

Class:8	Subject: Science	Topic: Friction
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SUMMARY SHEET		
Learner Previous Knowledge	Any push or pull is called force. Friction is a Contact Force	
Target Knowledge for this topic	Friction: What is friction? Causes of Friction Advantages and disadvantages of friction Ways to minimise and increase friction	
Learning Goals		
<i>More Complex Learning Goal-</i> Students will be able to analyse how friction works in any given situation.		
<i>Target Learning Goal-</i> Students will be able to describe friction its causes, list its advantages and disadvantages and also suggest ways to increase and decrease friction.		
<i>Simpler Learning Goal-</i> Students will be able to define friction and list ways to increase and decrease friction.		
Period No.	Lesson Objectives	Teaching Learning Materials Required
1	Define and explain friction.	• Board and markers • Worksheet 1
2	• Find out the cause of friction.	• Board and markers • Worksheet 2 • Activity: (per group): brick or block of wood, string, spring balance, table, sand paper, cloth, polythene
3	• Analyse and find out advantages and disadvantages of friction from given examples.	• Board and markers • Worksheet 3 • Reference sheet 1

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4 and 5	Identify types of friction and list the ways of reducing and increasing friction.	- Board and markers - Worksheet 4
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Period 1

Lesson Objectives

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

- Define and explain friction.

Teaching Learning Materials required

- Board and markers
- Worksheet 1

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 or 5

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Introduce the topic	<u>Introduction to the topic</u> • Let all the students sit in their group. Introduce the topic of friction by asking questions such as: ○ What happens when you kick a ball? Does it continue to roll or does it stop? ○ Why do you think it stops? • Ask the students to roll a pencil or pen on the table surface. Now ask them to roll it on a smooth piece of paper. Ask them to observe the difference. Pose the question? 'Why is there a difference between the movements of the rolling pencil on different surfaces? ' • Collate their responses verbally. • .
Lesson Middle <u>Time:</u> 25 min <u>Purpose:</u> • Develop conceptual understanding	• Distribute worksheet 1. • Let the groups now attempt the questions given in the worksheet. • There can be a whole class brainstorming for the answers. • Collect all the answers and ensure that they arrive at a common consensus.

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Lesson End <u>Time:</u> 5min <u>Purpose:</u> • Finish up • Homework Distribution	<u>Finish Up</u> • Clear doubts of the students. Home Assignment • Ask them to attempt the questions given in the homework part of the worksheet 1.
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Worksheet 1**Skill: Comprehension**

1. What would happen if there is no friction?

2. The force produced when two surfaces move against each other is called _____

3. Friction acts in the _____ direction of the movement of an object.

4. What type of surface will produce less friction? Give an example.

5. Arrange the following in decreasing order of friction that they will experience on a glass top table.
eraser, ice cube, pencil, plastic tube

6. Why is heat produced when you rub your palms together?

Homework

I. Fill in the blanks by choosing the correct options.

[Ice, skating, opposes, accelerates, friction, smooth, rough, left, right]

1. Friction is less on a _____ surface.

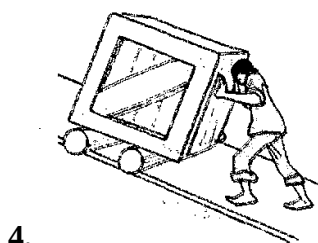
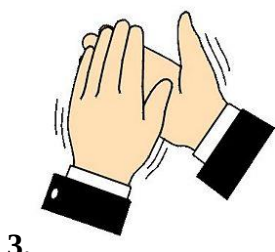
2. If you push an object from left to right, the force of friction acts from _____ to _____

3. Friction always _____ the motion of an object.

4. A moving object slows down because of _____

5. Between ice rink and skating rink, _____ rink will have more friction.

II. Draw an arrow and show where friction is occurring in each picture given below.



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Period 2

Lesson Objectives

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

- Find out the cause of friction.

Teaching Learning Materials required

- Board and markers
- Worksheet 2
- Activity: (per group): brick or block of wood, string, spring balance, table, sand paper, cloth, polythene

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4-5 each

Note for facilitator- Keep the setup ready for the activity well in advance.

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Activate prior knowledge.	<u>Homework discussion</u> • Begin the class by discussing answers to the homework assignment through a whole class discussion. Ensure that the class is in consensus. • Inform the students that they will now find out what causes friction.
Lesson Middle <u>Time:</u> 30 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Activity</u> • Distribute worksheet 2 to all the students. • Instruct them that they will now see video and attempt to do the activity as per instructions in worksheet 2 . • The groups can first perform the activity and answer the observation questions. • They can then attempt the questions based on the activity independently. • This can be followed by a whole class discussion in which 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.

