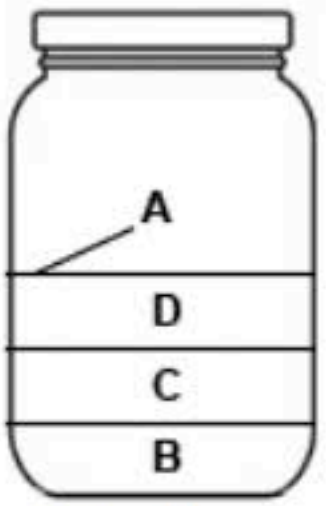
Soil Analysis Field Report

Part 1 - Soil Texture

The mineral component of soil is made up of different size particles called sand, silt, and clay. In this test, you will mix soil and water in a jar and then let the soil sink to the bottom so that these different size particles form different layers. By measuring the layers, you will be able to calculate the percentage of sand, silt, and clay in your soil. Follow these steps and record your measurements below.

1. Using a trowel or large spoon, fill your jar about one-third full of soil from 2-3 inches below the surface.
2. Shake the jar gently to level the soil, then measure the soil's depth (A).
3. Fill the jar nearly full of water and then shake it hard to mix the soil and water.
4. Place the jar on a table and wait for the soil to settle.
5. The largest and heaviest particles, called sand, will settle in less than a minute. Measure the depth of sand in the jar (B).
6. The medium-sized particles, called silt, can take hours to settle. Wait a day and then measure the depth of the silt layer (C).
7. The smallest particles, called clay, take even longer to settle, but you can assume that the depth of the clay layer (D) will be equal to the total depth of the soil minus the depth of the sand and silt layers; that is, A - (B + C) = D.



Sample location: _____

A. Soil Depth: _____

D. Clay Layer: _____

C. Silt Layer: _____

B. Sand Layer: _____

8. Now calculate the percentage of sand, silt, and clay using these equations.

(B ÷ A) x 100 = _____ percent sand (C ÷ A) x 100 = _____ percent silt

100 - (percent sand + percent silt) = _____ percent clay

The most productive soil, called *loam*, is approximately 40% sand, 40% silt, and 20% clay. How does your soil compare to loam?

_____

_____

_____

_____

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Part 2 - Soil Fertility

For thousands of years, farmers had to rely on their senses to determine if a soil was *fertile* — that is, whether it would be good for growing healthy crops. Today, most farmers use a soil testing laboratory to determine if their soil is fertile, but you can still learn a lot about soil by using your senses.

Conduct this soil fertility analysis when the soil is moist, about two days after a soaking rainfall or after you've watered the garden. Mark an X in the appropriate box for each soil test, then total the X's at the bottom of the chart. Remember to describe other colors you see in the soil in the space provided.

Soil Tests	Fertile	Average	Infertile
Air and Water			
Can you push a wire coat hanger into the soil?	Goes in easily	Can be pushed in	Coat hanger bends
How does a handful of moist soil feel?	Moist but not muddy	Somewhat dry or muddy	Very dry or very wet
How does the moist soil hold together?	Holds shape but crumbles easily	Breaks apart in clumps	Doesn't hold shape or hard to break up
Nutrients			
What color is the topsoil?	Black, dark brown	Light brown	Grey, yellow
What other colors do you see in the soil?			
How does the soil smell?	Fresh, earthy	No smell or dusty	Sharp, swampy, strange
Can you see organic matter in the soil?	Lots	Some	Not much
Can you see worms and other organisms?	Lots	A few	Almost none
Total (count X's for each column)			

Use the scale below to rate the fertility of your garden soil based on the results of your tests. Mark an X on the appropriate number.

Very Fertile — Not Fertile

10	9	8	7	6	5	4	3	2	1	0

Soil Colors

Black or dark brown soil is rich in organic matter and usually found in the top 4-5 inches below the soil's surface.

Light brown may indicate that the soil is dry and does not retain water efficiently, especially if you have conducted your tests soon after watering.

Grey or bluish-grey usually indicate that the soil is wet most of the year and does not drain water efficiently. This will reduce the amount of air in the soil, which reduces the oxygen available to organisms that produce nutrients from organic matter and slows oxidation of mineral nutrients like iron and manganese.

Purple or purplish-black soil has a high concentration of manganese, a plant nutrient essential for photosynthesis and root growth.

