

Class:7	Subject: Science	Topic: Soil
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SUMMARY SHEET		
Pedagogical Approach: Student – led		
Learner Previous Knowledge	Soil is made from weathering of rocks due to natural factors like wind water, temperature and erosion.	
Target Knowledge for this Topic	Soil Profile Uses of Soil Soil Types Percolation Rate of water in soil Moisture in soil Absorption of water by soil Soil and crops	
Learning Goals		
More Complex Learning Goal- Students will be able to infer the type of soil or crops which can be grown in specific kind of soil from the given data and find out rate of percolation of water in soil.		
Target Learning Goal- Students will be able to describe soil profile, characteristics of soil and variety of crops grown in different types of soil.		
Simpler Learning Goal- Students will be able to give uses of soil, name the layers in soil profile and list crops grown in different kinds of soil.		
Period No.	Lesson Objectives	Teaching Learning Materials Required
1	List uses of soil and identify components of soil through an activity.	- Board and markers - Worksheet 1 - Activity material: (for each student) sample of soil, newspaper
2	Identify and explain layers of soil.	- Board and markers - Worksheet 2 - Experiment: (for every group): soil sample, glass tumbler, water

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3	Describe the soil profile and different types of soil.	- Board and markers - Worksheet 3 - Activity: soil sample, water
4	- Find out the percolation rate of water. - Understand that soil have moisture in it - Understand the absorption of the water by the soil.	- Board and Markers - Worksheet 4 - Activity- (for each group) iron or PVC pipe of about 20 cm in length (you may use a plastic jar whose bottom has been cut off), water, measuring cup
5	Describe the type of soil needed to grow different types of crops.	- Board and markers - Worksheet 5

Lesson Plan 1

Lesson Objectives

At the end of this lesson students will be able to:

- List uses of soil and identify components of soil through an activity

Teaching Learning Materials required

- Board and markers
- Worksheet 1
- Activity material: (for each student) sample of soil, newspaper

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 or 5

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Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> Introduce the topic	<u>Introduction to the topic</u> - Introduce the topic of soil by posing questions such as: - Where do you find soil? - How is soil useful? - We cannot live without soil. Do you agree with this statement? - Name some objects which need soil to make them. - Collate their responses on the board. - Now inform the students that they will observe the soil samples and answer some questions based on their observation.
Lesson Middle <u>Time:</u> 25 min <u>Purpose:</u> Develop conceptual understanding	<u>Activity & Videos</u> - Distribute Worksheet 1 to all the groups. Ask them to do the activity which is simple and does not take much time. - Ask the students of a group to observe the soil sample that each one of them has brought, carefully. - The students must now answer the questions in the Worksheet. - Ask the groups to attempt questions based on it. - Let the groups now share their responses and brainstorm for the answers. - Collect all the answers and ensure that they arrive at a common consensus.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish up	<u>Finish Up</u> Clear doubts of the students.

Worksheet: 1

Skill: Spirit of Inquiry

Activity

Material: sample of soil, newspaper

Instructions

- Put the sample of the soil on the newspaper.
- Observe it carefully and fill in the observation table.

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- Now observe the samples brought by your team members.
- Let each member do this activity individually.

Observation Questions

- Are all the soil samples collected by your group members, similar or different?

- What is the use of the soil that you have collected from? _____

Place from where soil was obtained	Plants that you may find in the soil [eg. twig] (if any)	Animals that you may find in soil [eg. beetle] (if any)	Any matter which is not living

Part 2

- What are the factors which have led to soil and Earth pollution? Name any three.

- How does plastic contribute to soil pollution?

- How can we control soil pollution?

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Lesson Plan 2

Lesson Objectives

At the end of this lesson students will be able to:

- Identify and explain layers of soil.

Teaching Learning Materials required

- Board and markers
- Worksheet 2
- Experiment: (for every group): soil sample, glass tumbler, water

(Note to the facilitator: This class may be carried out in the school garden.)

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4-5 each in the school garden

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Activate prior knowledge.	<u>Brainstorming</u> • Ask the students what would happen if there is no soil. Reiterate the importance of soil by collating all responses and ensuring that the class is in consensus. • Have a brief brainstorming session in which you may pose questions such as: ○ What do you think soil is made of? ○ How is soil made, according to you? ○ Are soils from different places similar or different? • Inform the students that they will now find out what soil is made of through an experiment.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u>	<u>Experiment</u> • Distribute Worksheet 2 to all the students and also distribute items for the experiment. • Let them follow the instructions and do the activity. • Ask them to record their observations. • They must now attempt the questions given in the worksheet part of Worksheet.

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Develop conceptual understanding	- Let there be a whole class discussion in which the conclusions as well as the answers are discussed. - Arrive at a common consensus.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish Up	<u>Finish Up</u> - Wrap up the class by clearing any doubts. Home Assignment - Give part-2 of the worksheet as home assignment.

