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# UNIT 8 Forces

## SCHEME OF WORK

**Suggested time frame:** 8 periods (1 period is approximately 40 minutes.)

Lesson	No. of Periods	Learning Objective(s)	Process Skill(s)	Vocabulary	Resource(s) and Material(s)
1	2	<ul style="list-style-type: none"> <li>Recognise that a force is a push or a pull.</li> <li>Understand that a force can make an object move.</li> <li>Recognise that wind and water can move objects.</li> </ul>	<ul style="list-style-type: none"> <li>Analysing</li> <li>Communicating</li> <li>Generating possibilities</li> <li>Inferring</li> <li>Observing</li> </ul>	<ul style="list-style-type: none"> <li>Force</li> <li>Motion</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, pp. 113–117</li> <li><b>Activity Book</b>, p. 73</li> <li>Textbooks, rulers, toy cars</li> <li>Rubber bands, pencils</li> <li>Pictures from newspapers and magazines or photographs showing forces in action, paper arrows of two colours (e.g. red for “push” and blue for “pull”)</li> </ul>
2	3	<ul style="list-style-type: none"> <li>Explain the effects of forces on objects.</li> </ul>	<ul style="list-style-type: none"> <li>Analysing</li> <li>Communicating</li> <li>Inferring</li> <li>Observing</li> </ul>	<ul style="list-style-type: none"> <li>Effect</li> <li>Speed</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, pp. 118–119 and p. 126</li> <li><b>Activity Book</b>, pp.74–75</li> <li>Soccer ball</li> <li>Modelling clay</li> <li>Ball, empty bottle</li> <li>Paper plates, straws, sheets of coloured paper, scissors, glue, marbles, ice cream sticks</li> </ul>
3	3	<ul style="list-style-type: none"> <li>Observe that when an object is pushed or pulled, an opposing pull or push can be felt.</li> </ul>	<ul style="list-style-type: none"> <li>Analysing</li> <li>Communicating</li> <li>Formulating hypothesis</li> <li>Inferring</li> <li>Observing</li> </ul>	<ul style="list-style-type: none"> <li>Opposing force</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, pp. 120–125</li> <li><b>Activity Book</b>, pp. 76–82</li> <li>Internet</li> <li>Chalk, rope</li> <li>Switch, thick towels, boxes, door, pencils</li> </ul> <p>Optional:</p> <ul style="list-style-type: none"> <li>Textbooks, rulers, cubes, water</li> <li>Scissors, plastic bags, hole puncher, string, identical erasers, stopwatch</li> </ul>

**Note:** This unit is supported by PowerPoint Slides and an online Question Bank, which can be found at: [www.MCEduHub.com](http://www.MCEduHub.com)

## Lesson 1

Duration of lesson: 2 periods

## Learning objectives

- Recognise that a force is a push or a pull.
- Understand that a force can make an object move.
- Recognise that wind and water can move objects.

## Process skills

- Analysing, communicating, generating possibilities, inferring, observing

## Vocabulary

- Force, motion

5E	Lesson	Resource(s) and Material(s)
<b>Engage</b> (5 min)	<i>(Process skills: Observing, analysing, communicating)</i> <ul style="list-style-type: none"> <li>• Get pupils to look at the picture on Textbook p. 113 showing an activity that involves a push and a pull.</li> <li>• Get pupils to answer the questions in the speech bubble and thought bubble.               <ul style="list-style-type: none"> <li>➢ Dr Atom: What must Joe do to prevent Sue from throwing him over?</li> <li>➢ Zoe: What does Sue have to do to throw Joe over?</li> </ul> </li> <li>• Lead pupils to recognise that Joe needs to push harder on Sue and Sue has to pull harder on Joe.</li> </ul>	<ul style="list-style-type: none"> <li>• Textbook, p. 113</li> </ul>
<b>Explore</b> (15 min)	<i>(Process skills: Observing, communicating, inferring)</i> <ul style="list-style-type: none"> <li>• Divide pupils into groups of four or five.</li> <li>• Get each group to carry out the following activity:               <ul style="list-style-type: none"> <li>➢ Stack five textbooks on the table.</li> <li>➢ Place a ruler at an angle against the top of the stack of books to create a slope. (The end of the ruler should be resting against the top edge of the stack of books.)</li> <li>➢ Place a toy car at the top of the stack of books near the slope.</li> <li>➢ Try to make the toy car move down the slope.</li> </ul> </li> <li>• Ask pupils the following question:               <ul style="list-style-type: none"> <li>➢ What did you do to move the toy car down the slope?</li> </ul> </li> <li>• Get each group to use a rubber band to tie some pencils together.</li> <li>• Ask pupils the following question:               <ul style="list-style-type: none"> <li>➢ What did you do to the rubber band while tying the pencils together?</li> </ul> </li> <li>• Lead pupils to recognise that they have used pushes and pulls to carry out the actions above.</li> </ul>	<ul style="list-style-type: none"> <li>• Textbooks, rulers, toy cars</li> <li>• Rubber bands, pencils</li> </ul>

