

Science, Health, and Technology

(2nd edition)

Level C: Grade 3+

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When you have an activity page or chart, you need to paste it carefully into your notebook. If it is a full-size sheet of paper, please fold the paper in half and put your glue along the top. (A glue stick works better in a notebook rather than the wet school glue that sometimes wrinkles the pages.)

Notes to Paste

The notes to cut and paste into your notebook have smaller print than the ones to copy by hand. They might be in a plain frame or not. They will usually have more sentences to read in the note compared to the shorter notes you would hand-copy.

They might also be in a different lettering style.

Sometimes, a note might also have the option of being traced if it is **"thick" and "grey"**.

Sometimes, a handout page might be a few paragraphs read to you with space for you to draw something. The letters on those pages will be smaller because an older person is to read that. Not all handout pages have a border around them like the example above but the core notes should have a border.

Remember to read and understand the large print on each page.

On your first page, print the word **Soils**. On part of the page, draw some things that you know already about soil. Then, have some fun and make some mud pies! If possible, try making mud pies out of sand, garden dirt, and rocky soil. Which soil types make the best mud pies?

First day: Make some mud pies using various kinds of soil in your backyard.

Second day: notes on soil...

Kinds of Soil

Soil is various kinds of rock pieces mixed with decaying (or already decayed) plant and/or animal body parts.

Loam soil contains a lot of decayed material. We call it "rich soil" because it has lots of this decayed material! It is good for growing crops and garden vegetables.

Decay means dead parts breaking up into smaller bits. It is also called decomposition. Decaying material can be things like banana peels, dead insects, leaves, rotten tomatoes, snake skins, and manure.

Gravel

Gravel is loose, somewhat smooth or rounded rock and mineral pieces.

Gravel can be sorted into 3 general sizes (sometimes by straining it through screens):

- small-sized gravel is called pebbles or granules
- medium-sized gravel is called cobbles or (“river rock”)
- large-sized gravel is called boulders

Gravel can be found near moving water and where icy, melting glaciers are moving (or have moved) over land.

Big machines dig in gravel pits to bring out gravel to be used in the construction industry. Gravel is used to build roads for vehicles.

When it is mixed with asphalt or cement, it can become pavement.

When it is mixed with sand (but not clay), water, and cement, it can make concrete blocks, sidewalks, or stairs.

The sand and gravel mixture is called aggregate.

Movement of Water Through Various Soil Types

Purpose: To see how fast water flows down different types of soil.

Materials:

- 3 drinking glasses
- Soil samples of sand, gravel, and loam (and optional – clay)
- 3 (or 4) – ½ cups of water (optional: colour the water with food colouring)
- 2-3 people to pour water at the same time

Hypothesis: Which soil do you think water will flow through the fastest? (circle one)

SAND GRAVEL LOAM CLAY (optional)

Experiment/Method:

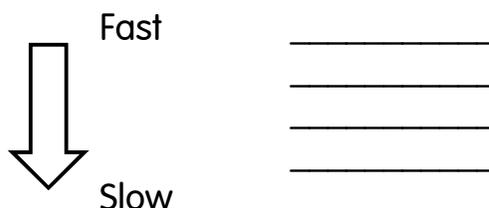
1. Fill each glass with a type of soil.
2. Pour ½ cup of water on the top of each glass at the same time.
3. Observe by looking through the glasses, which soil allows the water through to the bottom first, second, and third.

Observations: Record your observations in a simple chart in your notebook using the words “slow”, “very slow”, and “fast” to describe the flow of water.

Conclusion: Record what you learned from this experiment by writing a couple of sentences under the heading “Conclusion” about which was the fastest and which was the slowest and why (e.g because it had more cracks or was stickier, etc.). Also answer this question if you weren’t able to observe it directly:

How fast do you think water would flow down in a glass filled with clay soil?

Put in order the 4 types of soil according to how fast water moves through it: Clay, Gravel, Loam, Sand



More about Fertilizers and Soil Amendments

Three of the biggest nutrients that plants need from the SOIL are

NITROGEN (N), PHOSPHORUS (P), + POTASSIUM (K).

(Other important macronutrients include calcium, magnesium, and sulfur.)

Many people “feed” their farm crops, gardens, and lawns fertilizer to help them grow better. The labels on fertilizer bags in the store show how much of these 3 nutrients are in the bag in this order:

N-P-K

If the number says 20-5-5, that means that it has lots of nitrogen but very little phosphorus and very little potassium. Depending on what the soil has in it already, adults choose a fertilizer to feed the soil what it needs to work well for what it will be used for.

There are 2 kinds of fertilizers:

1. Inorganic Fertilizers are chemicals which sometimes also contain other chemicals that may be dangerous to human health. Care must be taken to apply the right amounts of the types of fertilizer that the plants really need to grow well, without making nearby water supplies polluted with too much fertilizer or harmful chemicals.



For example, if too much nitrogen runs-off into a stream, it can cause more weeds and water plants to grow bigger and fill in the stream so that fish cannot live there any longer.

