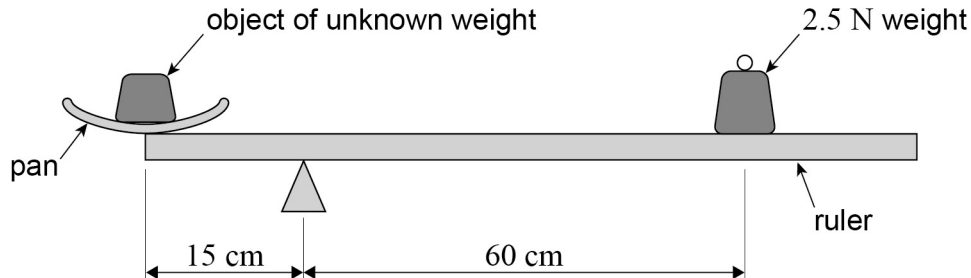


1

The diagram shows a uniform metre ruler of weight 1.5 N pivoted 15 cm from one end for use as a simple balance.



A scale pan of weight 0.5 N is placed at the end of the ruler and an object of unknown weight is placed in the pan. The ruler moves to a steady horizontal position when a weight of 2.5 N is added at a distance of 60 cm from the pivot as shown.

What is the weight of the object?

[1 mark]

A 9.5 N

☐

B 10.0 N

☐

C 13.0 N

☐

D 13.5 N

☐☐

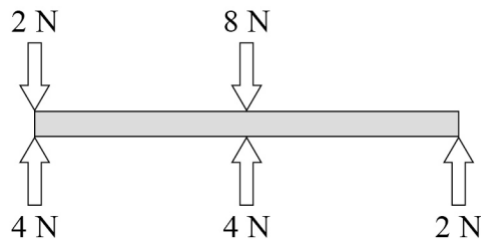
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2

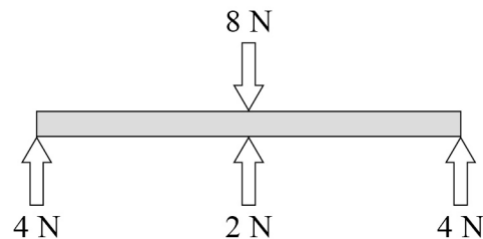
A light uniform rigid bar is pivoted at its centre. Forces act on the bar at its ends and at the centre.

Which diagram shows the bar in equilibrium?

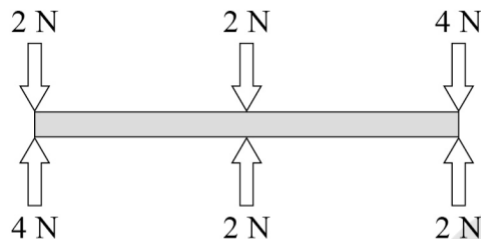
[1 mark]



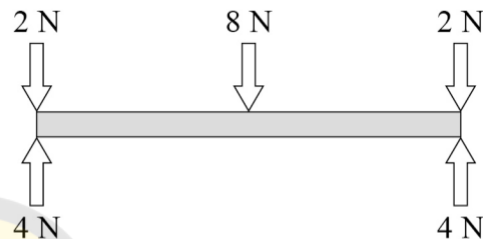
A



B



C



D

A

B

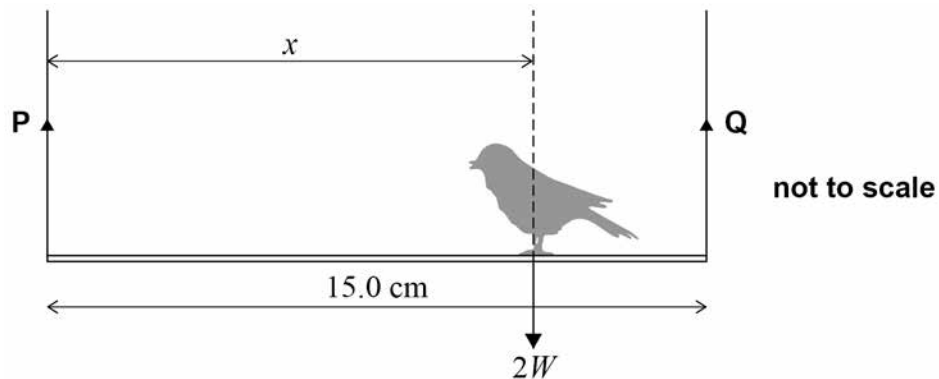
C

D

☐
☐
☐
☐
☐

3

A bird sits on a uniform rod suspended from vertical wires **P** and **Q**.