5E	Lesson	Resource(s) and Material(s)
<p><b>Explain</b></p> <p>(20 min)</p>	<p><i>(Process skills: Observing, inferring, communicating)</i></p> <ul style="list-style-type: none"> <li>• Use Textbook p. 114 to explain what a force is.</li> <li>• Point out that when we push an object, the object moves away from us, and when we pull an object, the object moves towards us.</li> <li>• Go through the examples of forces in our daily lives on Textbook p. 115.</li> <li>• Get pupils to observe and act out the different actions shown in the pictures on Textbook p. 115.</li> <li>• Ask pupils the following question:               <ul style="list-style-type: none"> <li>➢ Is the force in each action a push, a pull, or a push and a pull?                   <ul style="list-style-type: none"> <li>○ Twisting a towel: A push and a pull</li> <li>○ Hammering a nail: A push</li> <li>○ Tugging a kite string: A pull</li> </ul> </li> </ul> </li> <li>• Get pupils to use Flashback on Textbook p. 116 to recall that wind is moving air.</li> <li>• Tell pupils that forces also exist in nature, such as forces of wind and water.</li> <li>• Ask pupils the following question:               <ul style="list-style-type: none"> <li>➢ What can a force in nature do?</li> </ul> </li> <li>• Use Textbook pp. 116–117 to explain that forces in nature help move objects.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Textbook</b>, pp. 114–117</li> </ul>
<p><b>Elaborate</b></p> <p>(20 min)</p>	<p><i>(Process skills: Observing, inferring, communicating)</i></p> <ul style="list-style-type: none"> <li>• Get pupils to carry out the activity in Explore on Textbook p. 115.</li> <li>• Get pupils to use Language Connect on Textbook p. 114 to find words that have the same meaning as “push” and “pull”.</li> <li>• Get pupils to use Research on Textbook p. 117 to find out what a tornado is.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Textbook</b>, Language Connect, p. 114, Explore, p. 115 and Research, p. 117</li> </ul>
<p><b>Evaluate</b></p> <p>(20 min)</p>	<p><i>(Process skills: Generating possibilities, communicating, observing, analysing, inferring)</i></p> <ul style="list-style-type: none"> <li>• Ask pupils the following questions:               <ul style="list-style-type: none"> <li>➢ What is another action in our daily lives that involves a push, a pull, and both a push and a pull?                   <ul style="list-style-type: none"> <li>○ Push: pressing a lift button</li> <li>○ Pull: opening a drawer</li> <li>○ Push and pull: vacuuming the floor (Accept other possible answers.)</li> </ul> </li> <li>➢ What causes a sailboat to move on water?                   <ul style="list-style-type: none"> <li>○ The forces of wind and water cause the sailboat to move.</li> </ul> </li> </ul> </li> <li>• Get pupils to complete Activity 1 on Activity Book p. 73.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Activity Book</b>, Activity 1, p. 73</li> <li>• Pictures from newspapers and magazines or photographs showing forces in action, paper arrows of two colours (e.g. red for “push” and blue for “pull”)</li> </ul>

## Lesson 2

Duration of lesson: 3 periods

## Learning objective

- Explain the effects of forces on objects.