2. Organic Fertilizers NATURALLY have a lot of good, useable N, P, or K in them. They include:

- animal manure (poop and pee)
- “green” manure (plants tilled in)
- compost (dead plants including wood products)
- dried animal blood (blood meal)
- crushed bones (bone meal)
- and dried, crumbled fish parts (fishmeal).

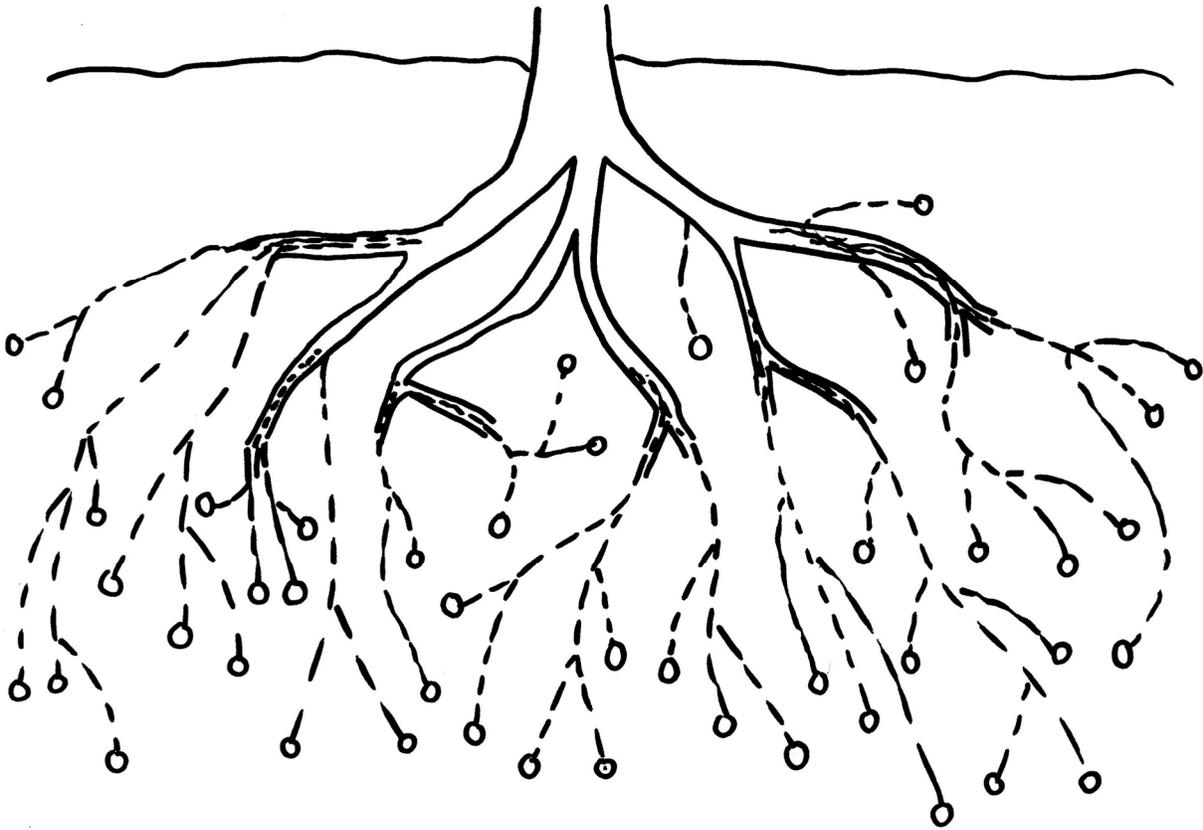
Animal-based products must be well-rotted or it can cause the living leaves to “burn” (die).

“Green manure” is the living plants which are tilled into the soil, roots, stem, leaves, and all, on purpose and then left in the ground to decompose there, instead of in a composter. To be really useful as “green manure”, the parts of the plants which would normally be eaten are NOT picked off – they feed the soil instead! In many places in Canada, people can grow 2 manure crops in a year in order to improve their soil to plant normally the next year. Some people have a plan where they grow green manure crops every few years in order to give the soil “a rest” and extra food to replenish nutrients. After all, if soil doesn’t have good nutrients, the plants will not grow as well and will not have as many nutrients in them for us to eat.

(Garden photos of green manure are in Appendix C – oats, peas, beans, and buckwheat.)

Peat moss is also called an organic fertilizer but is added some soils for the purpose of getting more air into it and soaking up extra water. Peat doesn’t have many nutrients to add to the soil like other fertilizers. A lot of people add peat moss to their gardens. It is very acidic so some people use it to change the colour of hydrangeas that you might sometimes see in a grocery store in the spring! 😊

Roots – How Plants Get Minerals from the Soil



AIR and **WATER** (which has minerals in it plus H, O, and C) and **FOOD** (food is the N, P, and K and other minerals in the soil) are dissolved in the water

absorbed through the root tips and get transported

UPWARDS

by a sucking pressure (called turgor pressure)
to all parts of the plant – the root, the stem, the leaves,
the flower, and the fruit!

(We can also see upwards sucking pressure working when we put a cut stem such as a carnation flower or celery stalk into water and food colouring.)