Worksheet 2

Skill: Spirit of Inquiry

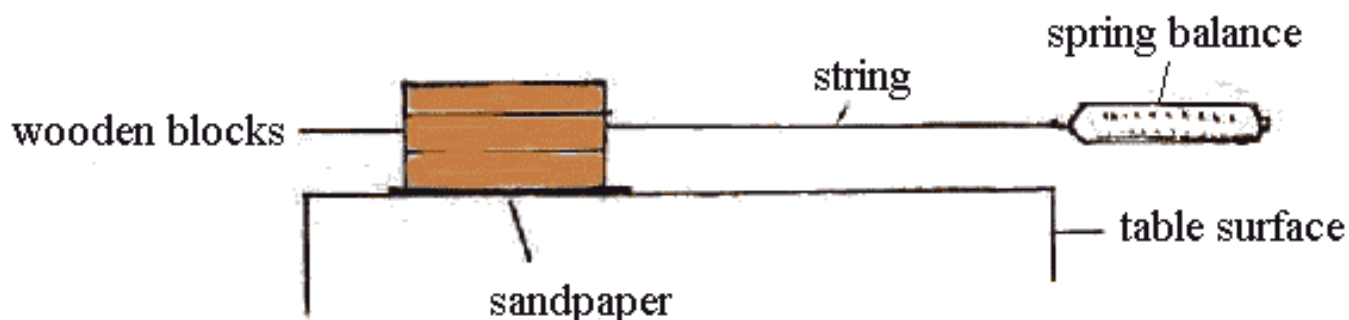
Activity

Aim: To find out what causes friction

Material: brick or block of wood, string, spring balance, table, sand paper, cloth, polythene

Instructions:

1. Tie string to the brick or block of wood.
2. Place the brick on the table.
3. Attach the other end of the string to a spring balance as shown in the picture.
4. Pull the spring balance until the brick/block just begins to move.
5. Note the reading on the spring balance in the table given below. This reading tells you about the force of friction between two surfaces.
6. Now put the brick/block on the sand paper and move it and once again note the reading.
7. Repeat this process on different surfaces like, table, cloth etc. and note the reading.



Type of Surface	Reading on Spring Balance
Wooden	
Sand paper	
Cloth	
Polythene	

Observation Questions:

1. Which surface shows more reading?

2. What can be the reason?

Attempt the questions based on your activity

1. Based on your observation and the video which you watched, explain why friction is less on roads during monsoon season.

2. A wooden block, when rubbed with sand paper becomes smooth. What will be the effect on friction now?

3. In the following picture, explain in which case friction will be more and why.



4. Observe the picture and answer the questions.



- a. Will the friction be more or less between the sled and the ground? _____
- b. Draw an arrow to show direction of friction.

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Period 3

Lesson Objectives

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

- Analyse and find out advantages and disadvantages of friction from given examples.

Teaching Learning Materials required

- Board and markers
- Worksheet 3
- Reference sheet 1

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 or 5

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> Introduce the topic	<u>Whole Class Discussion</u> - Begin the class by posing some questions such as: - In which direction does friction work? - Which one will exert less friction: silk or plastic? - Why does your bicycle stop when you apply brakes? - Why does a rolling object stop on its own? - Gather answers and ensure that the whole class is on the same page. - Inform the students that they will now do a group task and find out advantages and disadvantages of friction.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	<u>Group Task</u> - Distribute reference sheet 1 and worksheet 3 to the students. - Ask the groups to follow the instructions given in worksheet. - They can gather the information now. - Each group can discuss the answers that they have found out. - Ensure that the groups are working smoothly and they are in consensus.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish Up	<u>Finish Up</u> Let each group state one advantage and one disadvantage of friction. Gather the response on the board for everyone to see.

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Reference Sheet 1

I. Facts about friction

- Friction is a force which opposes motion.
- It tries to stop a moving object and prevents stationary objects from moving.
- Rough surfaces have more friction than smooth.
- The surfaces of objects when observed through a microscope will appear as mountains and valleys. Hence, when two objects are in contact with each other they touch one another only in places which reduce the speed of the motion. This causes friction.
- Friction is more when you press down because the jagged surfaces of objects interlock and this increases the friction.

