Investigating levers

Outstanding Science Year 5 - Forces - OS5E006

National Curriculum Statutory Requirements
5E3 - recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect; **UKS2W2** - taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate; **UKS2W3** - recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

Learning Objective
I can explain how a lever works.

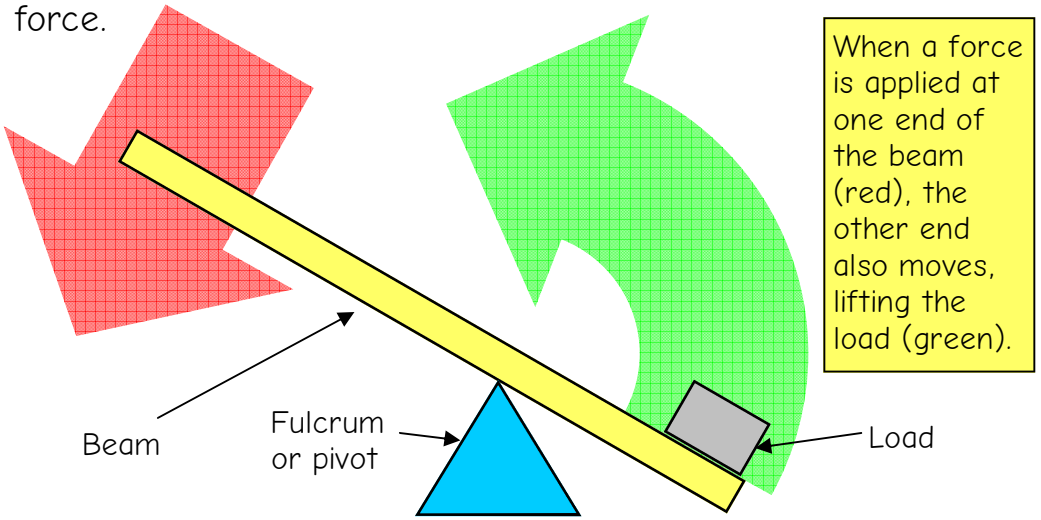
Me: Teacher:

Scientific play

Take a ruler, pencil and two coins of different weights. Place the ruler on the pencil and place the coins at either end. Can you make the ruler balance?

Levers

A lever is one of the oldest and simplest machines used by humans. A lever consists of just two parts - a beam (the long part) and a fulcrum or pivot (hinge). The beam rotates (turns) along the fulcrum. Levers are useful because they allow humans to lift heavy weights by applying a smaller force.



When a force is applied at one end of the beam (red), the other end also moves, lifting the load (green).

Investigation

How can we lift a 1kg weight using a lever?

You will need:

- 1 x 1kg weight (to act as the load)
- 10 x 100g weights (to create a range of forces)
- A 1 metre ruler (to act as the beam)
- A suitable fulcrum (such as a poster tube)

Method

Set up the apparatus as shown in the diagram. Place the 1kg load at one end of the ruler. Place the fulcrum 20cm from the load.
Predict and then measure how far a 1kg weight needs to be from the fulcrum in order to make the beam balance. Record your prediction and measurement in the table.
Predict and then measure how far a 900 weight needs to be. Repeat with 800, 700, 600, 500, 400, 300, 200 and 100g weights.

