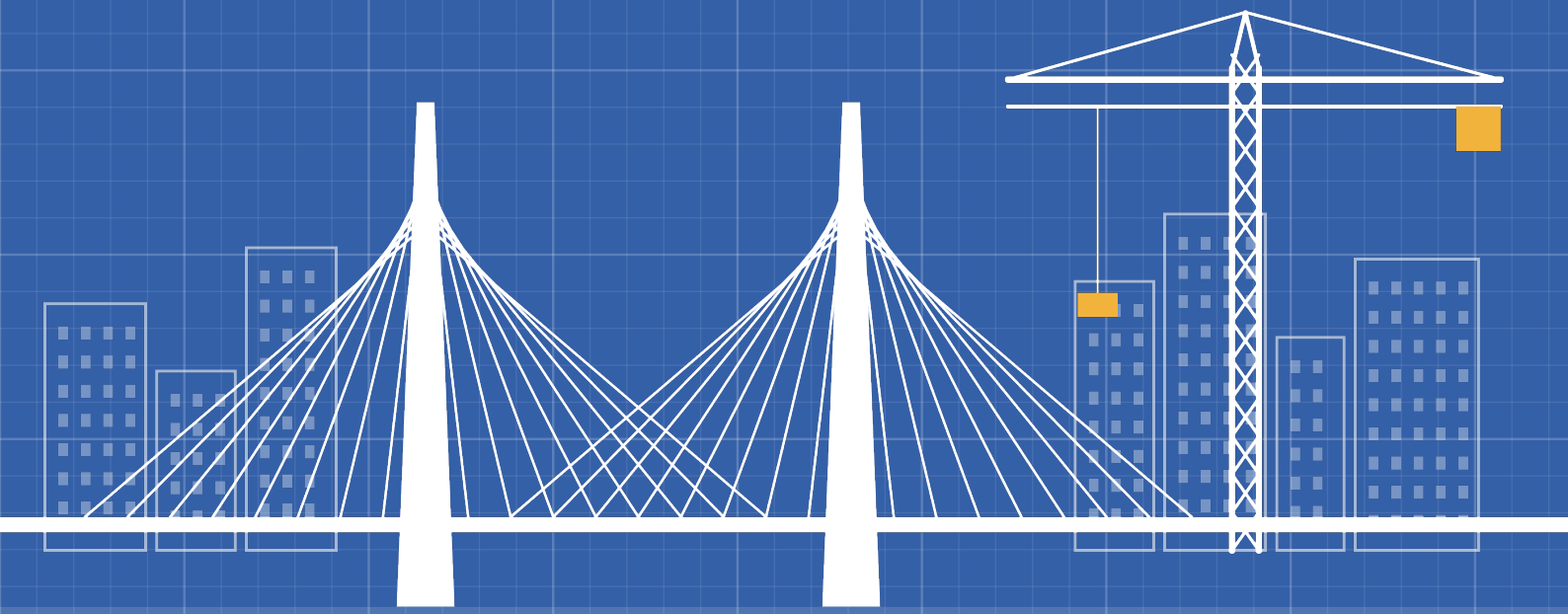


PRACTICE PACK

MOMENTS PRACTICE PACK

Three levels of turning-force problems — from your first moment calculation to cranes and see-saws.

Goes with page 14–15 of your course notes and Worksheet 3. Start at the level your teacher suggests.

NAME

CLASS

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designclass
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METHOD

HOW TO SOLVE MOMENTS

THE FORMULA

moment (Nm) = force (N) × distance (m)

The distance is always measured from the **pivot** (also called the fulcrum) to the line of the force.

THE PRINCIPLE OF MOMENTS

If a beam is **balanced**: **total clockwise moments = total anticlockwise moments**

Forces on the **right** of the pivot (pushing down) turn the beam **clockwise**. Forces on the **left** turn it **anticlockwise**.

Step	What to write	Example (100 N at 2 m right, F at 1 m left)
1	Write the rule	clockwise moments = anticlockwise moments
2	Put in the numbers	100 × 2 = F × 1
3	Work it out	200 = F × 1, so F = 200 ÷ 1
4	Answer with a unit	**F = 200 N**

WATCH OUT

Distances must be in **metres**. To change centimetres to metres, divide by 100 (e.g. 40 cm = 0.4 m). To find an unknown **distance**, divide the moment by the force: d = M ÷ F.