The rod has a weight W and is 15.0 cm long.

The weight of the bird is $2W$ and acts at a distance x from **P**.

What is the value of x when the tension in **P** is half the tension in **Q**?

[1 mark]

A 7.50 cm

B 10.0 cm

C 11.3 cm

D 15.0 cm

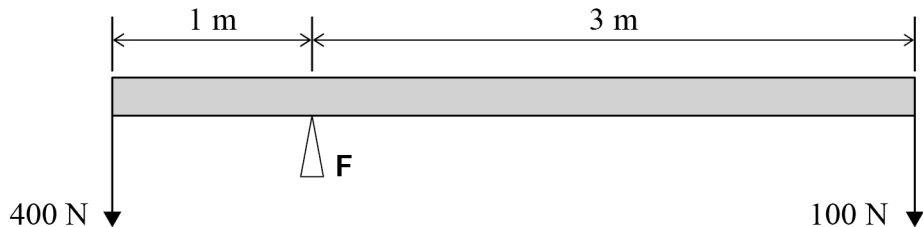


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4

A uniform rod is balanced horizontally about a support **F**. Forces of 400 N and 100 N act at the ends of the rod, as shown.



What is the reaction force acting on the rod at support **F**?

[1 mark]

A 100 N

☐

B 500 N

☐

C 550 N

☐

D 600 N

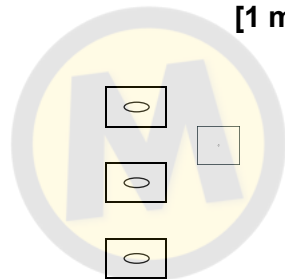
☐☐

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Which statement about a couple is **not** true?

- A** It must consist of coplanar forces.
- B** It can produce rotational motion.
- C** It can produce translational motion.
- D** It has a moment with units N m.