Orange or red soil has a high concentration of iron oxide — also known as *rust*. Iron oxide forms in soil that is alternately wet and dry, and may be a sign that the soil drains water efficiently. Iron oxide also provides plants with iron, another essential nutrient for photosynthesis. In some cases, however, a high concentration of iron oxide may be caused by iron rich rock beneath the soil and indicate a deficiency of other nutrients.

Yellow indicates a high concentration of acidic minerals in the soil, which can reduce the availability of phosphorus, a plant nutrient essential for "fruiting and rooting."

Soil Texture

Directions: Color the graphics below based on the percentages of soil types in each of the samples you collected.

Sample 1

Soil Textural Triangle

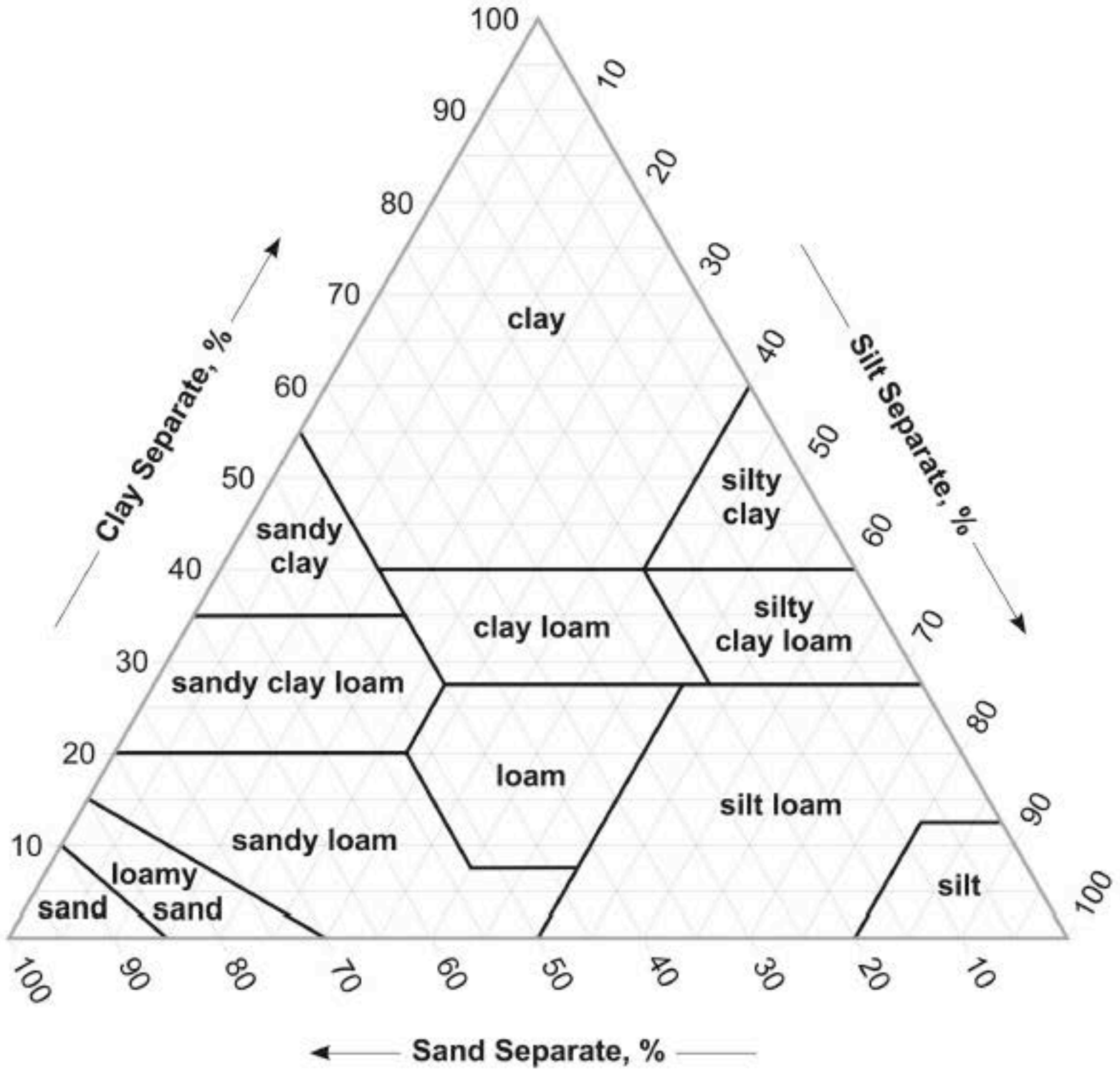

Image credit: USDA Natural Resources Conservation Service
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2_054311

