



Garden Lesson 5: The Dirt on Soil

SCIENCE

Observe, Investigate, Identify, Test, Question



MATHEMATICS

Measure, Calculate, Estimate, Sort



LANGUAGE ARTS

Comprehend, Read, Write



VISUAL ARTS

Draw, Colour



5.1 INTRODUCTION

The word *soil* refers to the mixture of air, water, minerals, organic matter, and living creatures such as bugs and worms that sustains plant life. Healthy soil is one of the key elements of a thriving and sustainable garden. While there are a few ways to increase soil health, one of the easiest and most accessible is to use compost.

Lesson 5 will walk through some at-home methods of testing garden soil composition to determine what it's made of, and identify which items can and cannot be composted for use in the garden.

Terms to Know

Soil contains three main types of minerals: **Sand**, **Silt** and **Clay**.

Sand		Soil containing more Sand is light and dry, which allows for easier growth underground and is preferred by many root vegetables.
Silt		Soil containing more Silt retains water and tends to be quite fertile, which is preferred by most plants.
Clay		Soil containing more Clay is heavy and retains water, but can be challenging to grow in.

Soil containing a balanced mixture of sand, silt and clay is referred to as **Loam**.

Organic matter provides nutrients to soil. It can be added to a garden through **compost**, which has the appearance of soil and is made by mixing carbohydrate-rich "**browns**" and nitrogen-rich "**greens**" with water, air and soil.

GREEN



BROWN



TIPS AND TOOLS

Worms are great for gardens! They create small tunnels that aerate roots and improve water flow through soil. They also increase the nutrients in the soil by digesting dead plant debris and expelling it as nutrient-packed "castings".

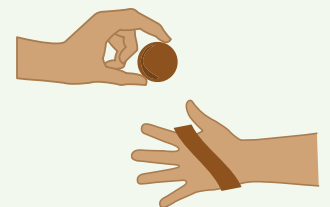
Follow [this guide](#) to start your own vermicompost bin.

5.2 SOIL COMPOSITION TEST #1

1. In your garden journal, write "Soil Tests" at the top of the next blank page with a sub-header "Test #1" underneath. The following activity will be completed under this header.
2. Take a handful of soil and add just enough water so it can easily form into a ball. Press a finger into the centre. Did the ball: **a)** break apart or **b)** stick together? Record the result.
3. Press the ball between your thumb and forefinger to make a long, flat shape like a ribbon. Did it: **a)** fall apart, **b)** make a ribbon between 2.5-5 cm in length before falling apart or **c)** make a ribbon longer than 5 cm? Record the result.
4. Repeat these tests with soil from a different spot in the garden as many times as desired to get an accurate picture of the soil across the entire garden. Compare the results.
5. Soil with more sand will fall apart easily, while soil with more clay will stick together. Based on this activity, guess whether your soil contains more sand, more clay, or a balance of both. Record your guess and proceed to the next test.

5.2 MATERIALS:

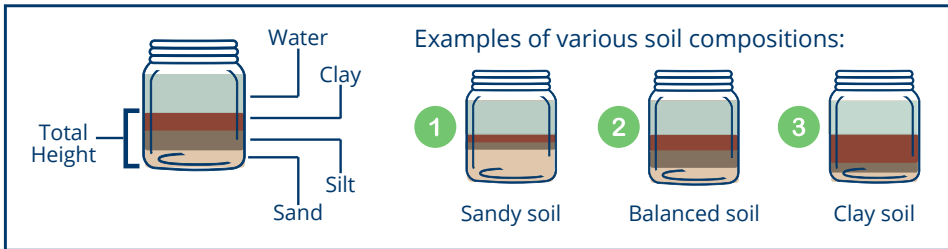
- Garden journal
- Pen or pencil
- Soil or dirt
- Water
- Ruler or measuring tape



5.3 SOIL COMPOSITION TEST #2

1. On the same page as Activity 5.2, create another sub-header: "Test 2". The following activity will be completed under this header.
2. Using a sieve or colander, sift a few handfuls of soil to remove rocks, sticks or other large debris. Fill an empty jar halfway with the sifted soil. Fill the rest of the jar with water, leaving about 3 cm of air space at the top.
3. Close the lid tight. Shake until soil and water are completely mixed. Set the jar aside somewhere it will not be moved or disturbed.
4. Check the jar after 24 hours. The minerals in the soil vary in weight, so they will settle in a specific order: sand at the bottom, silt in the middle and clay at the top.
5. Using a ruler or other measuring device, record the height of each of the three layers and the height of all three layers combined. If helpful, draw a sketch of the jar layers. On the same page, calculate the percent of each mineral contained in the jar.

5.3.1 EXAMPLE (MEASURING LAYERS):



5.3.2 EXAMPLE (CALCULATING PERCENTAGES):

Layer:	Sand	Silt	Clay	TOTAL
Height:	32 mm	32 mm	16 mm	80 mm

$$\% \text{ Sand} = \frac{\text{Height of sand}}{\text{Total height}} = \frac{32 \text{ mm}}{80 \text{ mm}} = 40\%$$

$$\% \text{ Silt} = \frac{\text{Height of silt}}{\text{Total height}} = \frac{32 \text{ mm}}{80 \text{ mm}} = 40\%$$

$$\% \text{ Clay} = \frac{\text{Height of clay}}{\text{Total height}} = \frac{16 \text{ mm}}{80 \text{ mm}} = 20\%$$

6. Based on this **Activities 5.2 and 5.3**, what is the soil composition in your garden: **a)** sandy soil, **b)** clay soil, or **c)** balanced soil? Was your guess from the previous activity correct?

5.4 GARDEN COMPOSTING 101

Using the chart on the right side of the page as a guide, decide which items below should be put into the garden compost bin. Colour each one and draw a line to connect it to the bin. Put an "X" over the items that should not go into the garden compost bin.



5.3 MATERIALS:

- Mesh sieve or colander
- Soil or dirt
- Mason jar (or upcycled jar, such as an old jam jar)
- Water
- Ruler or measuring tape
- Garden journal
- Pen or pencil
- Calculator

TIPS AND TOOLS

Although many things can go into the green bin or kitchen compost, only certain items should be added to a **garden compost** (see examples below).

Note: Anything added to the garden compost should be cut or broken into small pieces first.

GARDEN COMPOST BIN:

YES	NO
Fruit scraps	Meat or fish
Vegetable scraps	Dairy
Plant parts	Eggs
Eggshells	Bones
Coffee grounds	Fatty/oily foods
Tea bags	Pet waste
Dryer lint	Weeds
Cardboard	Large branches
Paper	Wood logs
Small twigs	Diseased plants
Tree bark	Pesticides