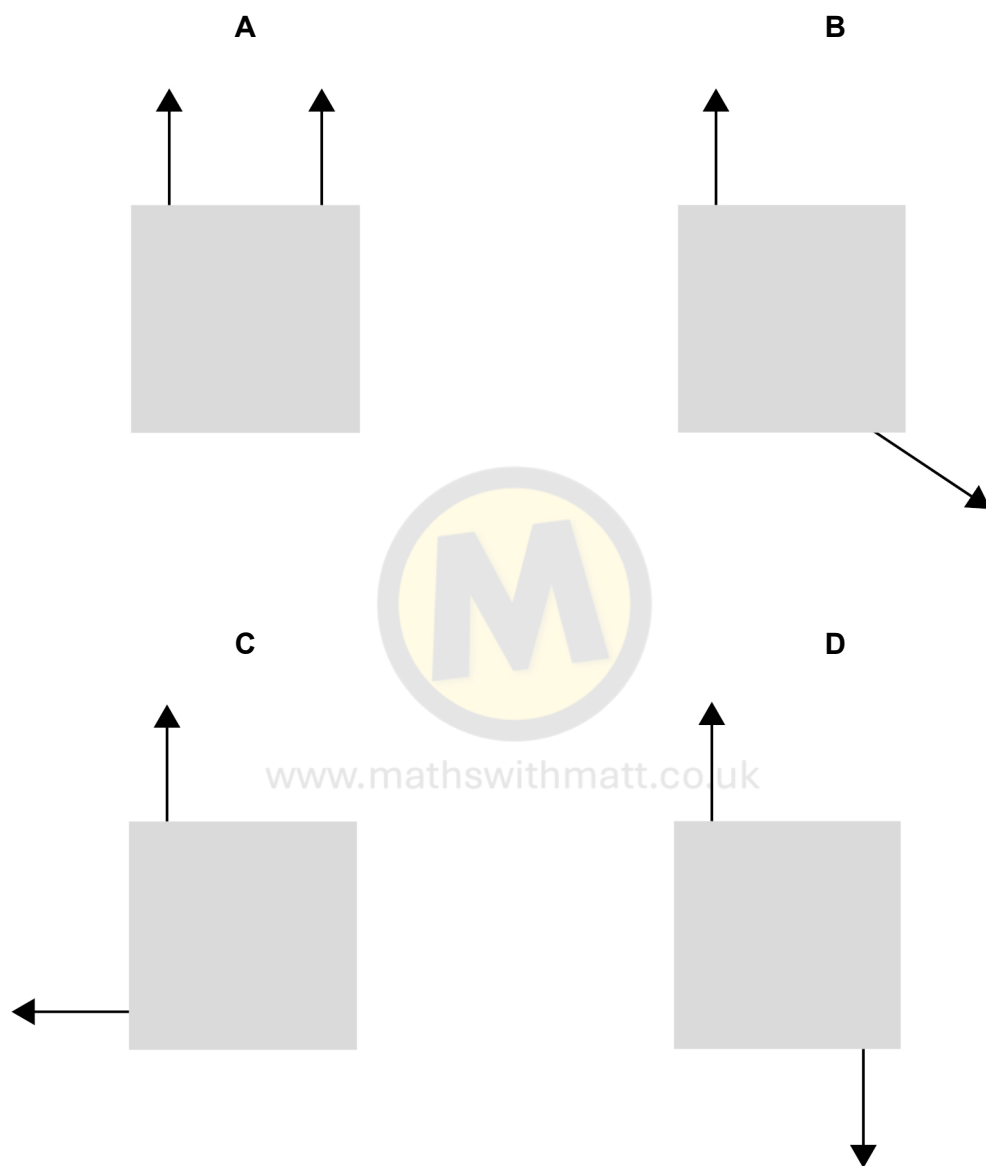
[1 mark]

☐☐☐☐☐

*Do not write
outside the
box*

Each diagram shows two horizontal forces acting on a solid square object seen from above.

All the forces have the same magnitude.



Which system produces a couple about any point inside the object?

[1 mark]

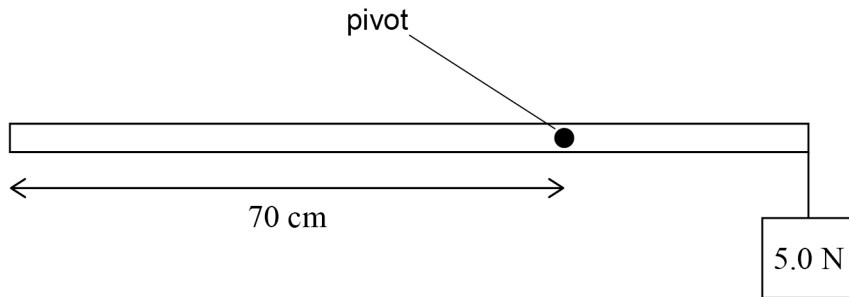
- | | |
|----------|---|
| A | ☐ |
| B | ☐ |
| C | ☐ |
| D | ☐ ☐ |



7

A uniform metre ruler of weight 2.0 N is freely pivoted at the 70 cm mark.

A student holds the ruler in a horizontal position and suspends a 5.0 N weight from the 100 cm end.



What is the magnitude of the resultant moment when the student releases the ruler?