Sample 2

Soil Textural Triangle

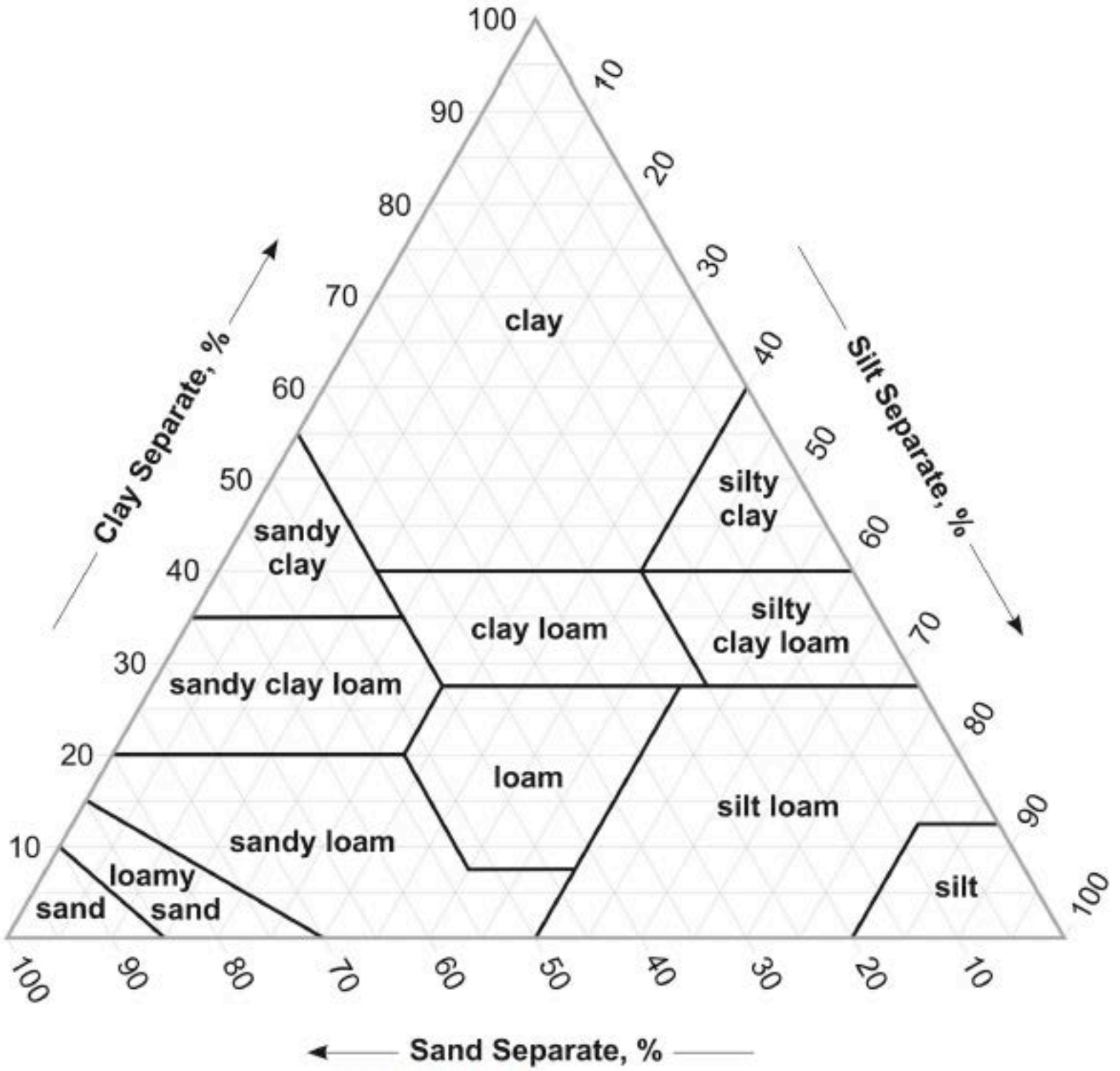

Image credit: USDA Natural Resources Conservation Service
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Soil Evaluation

Answer the following questions. If you need extra space, use additional paper from your notebook.

1. Give an example of why soil is an important natural resource.

2. Identify the four components of soil.

3. Name one characteristic for each of the different size particles found in soil — sand, silt, and clay.

4. Give an example of why it is important to know the texture and fertility of your garden soil.

5. Explain how a garden can help to produce healthy soil.