## Process skills

- Analysing, communicating, inferring, observing

## Vocabulary

- Effect, speed

SE	Lesson	Resource(s) and Material(s)
<b>Engage</b> (30 min)	<p><i>(Process skills: Observing, communicating)</i></p> <ul style="list-style-type: none"> <li>• Take pupils to a field to play a game of soccer.</li> <li>• Ask pupils the following questions after the game:               <ul style="list-style-type: none"> <li>➢ What happened when you kicked the stationary ball?</li> <li>➢ How did you change the direction in which the ball was moving?</li> <li>➢ How did you make the ball roll more quickly?</li> <li>➢ How did you stop the ball from moving?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Soccer ball</li> </ul>
<b>Explore</b> (30 min)	<p><i>(Process skills: Observing, analysing, communicating)</i></p> <ul style="list-style-type: none"> <li>• Get pupils to recall what a force is.               <ul style="list-style-type: none"> <li>➢ A force is a push or a pull.</li> </ul> </li> <li>• Get pupils to carry out the activity in Explore on Textbook p. 118 to observe what forces can do to modelling clay.</li> <li>• Ask pupils the following question:               <ul style="list-style-type: none"> <li>➢ What happens to the modelling clay as you mould it?                   <ul style="list-style-type: none"> <li>○ It changes in shape.</li> </ul> </li> </ul> </li> <li>• Get pupils to use Flashback on Textbook p. 118 to recall that some materials can return to their original size and shape after they are pressed, twisted, bent or pulled.</li> <li>• Ask pupils the following question:               <ul style="list-style-type: none"> <li>➢ What can you do to make the modelling clay return to its original shape?                   <ul style="list-style-type: none"> <li>○ We can apply a force on it.</li> </ul> </li> </ul> </li> <li>• Get pupils to observe the following demonstration:               <ul style="list-style-type: none"> <li>➢ Place a ball in front of an empty bottle.</li> <li>➢ Push the ball towards the bottle.</li> <li>➢ Observe what happens to the ball and bottle.</li> </ul> </li> <li>• Ask pupils the following questions:               <ul style="list-style-type: none"> <li>➢ What happens to the bottle when the ball hit it?                   <ul style="list-style-type: none"> <li>○ The bottle topples over.</li> </ul> </li> <li>➢ What happens to the ball after it hit the bottle?                   <ul style="list-style-type: none"> <li>○ The ball changes direction. / The ball slows down.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Textbook, Explore and Flashback, p. 118</li> <li>• Modelling clay</li> <li>• Ball, empty bottle</li> </ul>

## Lesson 3

Duration of lesson: 3 periods

## Learning objective

- Observe that when an object is pushed or pulled, an opposing pull or push can be felt.

## Process skills

- Analysing, communicating, formulating hypothesis, inferring, observing

## Vocabulary

- Opposing force

5E	Lesson	Resource(s) and Material(s)
<b>Engage</b> (10 min)	<p><i>(Process skills: Observing, analysing, communicating)</i></p> <ul style="list-style-type: none"> <li>Show pupils an animation on balanced and unbalanced forces at: <a href="https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html">https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html</a></li> <li>Ask pupils the following question:               <ul style="list-style-type: none"> <li>How to we make the trolley move to the right or the left?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Internet</li> </ul>
<b>Explore</b> (15 min)	<p><i>(Process skills: Observing, analysing, communicating)</i></p> <ul style="list-style-type: none"> <li>Select six pupils to play a game of tug-of-war.               <ul style="list-style-type: none"> <li>Draw a line on the ground using the chalk.</li> <li>Divide the pupils into two groups of three.</li> <li>Get a pupil from each group to stand facing each other at equal distance from the line.</li> <li>Get the other two pupils to stand behind their groupmate.</li> <li>Get the groups to hold onto each end of the rope.</li> <li>Get the pupils to pull on the rope. The group loses when a person from the group crosses the line.</li> </ul> </li> <li>Ask pupils the following questions:               <ul style="list-style-type: none"> <li>How can both groups remain stationary?                   <ul style="list-style-type: none"> <li>They can pull their ends of rope with the same amount of force.</li> </ul> </li> <li>What does a group have to do to win the game?                   <ul style="list-style-type: none"> <li>The group has to pull the rope with a larger force than the opposite group. In this way, the opposite group will move towards and cross the line.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Chalk, rope</li> </ul>
<b>Explain</b> (15 min)	<p><i>(Process skill: Observing)</i></p> <ul style="list-style-type: none"> <li>Get pupils to carry out the following actions and observe whether they feel a force pushing back on their hands:               <ul style="list-style-type: none"> <li>Pushing on a wall</li> <li>Pulling a bag along the floor</li> </ul> </li> <li>Use Textbook pp. 120–121 to explain what opposing forces are.</li> <li>Explain to pupils what happens to an object when the forces acting on it are balanced and when the forces acting on it are unbalanced, using the examples on Textbook p. 122.</li> </ul>	<ul style="list-style-type: none"> <li>Textbook, pp. 120–122</li> </ul>