[1 mark]

A 0.15 N m

☐

B 0.19 N m

☐

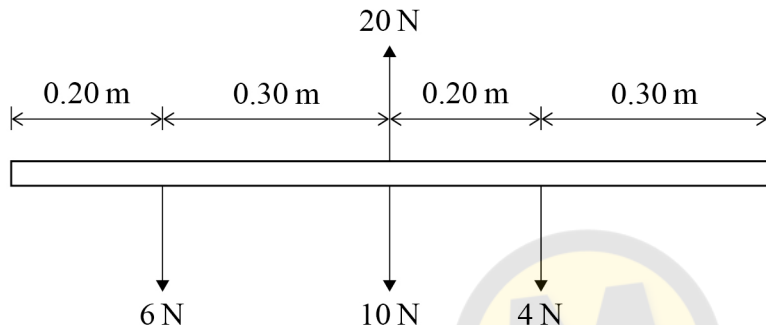
C 1.1 N m

☐

D 1.9 N m

☐☐

The diagram shows the forces acting on a uniform rod.



Which statement is correct?

[1 mark]

- A** The rod is in equilibrium.
- B** For equilibrium, an anticlockwise moment of 1.0 N m is needed.
- C** For equilibrium, a clockwise moment of 1.0 N m is needed.
- D** For equilibrium, the 10 N force should be increased to 20 N.

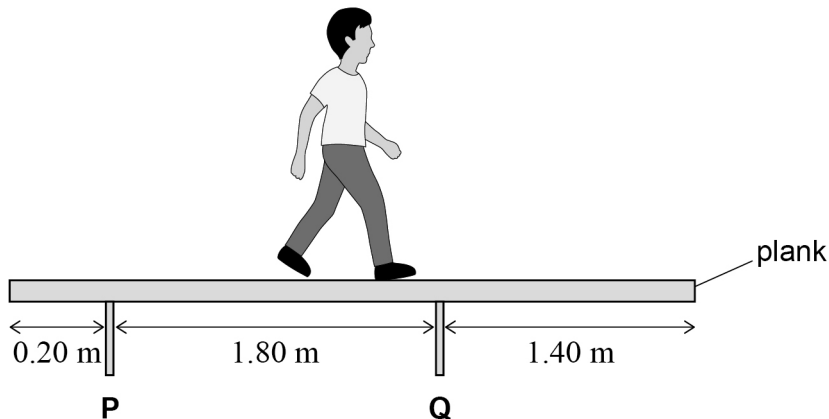
☐ ☐

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☐ ☐

☐ ☐

- 9 A uniform plank weighs 1200 N and rests on two pillars **P** and **Q**.
P and **Q** are 1.80 m apart.
P is 0.20 m from one end of the plank. **Q** is 1.40 m from the other end of the plank.
A man weighs 800 N and walks along the plank away from pillar **P**.



What is the horizontal distance between pillar **P** and the centre of mass of the man when the plank starts to tip?

[1 mark]

A 0.45 m

☐

B 2.25 m

☐☐

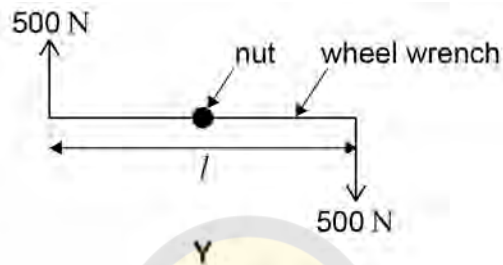
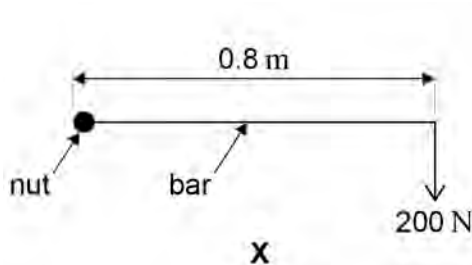
C 2.45 m

☐

D 3.15 m

☐

A car wheel nut can be loosened by applying a force of 200 N on the end of a bar of length 0.8 m as in **X**. A car mechanic is capable of applying forces of 500 N simultaneously in opposite directions on the ends of a wheel wrench as in **Y**.



What is the minimum length l of the wrench which would be needed for him to loosen the nut?

[1 mark]

A 0.16 m

B 0.32 m

C 0.48 m

D 0.64 m

☐☐☐☐☐