

## Mission Brief 8: Rocket weight distribution

### Test one: Centre of mass

The centre of mass is the place on your rocket where all the mass is concentrated, and your rocket's weight is evenly balanced on both sides. Here's how to measure it:

#### Step 1

Tie a string around the middle of your empty bottle rocket.

#### Step 2

Let it hang from the string. If the string is tied around the centre of mass, the rocket will hang horizontally, just like the diagram.

#### Step 3


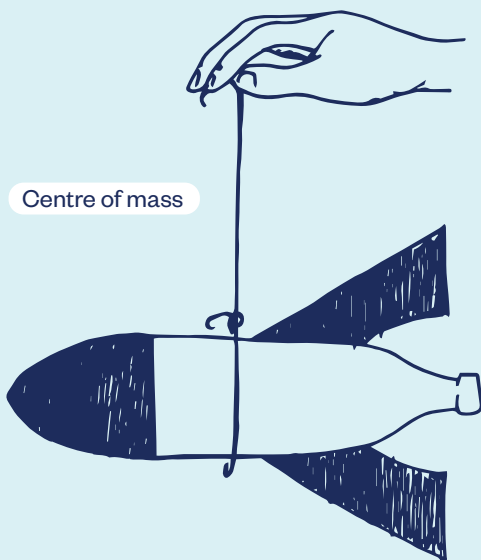
If your rocket doesn't hang horizontally, slide the string left or right until it does.

#### Step 4

Mark the spot on your rocket as the centre of mass.

#### Step 5

Record your results.

Centre of mass

**Tip!** To make sure your rocket flies straight, it's best if the centre of mass is closer to the rocket's nose. How could you achieve this?

### Test two: Centre of pressure

The centre of pressure is the place on your rocket where all the forces of flight are concentrated.

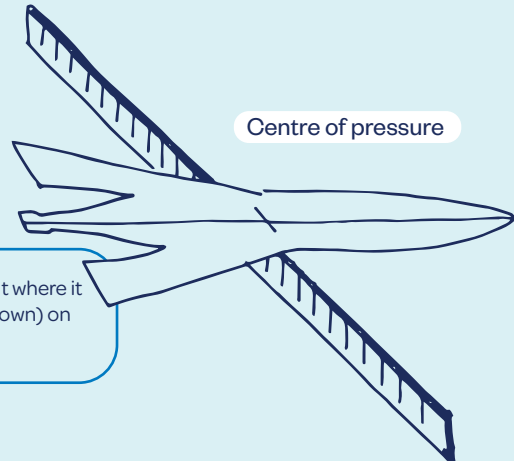
Here's how to measure it:

### Step 1

Draw the outline of your bottle rocket. Cut it out from card. It needs to be exactly the same shape and size as your rocket.

### Step 2

Try and find the point where it balances (flat side down) on the edge of a ruler.



**Tip!** For a rocket to be stable, it's best if the centre of pressure is closer to the tail of the rocket. How could you achieve this?

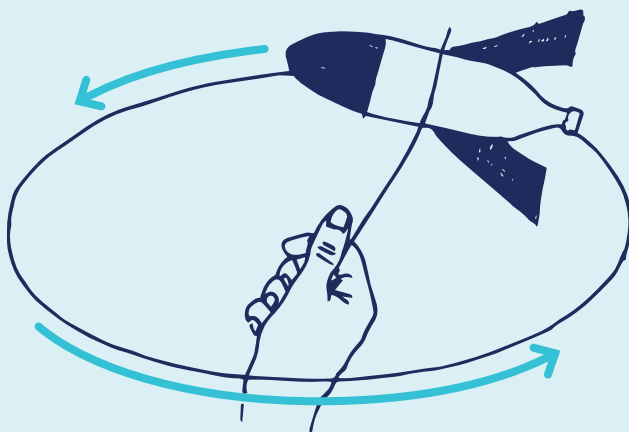
### Step 3

Mark the spot on your rocket as the centre of pressure.

### Step 4

Record your results.

Blank area for recording results.



### Extra time?

Check your rocket's stability by tying a string around its centre of mass. Then, find a clear space and start slowly swinging the rocket in a circle around you, nosecone first.

If the rocket is stable, the nosecone will stay at the front.

If it flies backwards or cartwheels, think about what you could do to adjust its centre of mass and centre of pressure.