

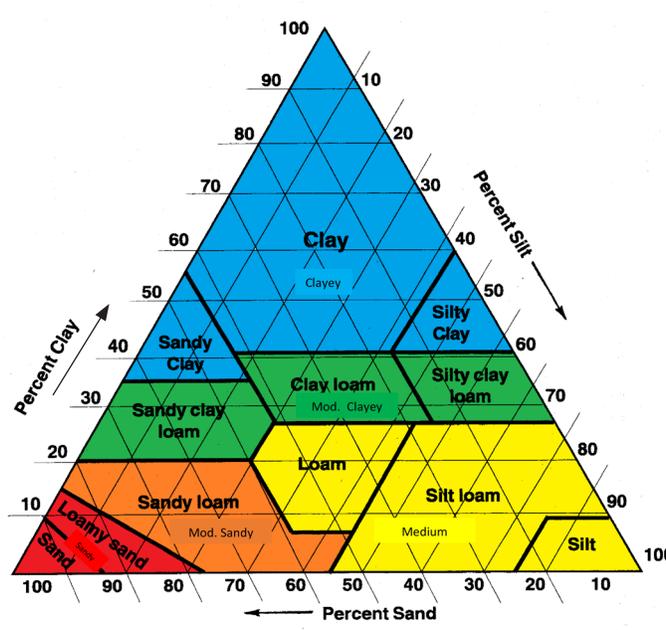
Soil Science Curriculum

Content and lab derived from the USDA-NRCS Guides for Educators. Go to www.nrcs.usda.gov/soils for the Guides and additional pictures and diagrams. This lesson plan was adapted for South Dakota from the University of Nebraska Institute of Agriculture and Natural Resources, CROPWATCH.

January 2018

Using Soil Textural Triangle

Approximately 45 minutes



The diagram is a ternary plot with vertices representing 100% of a component. The top vertex is 100% Clay, the bottom-left is 100% Sand, and the bottom-right is 100% Silt. The plot is divided into 12 soil texture classes: Clay (top), Silty Clay, Sandy Clay, Silty clay loam, Clay loam, Sandy clay loam, Loam, Silty loam, Sandy loam, Loamy sand, Mod. Sandy, Silt loam, and Silt (bottom-right). Intermediate lines are marked at 10% intervals for each component.

Objective
 By the end of the lesson, students will know or be able to:

- Use the soil textural triangle to distinguish between different types of soil

Preparatory Work

- Make necessary copies
- Review soil textural triangle use

Materials

- Soil Textural Triangle
- Guided Notes Page – one per student
- Guided Practice Page – one per student
- Answer key for teachers
- Three rulers or straight edges

Enroll the Participants - Use the Soil Textural Triangle to Distinguish between Different Types of Soil (Approximately 3 minutes)

Show a large picture of a Soil Textural Triangle to the class or give each student their own copy of the triangle. Ask if anyone has seen this before or how they believe it's used. Accept all answers until someone can identify it as a textural triangle used for determining soil texture.

Definition of Soil Texture

The weight proportion of the soil separates less than 2.0 mm in size (sand, silt and clay). Or, more commonly, the relative proportions of sand, silt and clay:

Sand = 2.0 to 0.05 mm

Silt = 0.05 to 0.002 mm

Clay = <0.002 mm

Sand, silt and clay in various proportions make up 12 soil texture classes

Using Soil Textural Triangle

Provide the Experience *(Approximately 5 minutes)*

Write the sample problem below on the board. Encourage students to work in small groups to determine the appropriate soil textural class. Allow groups to work together to solve the problem, wait until each group has determined the correct soil textural class.

Sample Problem:

75% Sand

15% Silt

10% Clay

Answer:

Sandy Loam

Congratulate students for their success in using the soil textural triangle.

Label the Information *(Approximately 10 minutes)*

After each group has successfully identified the soil textural class, explain to students that they will be writing a “How-to Guide” for this tool. In small groups, encourage students to write step by step instructions for using the soil textural triangle to accurately determine soil textural classes. After about five minutes, invite one group to share their “Soil Textural Triangle How-to Guide” with the class. Encourage each student to capture these instructions in their own words on their Guided Notes page.

Demonstrate the Relevance *(Time varies with students)*

Encourage students to work through the practice problems on the Guided Practice sheet. While students are practicing, move through the room offering support and encouragement to students that may find some challenges.

Review the Content *(Time varies with each group)*

When the majority of the class is finished, go through the problems as a group and check for understanding. Consider having each student provide an answer to ensure all students have grasped the material.