REFLECT

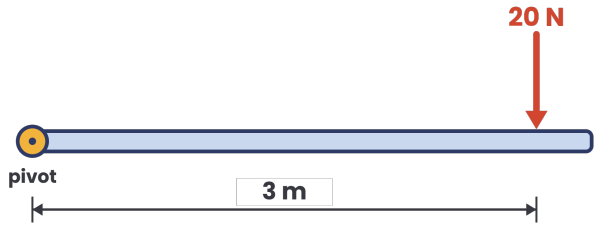
BEFORE YOU START

	Not yet	Getting there	Got it!
I know the moment formula and its units.	☐	☐	☐
I can find an unknown force on a balanced beam.	☐	☐	☐
I can find an unknown distance and convert cm to m.	☐	☐	☐

LEVEL 1 · FOUNDATIONS

Calculate a single moment

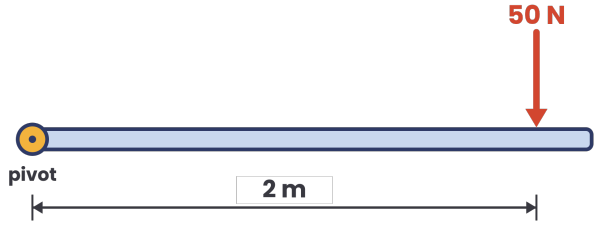
1 Calculate the **moment** of the force about the pivot.



WORKING

Answer = Nm

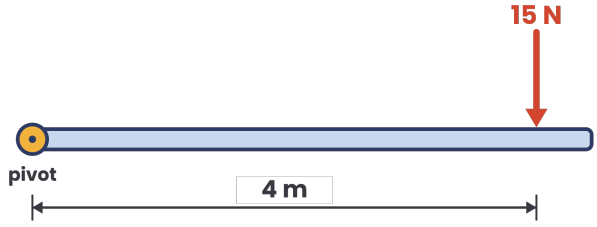
2 Calculate the **moment** of the force about the pivot.



WORKING

Answer = Nm

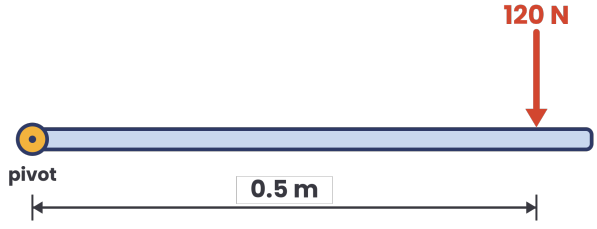
3 Calculate the **moment** of the force about the pivot.



WORKING

Answer = Nm

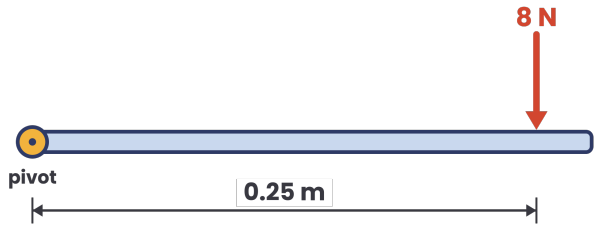
4 Calculate the **moment** of the force about the pivot.



WORKING

Answer = Nm

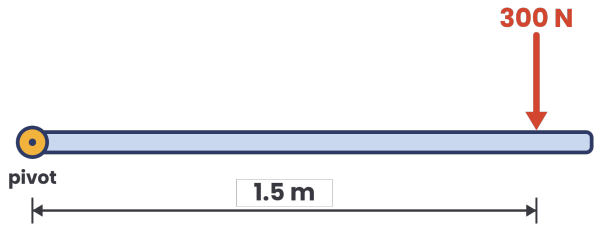
5 Calculate the **moment** of the force about the pivot.



WORKING

Answer = _____ **Nm**

6 Calculate the **moment** of the force about the pivot.



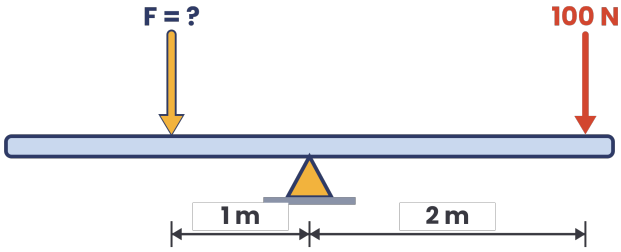
WORKING

Answer = _____ **Nm**

LEVEL 2 · FRAME

Find an unknown force on a balanced beam

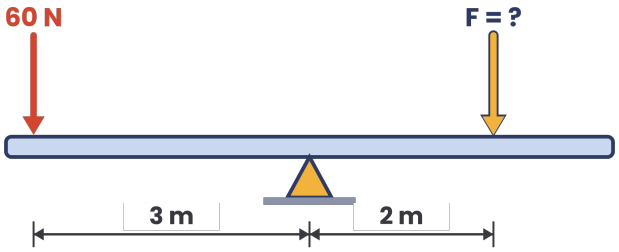
1 The beam is balanced. Calculate the force **F**.



