

# Use the Force

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KEY STAGE 2	YEAR GROUP: 4
SONG BANK LINK	SUBJECT LINKS
<b>Use the Force</b> Words and music by Jenny Beeching	<ul style="list-style-type: none"> <li>Science QCA Unit 4E: Friction</li> <li>Music QCA Unit 15: Ongoing Skills</li> </ul>
<b>DURATION: 45MINS - 1 HOUR</b>	

## Learning objectives

- Children will learn about friction as a force which slows moving objects and may prevent objects from starting to move.
- Children will learn that when objects are pushed or pulled, an opposing pull or push can be felt.

## Resources

- Use the Force* performance track
- Use the Force* echo track
- Use the Force* echo track (slower)
- Use the Force* backing track
- 2kg weights (one per group)
- force meters (one per group)
- carpet tiles (one per group)
- sheets of sandpaper (one per group)
- trays of sand (one per group)
- trays of marbles (one per group)
- a tray of ice

## Introduction

- Share the **Learning objectives** with the children at the start of the lesson.
- Display the lyrics to *Use the Force* on the interactive whiteboard and listen to the performance track, encouraging children to join in where they can.
- Revise Year 2 work (QCA Unit 2E: Forces and movement) by asking children to highlight the 'force' words in the song, eg. move, kick, pull, push.
- If the words 'gravity' and 'friction' have not featured yet, introduce them briefly, explaining that they are important 'force' words, and you will look at them in more detail later.

## Main activity

- Show two identical 2kg weights and ask children which would be the easiest to pull across the table.
- Demonstrate how a force meter (or a Newton meter) can be used to measure the force needed to pull the weight along the table top. Ask a child to examine the scale on the force meter, read it aloud, and then make a note on the flipchart or whiteboard.
- Attach the force meter to a second weight. Before pulling the weight along, place a tray of ice beneath it. Point out that you are pulling it along in exactly the same manner as before - the only change is the surface of the table.
- Again, invite one of the children to check the reading on the force meter.
- Hold a whole-class discussion. Why is there a difference between the two weights? What is causing the difference? What kind of surfaces do the children think will make it easier or harder to pull the weight? Children should be clear that friction is a force between two sliding surfaces (or surfaces which are trying to slide), and that this force slows down a moving object.

## Independent activity

- In groups, children measure the force required to pull a 2kg weight across a table top (as in the main activity). They then predict and measure what will happen when using other surfaces: a tray of sand, a carpet tile, sandpaper, a tray of marbles, etc.
- Ask the children to record their findings in a simple chart.

# Use the Force

## Differentiation

### Support

- Divide children into groups of mixed ability.
- Use of visual prompts, eg. display key words.

### Extension

- Ask children to note down how they ensured that the tests they did were fair.

## Plenary

Discuss the following.

- How does friction affect the force required to pull an object? (More friction means more force required.)
- How is friction increased and reduced? (Changing the smoothness of one or both surfaces: the smoother the surface, the less friction there is.)
- How might a lubricant (eg. oil, grease) have affected the level of friction? (It would have reduced the amount of friction.)

## Assessment for Learning

Can the children:

- describe and explain why it is more dangerous to drive on icy roads than on dry roads?
- suggest when friction is useful (eg. grips on shoes or tyres) and when it is not (eg. skis)?

## Next steps

- Move on to water resistance and air resistance. Both are types of friction and, as such, slow down an object that is moving through them.

## Differentiated success criteria

### All children will:

- Understand that friction is a force.
- Carry out a fair test on different surfaces to ascertain the effects of friction.
- Predict and then measure the force required to pull an object across these surfaces.
- Observe that surface texture affects the amount of friction.

### Some children will:

- Understand that friction resists the movement of one surface against another.
- Be able to explain the factors in place to ensure a fair test.
- Compare predictions with results.
- Explain how surface texture affects the amount of friction.

### A few children will:

- Describe and explain situations in which friction is desirable and situations in which it is detrimental.