

## **Specified Practical Activities Strand 2 – Soils**

### **To Determine the Texture of a Soil Sample by Hand Testing**

1. Identify 2 safety precautions that should be followed when completing this experiment.
  
2. What is the independent variable in this experiment?
  
3. What is the dependent variable in this experiment?
  
4. What factors would you need to control to ensure a fair test?
  
5. Describe the method that you carried out.
  
6. What results would you expect for a sandy soil using this method?
  
7. What results would you expect for a clay soil using this method?

8. What type of data is collected in this experiment? Explain your answer.
  
9. Analyse why knowledge of soil texture is of agricultural importance?
  
10. Comment on the reliability of the results of this experiment.

**To Determine the Texture of a Soil Sample by Sedimentation**

1. What is the independent variable in this experiment?
2. What is the dependent variable in this experiment?
3. What factors would you need to control to ensure a fair result?
4. What type of data is collected in this experiment? Explain your answer.
5. Why is it important that the experiment is left overnight before recording the results?
6. What are the potential sources of error when collecting data in this experiment?
7. What measures can be taken to reduce the potential errors mentioned above?
8. Describe the method of using a soil texture triangle.

9. Draw a labelled diagram of the results that you obtained.

10. Which method for determining soil texture (hand testing or sedimentation) do you think is more reliable? Explain your answer.

**To Determine the Texture of a Soil Sample using a Soil Sieve**

1. What is the independent variable in this experiment?
  
  
  
  
  
  
  
  
  
  
2. What is the dependent variable in this experiment?
  
  
  
  
  
  
  
  
  
  
3. What factors would you need to control to ensure a fair result?
  
  
  
  
  
  
  
  
  
  
4. Why is it important that the soil sample is completely dry before sieving?
  
  
  
  
  
  
  
  
  
  
5. Describe the method for using a soil sieve.
  
  
  
  
  
  
  
  
  
  
6. What type of data is collected in this experiment? Explain your answer.
  
  
  
  
  
  
  
  
  
  
7. What are the potential sources of error when collecting data in this experiment?

8. What measures can be taken to reduce the potential errors mentioned above?
9. How would the size of soil particles affect the ability of soils to hold moisture?
10. Why might crops have difficulty growing in sandy or gravel-like soil?

**To Determine and Compare the Total Pore Space in a Compacted and Uncompacted Soil**

1. What is the independent variable in this experiment?
  
2. What is the dependent variable in this experiment?
  
3. What factors would you need to control to ensure a fair result?
  
4. Why is it necessary to tap the graduated cylinder for 20 seconds before recording the volume of soil?
  
5. What type of data is collected in this experiment? Explain your answer.
  
6. How might a soil become compacted in agriculture?
  
7. Why is pore space an important factor in agricultural soils?

8. What are the potential sources of error when collecting data in this experiment?
9. What measures can be taken to reduce the potential errors mentioned above?
10. How does the porosity vary with the compaction of soil?



**To Calculate the Percentage Water in a Soil Sample**

1. What is the independent variable in this experiment?
  
  
  
  
  
  
  
  
  
  
2. What is the dependent variable in this experiment?
  
  
  
  
  
  
  
  
  
  
3. What factors would you need to control to ensure a fair result?
  
  
  
  
  
  
  
  
  
  
4. Why is the soil sample placed in an oven at 105°C?
  
  
  
  
  
  
  
  
  
  
5. Why should the experiment be repeated a number of times?
  
  
  
  
  
  
  
  
  
  
6. Identify 2 safety precautions to follow when carrying out this practical activity.
  
  
  
  
  
  
  
  
  
  
7. What are the potential sources of error when collecting data in this experiment?

8. What measures can be taken to reduce the potential errors mentioned above?
9. What type of data is collected in this experiment? Explain your answer.
10. Analyse the importance of soil moisture content in agriculture.

### To Demonstrate Capillarity in a Compacted and Uncompacted Soil

1. What is the independent variable in this experiment?
2. What is the dependent variable in this experiment?
3. What factors would you need to control to ensure a fair result?
4. Draw a labelled diagram of the set-up of this experiment.
5. What are the potential sources of error when collecting data in this experiment?
6. What measures can be taken to reduce the potential errors mentioned above?

7. Describe the results that you obtained for a compacted soil.
8. Describe the results that you obtained for an uncompacted soil.
9. Define the term capillary action.
10. Would you expect greater capillarity in clay soils or sandy soils? Explain your answer.

**To Compare the Infiltration Rate of a Compacted Soil and an Uncompacted Soil**

1. What is the independent variable in this experiment?
  
  
  
  
  
  
  
  
  
  
2. What is the dependent variable in this experiment?
  
  
  
  
  
  
  
  
  
  
3. What factors would you need to control to ensure a fair result?
  
  
  
  
  
  
  
  
  
  
4. Draw a labelled diagram of the equipment used in this experiment.
  
  
  
  
  
  
  
  
  
  
5. What type of data is collected in this experiment? Explain your answer.
  
  
  
  
  
  
  
  
  
  
6. Using the results of the infiltration tests, describe how soil compaction influences water flow through soil.

7. Why is soil infiltration important?
8. Suggest how farmers could improve the infiltration rate of their soil.
9. What are the potential sources of error when collecting data in this experiment?
10. What measures can be taken to reduce the potential errors mentioned above?