WORKING

Answer = N

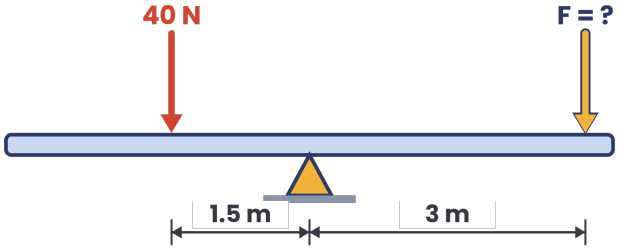
2 The beam is balanced. Calculate the force **F**.



WORKING

Answer = N

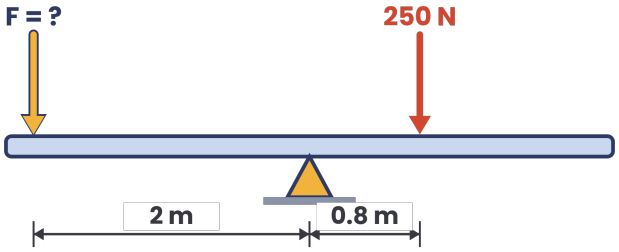
3 The beam is balanced. Calculate the force **F**.



WORKING

Answer = N

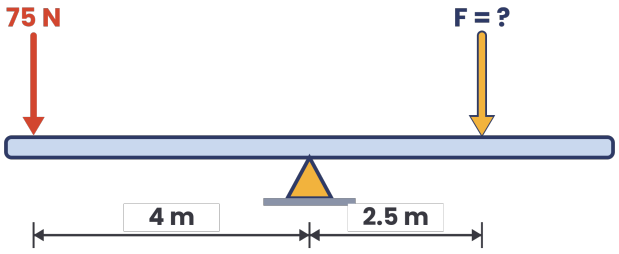
4 The beam is balanced. Calculate the force **F**.



WORKING

Answer = N

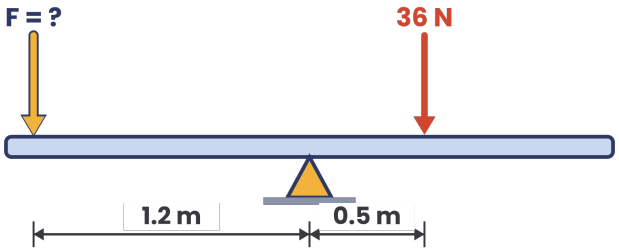
5 The beam is balanced. Calculate the force **F**.



WORKING

Answer = N

6 The beam is balanced. Calculate the force **F**.



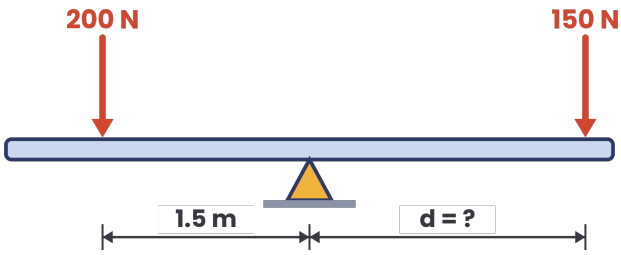
WORKING

Answer = N

LEVEL 3 · TOP FLOOR

Unknown distances, unit conversions and real-world problems

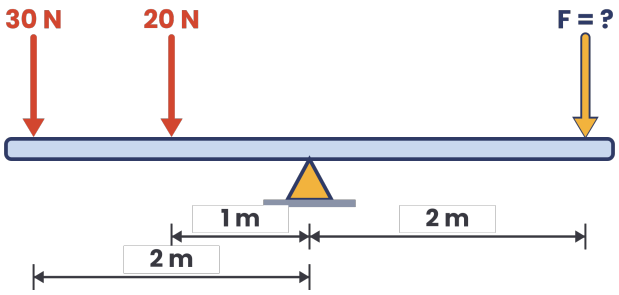
1 The beam is balanced. Calculate the distance **d**.