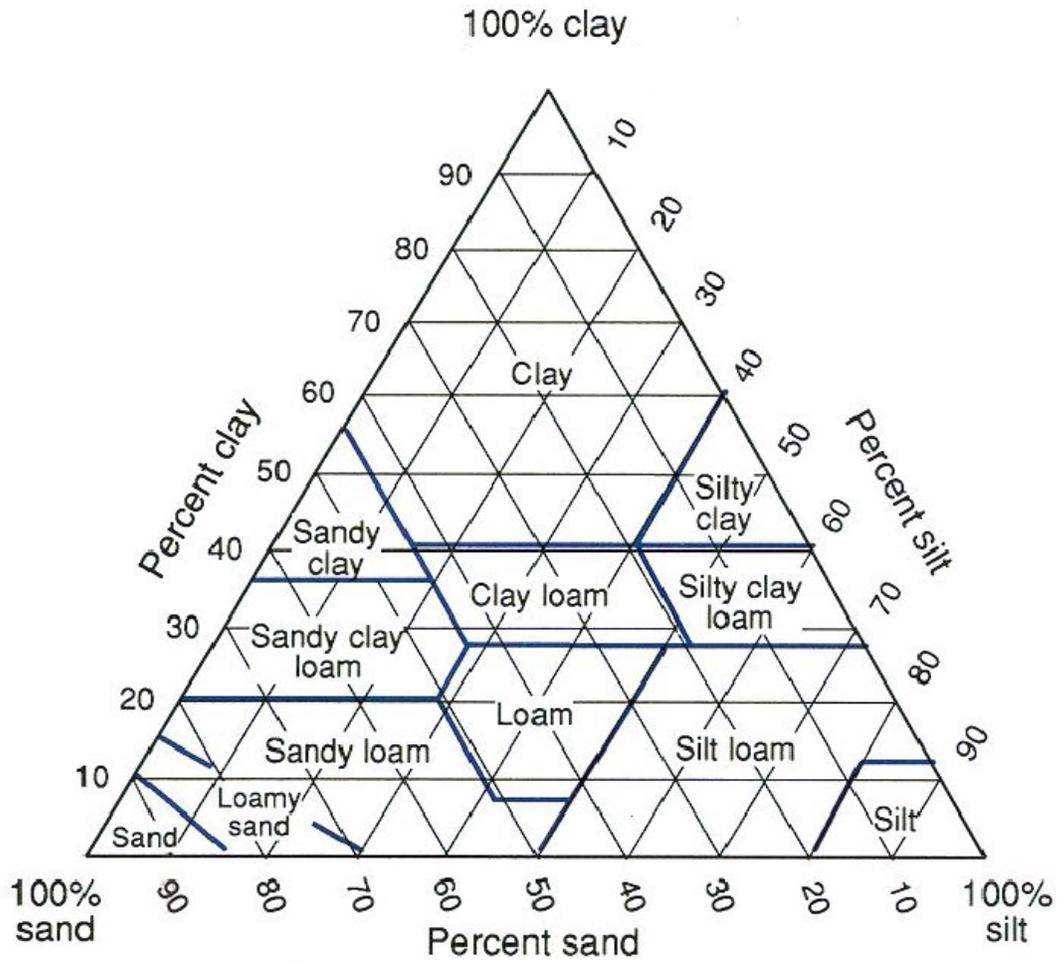
Celebrate Student Success *(Approximately 2 minutes)*

Thank students for their hard work and focus while demonstrating the use of a soil textural triangle. Congratulate students on their ability to determine appropriate soil textural classes as this is important in crop production, landscaping, and even construction. Explain that they will use this information as they determine soil texture and permeability in the land judging competition.

Using Soil Textural Triangle

Guided Notes: Soil Textural Triangle

Notes completed by _____



Soil Textural Triangle How-To Guide:

Using Soil Textural Triangle

Guided Practice: Soil Textural Triangle

Completed by _____

Determine the appropriate soil textural class using the soil textural triangle for each problem below:

1. 40% Sand
50% Silt
10% Clay

2. 70% Sand
15% Silt
15% Clay

3. 35% Sand
15% Silt
50% Clay

4. 20% Sand
60% Silt
20% Clay

5. 30% Sand
40% Silt
30% Clay

7. Which soil textural class do you believe is best for growing plants? Why?

6. Complete the chart using the soil textural triangle.

| % Sand | % Silt | % Clay | Texture |
|--------|--------|--------|---------|
| 5 | | 50 | |
| 27 | 35 | | |
| | 31 | 33 | |
| 22 | 23 | | |
| 10 | | 7 | |
| | 7 | 23 | |

Using Soil Textural Triangle

Guided Practice: Soil Textural Triangle KEY

Completed by _____

Determine the appropriate soil textural class using the soil textural triangle for each problem below:

1. 40% Sand
50% Silt
10% Clay

Silt Loam

2. 70% Sand
15% Silt
15% Clay

Sandy Loam

3. 35% Sand
15% Silt
50% Clay

Clay

4. 20% Sand
60% Silt
20% Clay

Silt Loam

5. 30% Sand
40% Silt
30% Clay

Clay Loam

6. Complete the chart using the soil textural triangle.

7. Which soil textural class do you believe is best for growing plants? Why?

Answers will vary. Consider there are three general categories of soil texture: coarse texture (sandy soil); medium texture (loamy soil); and fine texture (clay soils). Coarse soil texture soils warm up faster in the spring. Soils with finer textures hold water and nutrients better than coarse textures. Sandy soils usually have good aeration, but can't hold water well. So, both water and nutrients can easily leach through the soils. Clay soils retain more water and nutrients than sand, but there is little infiltration of the water and less oxygen for the plant due to smaller pore space than those of coarser textures. Loam is the ideal soil, holding water, nutrients, and oxygen in a balance of sand, clay and organic matter.

| % Sand | % Silt | % Clay | Texture |
|-----------|-----------|-----------|------------------------|
| 5 | 45 | 50 | Silty Clay |
| 27 | 35 | 38 | Clay Loam |
| 36 | 31 | 33 | Clay Loam |
| 22 | 23 | 55 | Clay |
| 10 | 83 | 7 | Silt |
| 70 | 7 | 23 | Sandy Clay Loam |