Worksheet -2

Skill: Drawing Inferences

Experiment

Material: [for each group] soil, glass tumbler, water

Instructions:

1. Break the soil and make it into a powder.
2. Fill the glass tumbler half with water.
3. Add the soil to it and stir well with a stick.
4. Let the water stand undisturbed for some time.
5. Observe the tumbler now.

Observation questions:

1. What do you see in the tumbler? Layers of soil or a single layer of soil?

2. Besides soil do you see anything else such as dead leaves or animal remains of tiny animals like beetle or ants? _____

Information:

- Rotting and decaying dead matter in the soil is humus. Humus makes the soil rich in nutrients and ideal for growing plants.
- Soil is formed by a process in which rocks are broken down to smaller and smaller pieces by different agents such as wind, rain and climate. This process is called **weathering** of rocks.
- A vertical section where different layers of soil are seen is called soil profile.

1. Draw a diagram showing different layers that you observed in the tumbler when you mixed soil with water.



2. Do you think soil holds water? Give reason for your answer.

3. If you do not have soil, you cannot have food to eat. Do you agree? Why?

4. Can soil be produced instantly naturally? Why?

5. The layers of soil that form when it is mixed with water are as shown below:



a) Compare it with your diagram that you drew in question 1 and label your diagram accordingly.

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b) Which layer, in the above diagram, can also be labelled as humus? Mark it.

6. Why do you think, gravel or small stones form the bottom most layer while clay forms the second layer?

Information

1. Soil is formed due to weathering of rocks. Rocks get broken into tiny pieces due to wind, water and climate.
2. Humus is rotten and decaying material in the soil.
3. Soil is needed to grow food and thus our very living is dependent on it.
4. Soils from different places are different.

Lesson Plan 3

Lesson Objectives

At the end of this lesson students will be able to:

- Describe the soil profile and different types of soil.

Teaching Learning Materials required

- Board and markers\
- Worksheet 3

Details of Teaching Learning Experience

Seating Arrangement: - Individual

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> Introduce the topic	• Discuss the homework given in the last class. • Ask them have they ever seen a pit being dug up for some well or hand pump. • Let them discuss their experiences.
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	Collate their responses on the board.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	- Discuss what happens when we dig deeper and deeper the Earth. - Explain the different horizons of soil profile with the help of the fig 9.3 given on the page number 98 of NCERT book. - Distribute the worksheet 3 to the students. - Let them to try to do the part 1 of the worksheet. - The whole class must arrive at a common consensus with respect to the answers.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> - Finish Up - Homework distribution	<u>Finish Up</u> - Wrap up the class by clearing their doubts. <u>Home Assignment</u> - Part 2 of Worksheet 3.

Worksheet 3

Skill: Drawing Inferences

Part 1

1. How can you see a soil profile?

2. How many layers are there in soil profile? What are their names?

3. What does top soil contain? What can you expect to find here?

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4. What is sub soil? How is it?

5. What does the lowermost layer have?

6. What is bedrock?

7. List the factors which affect the soil profile.

Information

- The **top soil** is marked as **A-horizon** in soil profile. It is rich in humus and minerals and it is very fertile. It supports growing of plants and trees. It is soft, porous and contains water. It provides shelter to animals like worms, beetles, moles etc.
- The **second** layer is called **sub soil** or **B horizon**. It is lighter in colour. It has less humus and more minerals. It is harder and compact.
- The **third** layer **sub stratum** is marked as **C-horizon**. It is made of rocks with cracks and crevices.
- Below the three layers is the **bedrock**. It is rocky and difficult to dig with spade.
- Soil is classified on the basis of the size of their particles. There are three types of soils: sandy, clayey and loamy.
- **Sandy soil:** The particles are big, there are large spaces in between the particles and it is light, aerated and dry.
- **Clayey soil:** The particles are small and stick together with very little space for air. The soil is heavy and can hold lot of water.
- **Loamy soil:** Loamy soil is a mixture of sand and clay. The size of particles is medium. It has humus in it and is very suitable for growing crops as it holds the right amount of water.

Part 2

1. Soil has several uses. How do the following find use soil?

a. farmer: _____

b. construction worker: _____

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- c. civil engineer: _____
- d. geologist: _____
- e. earthworm: _____
- f. bird: _____
- g. you: _____

Lesson Plan 4

Lesson Objectives

At the end of this lesson students will be able to:

- Find out the percolation rate of water.
- Understand that soil have moisture in it
- Understand the absorption of the water by the soil.

