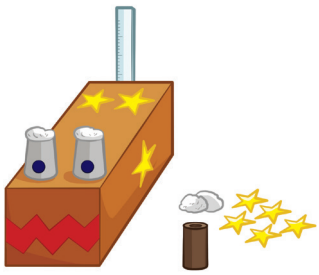
Battle of the Robots!



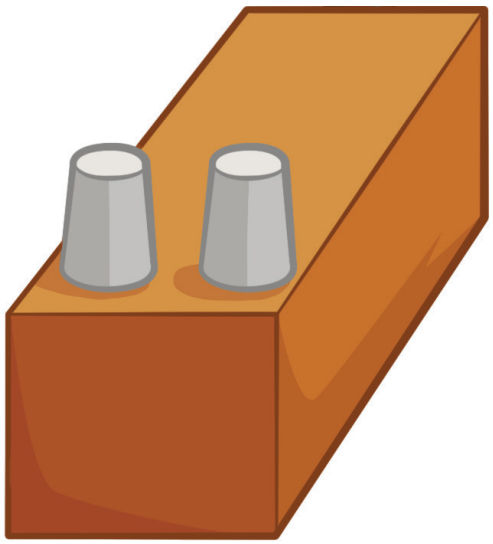
Build a fantastic pellet-shooting junk robot whilst practising measuring, working with averages, decimals and data!

You will need:

- Clean junk, e.g. old cardboard boxes and tubes, plastic bottles, pots and cups
- Parts for the robot's pellet launcher, e.g. a flexible ruler, lollipop sticks, elastic bands
- Pellets, e.g. small rolled up balls of paper
- Items for decorating the robot, e.g. pens, paints, foil, stickers
- Sticky tape or glue
- A tape measure
- Battle of the Robots Data Collection Sheet, one per person (page 3)

What to do

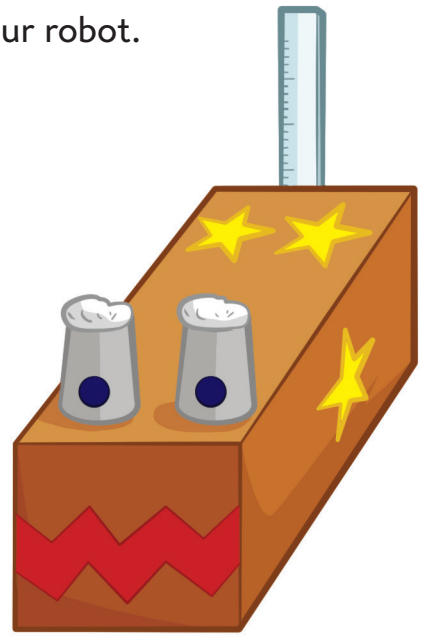
1. Build your robot. Use something sturdy, such as a strong cardboard box as the base. Fix your junk together firmly with either sticky tape or glue.



2. Design your robot's pellet launcher (there are some ideas on page 4 to help you).
3. Experiment with different designs until you find the right launcher and pellets. Be careful where you direct your pellets and make sure they're not too heavy. Small balls of paper are good.

Battle of the Robots! (continued)

4. Decorate your robot.



5. Now put your robot to the test. Find a long space, like a corridor or long room.
6. Mark a starting line with chalk or an object. With your robot on the starting line, fire a pellet. Mark where it lands.
7. Use your tape measure to measure how far the pellet has travelled.
8. Record the distance on your data collection sheet. Write it in metres, centimetres and millimetres in one box and in centimetres and millimetres in the other box.
9. Repeat twice and record the distances.
10. Work out and record your best, median and mean flights. Do you have a mode flight distance? What is the range of the distances?

Top tip

Why not print off another data collection sheet and see if you can improve your best, median and mode flight distances?

Data Collection Sheet

Length	1st launch	2nd launch	3rd launch
In metres, centimetres and millimetres			
In centimetres and millimetres			

Data Analysis

Personal best:

Median result:

Mode result:

Mean result:

Range of results:

The **median**, **mode** and **mean** are all types of **average**:

Median: the number in the middle if you place the numbers in order of size

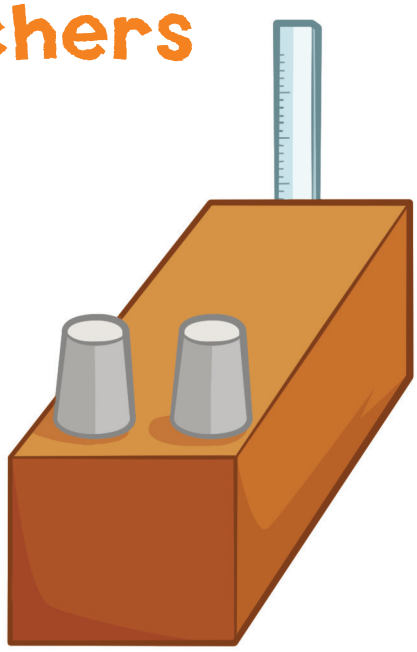
Mode: The most common result

Mean: The total of all the numbers, divided by the amount of numbers

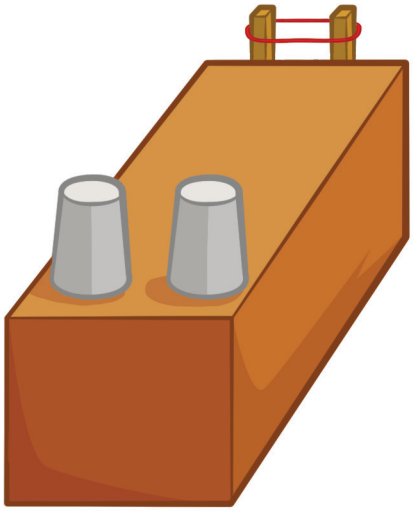
Range: the difference between the highest and lowest numbers

Possible Pellet Launchers

1. *The Terrible Twanger:* Attach a flexible ruler to your robot so that it sticks up from the front or back. Hold your pellet on the end of the ruler. Pull back the ruler and then let both the ruler and pellet go. As the ruler twangs back, the pellet should fly through the air.



2. *The Catastrophic Catapult:* Create a catapult using a couple of sticks and an elastic band. Attach it to your robot so that it sticks up from the front or back. Hold your pellet in the centre of the elastic band. Pull back the band and pellet together until the band is very stretched and then let them both go. As the elastic band shoots back, the pellet should be catapulted into the air.



3. *The Ballistic Blow-Pipe:* Take a long thin tube, like the barrel of a plastic pen or the inner cardboard tube from a roll of tin foil. Attach it flat onto the top of your robot, pointing forwards. Place your pellet just inside one end of the tube. Place your mouth against the other end of the tube and blow as hard as you can. The pellet should be thrust into the air.