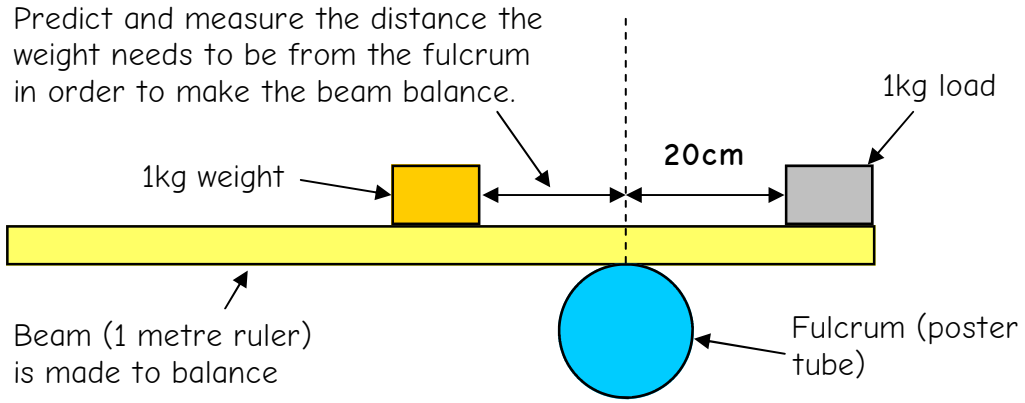
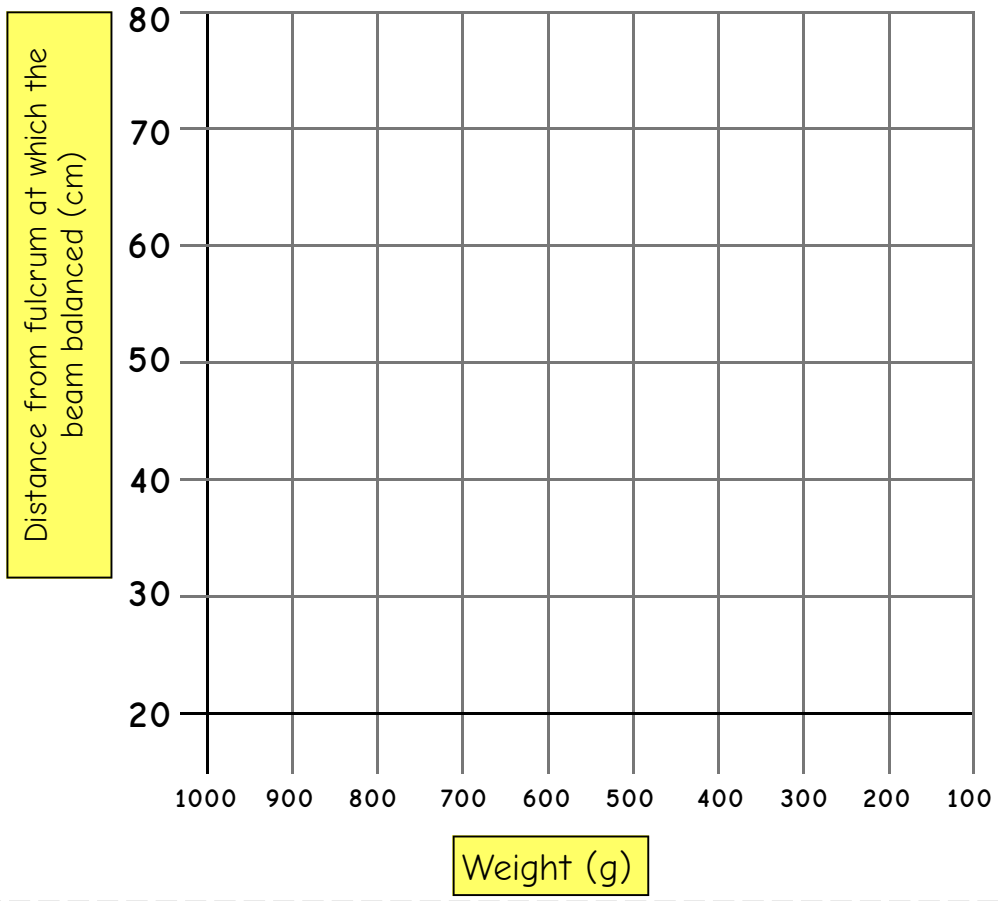


Table showing the distance at which different weights needed to be from a fulcrum in order to balance a 1kg load

	Distance from fulcrum (cm)	
	Prediction	Measurement
1kg		
900g		
800g		
700g		
600g		
500g		
400g		
300g		
200g		
100g		

Line graph showing the distance at which different weights needed to be from a fulcrum in order to balance a 1kg load



Discussion

How accurate were your predictions?

What happened to the distance the weight needed to be from the fulcrum as the size of the weight decreased?

How far did the 1kg load move? How far did the weights which you added move?

Can you explain how the lever works?