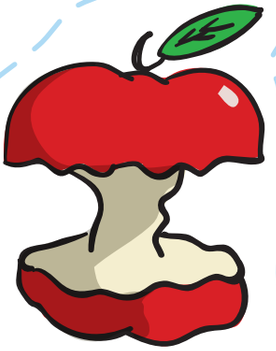
bones or meat



water

newspaper

leaves



fruit and vegetable scraps

dairy products:
milk, cheese or ice cream

oily foods

sawdust

grass clippings

COMPOST

What is compost?

_____

_____

_____

What are the 4 main ingredients in the recipe for compost?

_____

_____

_____

*Can you think of any items that **should not** be put in your compost?*

_____

_____

_____

What is "brown stuff" and what is "green stuff"?

_____

_____

_____

Great job!

_____

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