Teaching Learning Materials required

- Board and markers
- Worksheet 4
- Activity- (for each group) iron or PVC pipe of about 20 cm in length (you may use a plastic jar whose bottom has been cut off), water, measuring cup

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 or 5 on the school ground

Lesson Beginning <u>Time:</u> 5 min. <u>Purpose:</u> Recap the previous learning	<u>Homework discussion</u> • Discuss the uses of soil as given in the homework. Collect responses and enlist them all on a whiteboard. • Pour some water on the ground which has only soil. Pour similar amount of water in a place which is tiled. Ask the students to observe. Does the water flow or get absorbed identically in both cases? Collate the responses. • Inform the students that now they will do activity to find out a characteristic of soil which is percolation of water. • Ask students to find out the meaning of percolation from their dictionary.
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Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	<u>Experiment</u> • Distribute worksheet 4 to all students. • Let the students attempt the activity. • Let the students now attempt questions. • Now there can be a whole class discussion in which the answers of first part is discussed. Arrive at a common consensus. • Discuss the other properties of the soil also.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up • Homework Distribution	<u>Finish Up</u> • Finish up the discussion by clarifying any doubts. <u>Homework Assignment</u> • Part 2 of the worksheet.

Worksheet 4A

Skill: Drawing Inferences

Part 1

Activity

Material: iron or PVC pipe of about 20 cm in length (you may use a plastic jar whose bottom has been cut off), water, measuring cup

Note:

- *The pipes used by all groups must have the same diameter so that they can compare the result.*
- *All groups must perform this activity at different places on the ground so that they can get good comparison of result.*

Instructions

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1. Fix the pipe in the soil about 2 cm deep.
2. Measure 200 ml of water and pour it in the pipe.
3. Note the time when you start pouring water in the pipe.
4. When all water has percolated (penetrated the soil) or seeped in the soil, note the time again.
5. Ensure that water does not flow down the sides of the pipe or does not spill over.
6. If the pipe cannot hold 200 ml, pour as much as you can, wait for some time and then try again.

The rate of percolation can be calculated using the following formula:

Percolation rate (ml/min) = Amount of water (ml)/ Percolation time (min)

Suppose that the 200 ml water that you used in the activity took 10 minutes to percolate. Then,
rate of percolation= 200ml/10 min=20ml/min

The rate of percolation for my sample of soil is _____ml/min.

Part - 2

1. What is the meaning of percolation?

2. If a particular sample of soil takes 600 ml of water in 30 minutes to percolate soil, what is its percolation rate?

3. A sample of soil percolates 500 ml of water in 2 hours and 5 minutes. What is its rate of percolation?

4. Which soil will have highest percolation rate and which one will have lowest?

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Lesson Plan 5

Lesson Objectives

At the end of this lesson students will be able to:

- Describe the type of soil needed to grow different types of crops.

Teaching Learning Materials required

- Board and markers
- Worksheet 5

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4-5

Lesson Beginning <u>Time:</u> 5 min. <u>Purpose:</u> Develop conceptual understanding	• Pose the questions: ○ Does soil hold water? ○ Do all the soils absorb water to the same level or extent? • Collate the results and arrive at a consensus. • Pose the following questions: ○ Is the type of soil same at all places in India? ○ Will all kind of crops grow in any type of soil or does a particular soil grow only specific type of crops? • Let them answer the questions and collate them on the board.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	<u>Worksheet</u> • Ask them to read topic 9.7. • Distribute worksheet 5 to the students. • Let the students now attempt the questions based on it. • Let there be a whole class discussion on the questions of the Worksheet and ensure that all the students arrive at a common consensus.

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Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish Up	<u>Finish Up</u> Conclude the topic by clarifying doubts if the students have.
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Worksheet 5A

Skill: Comprehension

Part A

Answer the questions given below

1. List the factors affecting soil profile of a place.

2. Why is clayey soil very suitable for paddy crop?

3. Why does cotton need sandy-loamy soil?

4. Which soil is required for growing wheat?

Part B

Information

Clayey Soil- Crops which need lot of water and less air find clayey soil suitable for their growth. For example paddy crop or rice.

Sandy soil- On its own, sandy soil does not retain water and has lot of air. Such soil is not much suitable for crops. But when it is mixed with either clay or loam it is suitable to grow crops. For example, wheat grows well in sandy loamy soil.

Loamy soil- Loamy soil holds only adequate amount of water and rest of it gets drained out. This is suitable for lentils and pulses.

I Rank the following statements in order of their importance, according to you.

Soil is important to us...

- 1) to provide income for farmers, food companies, clothing companies, and grocers, to name a few.
- 2) as a surface for building roads, sidewalks, and the places where we live.
- 3) to provide food for livestock.
- 4) to walk on
- 5) to provide habitat to wildlife and insect
- 6) to provide rocks for building structures
- 7) to grow beautiful flowers
- 8) to grow plants for food, and to produce oxygen

II. Fill in the graphic organizer by identifying the crop in the box and filling in the type of soil suitable for its growth.



This is _____ crop and _____ soil is suitable for its growth.



This is _____ crop and _____ soil is suitable for its growth.



This is _____ crop and _____ soil is suitable for its growth.