Basic moments: a small lever

Student activity • investigation and reasoning

YEAR 10 / LESSON 10 / PHYSICS ONLY

The question

How can a smaller force balance a larger force on a lever?

Use the school’s small yellow lever and 10 g masses to compare clockwise and anticlockwise turning effects.

Equipment

- Small classroom lever and stable pivot
- 10 g masses, ruler, tray and booklet

Keep the lever low over a tray and fingers clear of the pivot. Add small masses gently; do not use the lever as a launcher or exceed its marked load. Catch loose masses in the tray, not with your feet.

Course coverage: Physics only: 1.30P, 1.32P. Moment and simple balance.

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. Place the lever on its stable pivot over a tray. Check that the unloaded lever balances and identify its pivot point.

2. Place a 10 g mass on one side at a measured distance from the pivot. Add a second 10 g mass on the other side and adjust its position to balance.

3. Keep the first load fixed. Try two 10 g masses on the other side and move them together until balance returns. Stay within the marked capacity of the lever.

4. Measure each perpendicular distance from pivot to the vertical line of action of the weight, not from the end of the lever. Record at least three balanced arrangements.

5. Convert mass to force with g = 9.8 N kg^{-1} and calculate moment = force × perpendicular distance in metres. Compare clockwise and anticlockwise totals.

6. Explain the effect of moving a fixed load closer to or farther from the pivot. State how pivot friction and coarse position markings affect the comparison.

Cleanup

- Remove masses before carrying the lever; count and return all small masses.

Record your evidence

Blank spaces are for your own work

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Reference and task data

A 10 g mass has weight 0.098 N when g = 9.8 N kg^{-1}. A moment is measured in N m. For a balanced, non-accelerating lever, clockwise and anticlockwise moments are equal within uncertainty. The lever's own weight has no moment only when its centre of gravity is over the pivot.

Left force / N	Left distance / m	Right force / N	Right distance / m

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Calculate the moment of 0.098 N at 0.10 m.

2. What happens if the same force acts twice as far from the pivot?

3. Can twice the force balance at half the distance?

4. Where is distance measured from?

5. Why check unloaded balance?

6. Why might the two calculated moments differ slightly?