

BBC



Motion

Teacher Resource





Motion

Watch the film:

You might find it useful to watch the Motion film before you read through the resources.

bbc.com/teach/terrific-scientific/KS2/zhmp47h

Introduction

Motion is the process of moving or being moved and **forces** cause motion to change.

At its very simplest we can explain a force as a push or a pull. Every time you put on clothes, open or close a door, or use a computer keyboard you are exerting forces. These forces often cause something to move. They cause motion. Whether it is a jumper being pulled over your head, the door closing, or the key being pushed down on the computer keyboard, motion is occurring.

Forces aren't only exerted by people. There are many different types of force. Magnets attract and repel other magnets. **Gravity** means unsupported objects fall towards the Earth. Air resistance, water resistance and friction are examples of forces that resist motion and slow down the movement of things.

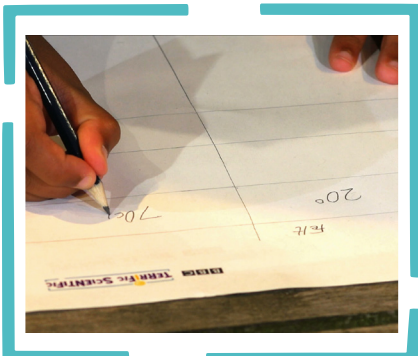
Surprisingly, even a small force can sometimes have a large effect when mechanisms such as levers are used. This is why a small child on the end of a seesaw can lift a larger child on the other side, provided the heavier child is sitting closer to the mid-point.

For this challenge you will need to use your knowledge of forces to help you increase the motion of a marble.



Pre-activity discussion - activities to get the children started

- Explain that there are many different types of motion and they all involve forces.
- Think about walking to school. What forces are you exerting to walk?
- There are also other forces that act on you as you walk. What are these forces?
- Imagine if these forces were not there.
- What would happen if gravity didn't exist?
- What would the world be like without friction?
- If you take up adventurous sports involving different types of motion such as paragliding, kayaking or skiing, do other types of forces play a larger part? What are these forces?
- Discuss the different types of forces that you saw in the Motion investigation film and how they contributed to the different types of motion displayed.



Learning intention

Children will:

- Be introduced to **Newton's laws of motion**.
- Know that gravity means unsupported objects fall towards the Earth.
- Explain the effect of friction on the motion of objects.
- Understand that a small force can sometimes have a large effect.

Working scientifically, children will:

- Take accurate measurements of how far the large marble travels and record this data.
- Share ideas about how to make the large marble travel further.
- Use the results of the test to set up further tests.
- Identify causal relationships and evidence used to support or refute their ideas.



Expected duration

Approximately 1 hour.

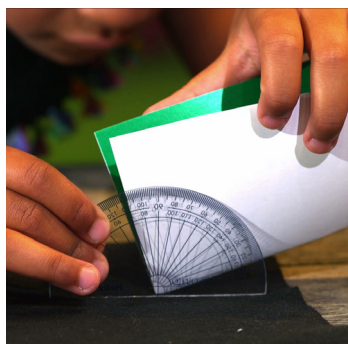
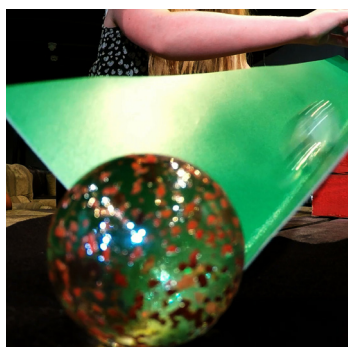
Equipment needed

- A bag of different sized marbles
- An assortment of different materials. For example: an A3 sheet of cellophane, aluminium foil, bubble wrap, sand paper or fleece
- Protractor
- Ruler
- Tape measure
- 100cm x 10cm length of card (carefully fold this in half lengthways for making the ramp)



Health & safety

- Look out for chips on glass marbles that may have sharp edges. Remove chipped marbles and use only intact ones.
- Marbles should only be rolled down the ramp - the challenge does not require them to be thrown, launched or dropped.
- If you are concerned about using glass marbles, these can be replaced with spherical plastic beads.



The investigation – instructions

Set up your card ramp and position a large marble at the bottom. The aim is to work out how to use a small marble moving down the ramp to move the larger marble as far as possible.

1. Free exploration

Work in a small group. Explore rolling marbles down the ramp and observe how making changes to the size of the (rolling) marble, the start position on the ramp, the angle of the ramp or the type of material they roll on to affects the distance they travel off the end of the ramp. Discuss what you found out and make notes about your findings.

2. Directed discovery

Place the ramp at a low angle such as 15 or 20 degrees. Put a large marble at the bottom of the ramp. Release a small marble from the top of the ramp and measure how far the large marble travels. Now repeat the activity, but with the ramp at a higher angle such as 30 or 40 degrees.

3. Challenge

Make the large marble travel as far as possible using the small marble, the ramp and any of the material provided.

Use your findings from the free exploration and directed discovery activities to attempt the challenge.

Record how far you were able to get the large marble to travel and how you achieved this.

Repeat your method to check the validity of your results.

Compare your results with those of other groups.



Creative conclusions – findings from the experiment

Using the results from their investigations, children should describe how they got the large marble to travel furthest.

They should identify the angle of the ramp, the material at the base of the ramp and where along the ramp the small marble was released.

They should share their results and compare their findings with other groups. They could discuss the class findings.

Questions to prompt discussion

- Which group's marble travelled furthest?
- Why did the marble travel furthest?
- What other equipment would you need to get it to travel even further?
- How would you get it to travel further?





Glossary

Force	A push or pull
Gravity	Force that makes unsupported objects fall towards the Earth
Friction	Force resisting motion, causing things to slow down
Motion	Moving or being moved