WORKING

Answer = _____ **m**

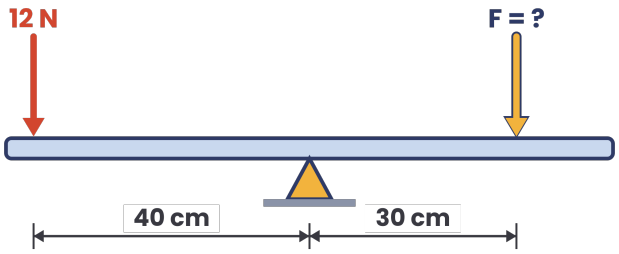
2 Two forces act on the **left** of the pivot. Add their moments together. The beam is balanced. Calculate the force **F**.



WORKING

Answer = _____ **N**

3 Careful — these distances are in **centimetres**. Convert to metres first (100 cm = 1 m). The beam is balanced. Calculate the force **F**.

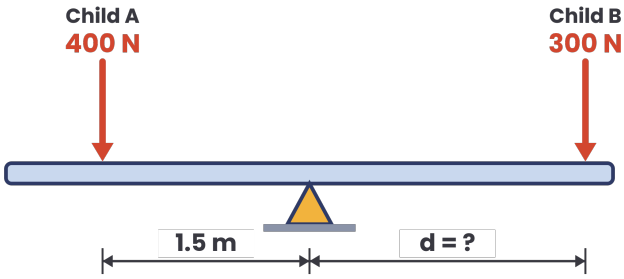


WORKING

Answer = _____ **N**

BGE STRUCTURES · MOMENTS · CC BY-NC

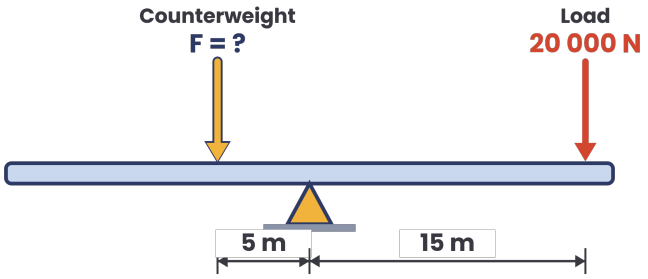
4 Two children balance a see-saw. Child A weighs 400 N and sits 1.5 m from the pivot. Child B weighs 300 N. Where must Child B sit?



WORKING

Answer = _____ m

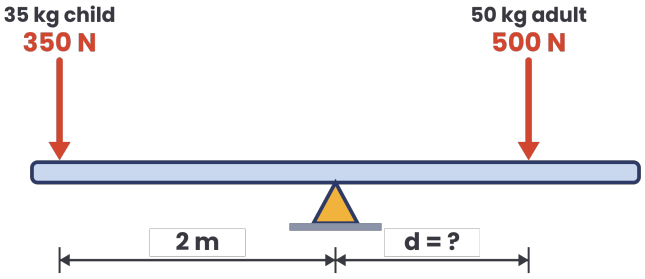
5 A tower crane lifts a 20 000 N load, 15 m from the tower. The counterweight sits 5 m from the tower on the other side. What force must the counterweight provide?



WORKING

Answer = _____ N

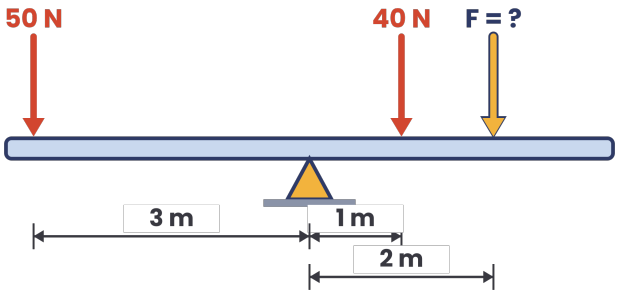
6 On Earth, each 1 kg of mass weighs about 9.8 N — use **10 N** here to keep the numbers friendly. A 35 kg child (350 N) sits 2 m from the pivot. Where must a 50 kg adult (500 N) sit to balance?



WORKING

Answer = _____ m

7 **Boss level:** forces on **both** sides! The anticlockwise side has one force; the clockwise side has two. The beam is balanced. Calculate the force **F**.



WORKING

Answer = _____ **N**

EXTRA DESIGN YOUR OWN

Draw a balanced beam problem for a partner. Work out the answer first on the back of your page so you can check theirs!

MY MOMENTS PROBLEM

Type-in version: describe your idea here, or sketch on paper / a tablet and attach a photo.

MOMENTS MASTERED?

Check your answers with your teacher, then try the **Bridge Truss Challenge** — where these forces matter for real.

Video help: **detscotland.co.uk** · BGE Structures.

"Engineering is the art of directing the great sources of power in nature for the use and convenience of man."

Thomas Tredgold, civil engineer (1788–1829)

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