**To Show Flocculation in a Soil Sample**

1. What is the independent variable in this experiment?
  
2. What is the dependent variable in this experiment?
  
3. What factors would you need to control to ensure a fair result?
  
4. Why is deionised water used in this activity?
  
5. Describe the method that was carried out.
  
6. What reagents/chemicals effectively cause flocculation in soil?

7. What is meant by flocculation?
  
  
  
  
  
  
  
  
  
  
8. What can a farmer do to cause flocculation in their soil?
  
  
  
  
  
  
  
  
  
  
9. Is the data collected quantitative or qualitative?
  
  
  
  
  
  
  
  
  
  
10. Comment on the reliability of the results obtained.



**To Demonstrate Cation Exchange Capacity in a Soil**

1. Identify 2 safety precautions that should be considered when completing this experiment.
  
  
  
  
  
  
  
  
  
  
2. How should the potassium chloride be added to the soil sample?
  
  
  
  
  
  
  
  
  
  
3. What is the function of the ammonium oxalate?
  
  
  
  
  
  
  
  
  
  
4. What indicates a positive result for calcium in the leachate?
  
  
  
  
  
  
  
  
  
  
5. Why are calcium ions present in the leachate?
  
  
  
  
  
  
  
  
  
  
6. Draw a labelled diagram of the apparatus used in this experiment.

7. What type of data is collected in this experiment? Explain your answer.
8. How could the leachate be tested for the presence of potassium ions? What colour indicates a positive result?
9. Explain what is meant by Cation Exchange Capacity.
10. Why is cation exchange capacity important in agricultural soils?

To Determine the pH of a Soil Sample

1. What is the independent variable in this experiment?
  
2. What is the dependent variable in this experiment?
  
3. What factors would you need to control to ensure a fair result?
  
4. Why is deionised water used in this activity?
  
5. Draw a labelled diagram of the apparatus used in this experiment.
  
6. What type of data was collected in this experiment? Explain your answer.
  
7. Why is knowledge of soil pH an important factor when growing crops?

8. How can a farmer alter the pH of their soil?
  
  
  
  
  
  
  
  
  
  
9. Do you think using universal indicator solution or a pH meter is a more accurate method of determining soil pH? Explain your answer.
  
  
  
  
  
  
  
  
  
  
10. What are some environmental issues related to soil pH?

**To Determine the Percentage Organic Matter in a Soil Sample and Convert that to Organic Carbon**

1. Identify 2 safety precautions that must be followed when completing this experiment.
  
  
  
  
  
  
  
  
  
  
2. Why must the soil sample be dry before commencing this experiment?
  
  
  
  
  
  
  
  
  
  
3. How did you identify that all the organic matter had been burned from the soil sample?
  
  
  
  
  
  
  
  
  
  
4. Draw a labelled diagram of the apparatus used in this experiment.
  
  
  
  
  
  
  
  
  
  
5. What type of data is collected in this experiment? Explain your answer.

6. What are the potential sources of error when collecting data in this experiment?
7. What measures can be taken to reduce the potential errors mentioned above?
8. What are the benefits of organic matter in agricultural soil?
9. How could a farmer increase the amount of organic matter in their soils?
10. Comment on the importance of soil organic carbon in agriculture.

## To Isolate and Grow Bacteria from Clover Root Nodules

1. Name the type of bacteria found in the root nodules of clover.
2. This is an example of a symbiotic relationship. Explain the underlined term.
3. Aseptic technique is used in this experiment. What is meant by aseptic technique and why is it important in this activity?
4. Identify 2 safety precautions that you followed throughout this activity.
5. What control was used in this experiment?
6. Nutrient agar plates are used in this experiment. What are nutrient agar plates and what are their purpose?

7. Describe how you incubated the agar plates.
8. What type of data is recorded in this experiment? Explain your answer.
9. What did you observe on the agar plates at the end of the experiment?
10. Discuss the benefits of the inclusion of clover in a grassland sward.



### To Show the Activity of Earthworms in a Soil

1. What is the independent variable in this experiment?
2. What is the dependent variable in this experiment?
3. What factors will be controlled in this experiment?
4. Identify 2 safety precautions that should be followed when completing this activity.
5. Describe how you set up the wormery.

6. Why is it important that the wormeries are left in a quiet place for the duration of the experiment?
  
  
  
  
  
  
  
  
  
  
7. What results were observed in each wormery?
  
  
  
  
  
  
  
  
  
  
8. What type of data is collected in this experiment? Explain your answer.
  
  
  
  
  
  
  
  
  
  
9. Discuss the benefits of earthworms in an agricultural soil.
  
  
  
  
  
  
  
  
  
  
10. What are the ideal soil conditions for earthworms?

**To Determine the Population of Earthworms in a Pasture**

1. Why is a clippers used to remove vegetation within the quadrat?
2. What is the purpose of the washing-up liquid in this experiment?
3. Why is the experiment repeated in a number of areas within the field?
4. Describe how you applied the washing-up liquid solution to the sample area.
5. What type of data is collected in this experiment? Explain your answer.
6. Identify ways in which a farmer could increase the earthworm population in a pasture.

7. Would you expect there to be a greater population of earthworms in a clay soil or a sandy soil? Explain your answer.
8. Would you expect there to be a greater population of earthworms in a tilled field or grassland? Explain your answer.
9. Identify 2 safety precautions that you followed when completing this activity.
10. Draw a labelled diagram of the apparatus used in this experiment.