Centre of gravity: suspended shapes

Student activity • observation and reasoning

YEAR 10 / LESSON 9 / PHYSICS ONLY

The question

Where does a freely suspended flat shape's weight act?

Use plumb lines from three suspension points to locate a thin shape's centre of gravity.

Equipment

- Pre-drilled lightweight lamina, clamped stand and blunt support
- String with 10 g plumb bob, padded tray, marker and ruler

Use pre-drilled shapes and blunt supports; pupils do not pierce or cut them. Clamp stands securely, keep the 10 g bob low above a padded tray and do not swing it. Keep faces away from projecting rods.

Course coverage: Physics only: 1.31P. Weight and centre of gravity.

Plan, model or apparatus sketch

Draw a labelled setup or force diagram; include the measured quantities.

Method and reasoning

Read the whole sequence before starting

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1. Use a staff-prepared lightweight irregular lamina with three holes near its edge. Clamp the stand to the bench and place a padded tray below the small plumb bob.

2. Suspend the shape from a blunt horizontal support through one hole. Hang a plumb line from the same support and allow both to settle without touching the bench.

3. View square-on and mark two points along the vertical string on the shape. Remove it and join the marks with a ruler.

4. Repeat using a second and third hole. Mark the intersection region rather than forcing imperfect lines to meet exactly.

5. Balance the lamina gently on a blunt support under the marked point, close above the padded tray. Do not use a sharp pin.

6. Explain why the centre of gravity lies vertically below the suspension point at rest. Discuss uncertainty from line width, friction, viewing angle and thickness.

Cleanup

- Remove the bob first, then return shapes and stands; wipe reusable markings.

Record your evidence

Blank spaces are for your own work

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Reference and task data

In a nearly uniform gravitational field, a body's weight acts through its centre of gravity. At rest on a freely turning suspension, this point lies vertically below the support. Three imperfect lines can enclose a small region that represents measurement uncertainty. An irregular outline need not have its centre of gravity at the visual centre.

Suspension point	Vertical line / sketch	Intersection / uncertainty
A		
B		
C		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Why use a plumb line?

2. Why use more than one hole?

3. Why wait for movement to stop?

4. What does a small triangle of intersections indicate?

5. Why is the centre of gravity below the pivot at stable rest?

6. Can the centre of gravity lie outside the material of a shape?