II. Given below are some cases where you can observe friction.

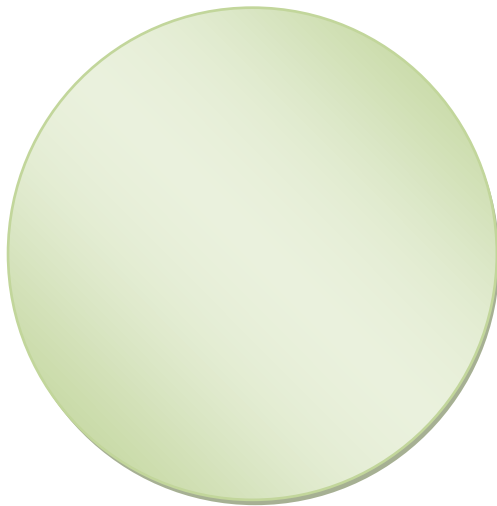
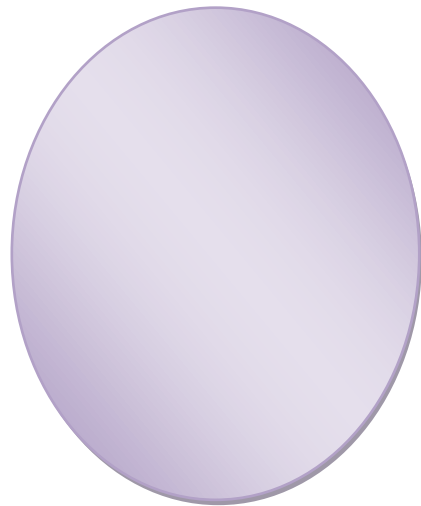
1. We are able to walk because of friction.
2. Energy required to do work is more than necessary because of friction.
3. Friction generates heat.
4. Writing on paper needs friction.
5. Cooling system is used in machinery to avoid damage because of the heat produced during the working of machinery.
6. Cars and buses are able to move easily on road without causing harm.
7. Soles of the shoes have to be replaced often as they wear out.
8. Brakes on cycle work very week because of friction.
9. Moving parts of machines have to be replaced often.
10. Striking a match stick needs friction.
11. Noise is also produced in machines due to friction.
12. Friction between trees causes forest fires.
13. Furniture does not move on its own because of friction.
14. If you leave car windows open while driving on highway, it creates a drag and it can result in using more fuel than necessary.
15. Fixtures and nails remain embedded in wall.

Worksheet 3**Skill: Analytical Thinking**

Instructions for Group Task to each Group

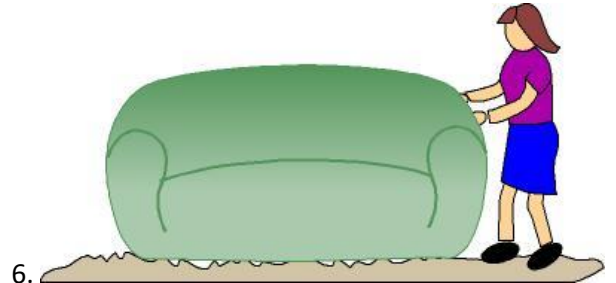
1. Divide your group into two sub parts and name them A & B.
2. Sub group A will pick out advantages of friction from QII of Annexure 3A and sub group B will pick out disadvantages of friction from it.
3. Read Annexure 3A thoroughly.
4. Each sub group will do the needful and attempt the questions below.
5. After each sub group has finished the task, they will swap their answers with each other.
6. The entire group can have a group discussion about the answers.

I. Given below are two bubbles: 'A' for advantages of friction and the other 'B' for disadvantages. Each sub group must fill in the bubble as per the requirement.

A**B**

II. Given below are some pictures. State whether Friction is advantages or disadvantageous in each. Write 'A' or 'D' as the case may be under it.





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Period 4 and 5

Lesson Objectives

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

- Identify types of friction and list the ways of reducing and increasing friction.

Teaching Learning Materials required

- Board and markers
- Worksheet 4

Details of Teaching Learning Experience

Seating Arrangement: - Normal

Lesson Beginning <u>Time:</u> 5 min. <u>Purpose:</u> Recap the previous learning	<u>Discussion</u> - Begin the class by asking 'What would happen if there is no friction at all?' - Collate the responses and then arrive at a consensus.
Lesson Middle <u>Time:</u> 55 min. <u>Purpose:</u> Develop conceptual understanding	- Explain the different type of frictions with the help of different examples. - Discuss the different ways of increasing and reducing friction. - Follow it up with a brainstorming session where you can pose questions such as: - Why are rockets and missiles streamlined? - Why is it easier to drag a luggage which has wheels as opposed to luggage which doesn't? - Putting talcum powder on carom board makes playing easy. Why? - What type of friction is in play when you push a box? - Why is it difficult to walk on slippery floor? - Distribute worksheet 4 to all students and ask them to attempt it. Discuss the answers and collect responses and ensure that the class is in consensus.
Lesson End <u>Time:</u> 10 min <u>Purpose:</u> Finish Up	<u>Finish Up</u> Finish up the discussion by clarifying any doubts.

Worksheet 4**Skill: Comprehension****I. Fill in the blanks.**

1. Friction always opposes _____
2. Friction exerted by air and water is called _____.
3. When an object slides on a surface it is called _____.
4. Rolling friction is _____ than sliding friction.
5. When irregularities on two surfaces in contact interlock with each other they cause _____.

II. Given below are pairs of pictures. Tick the picture which shows less friction in each case.**III. What is drag?**

IV. How streamline shape helps birds?
