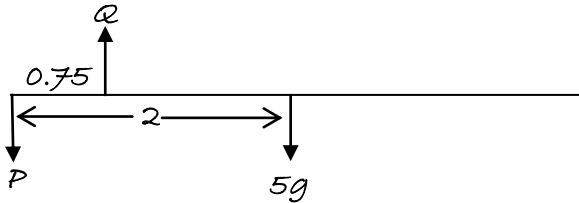## Edexcel A level Maths Moments

Section 1: The moment of a force
Solutions to Exercise level 2

1.

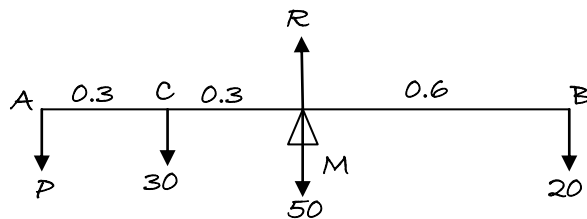Taking moments about left-hand end: $0.75Q - 5g \times 2 = 0$

$$0.75Q = 10g$$

$$Q = \frac{40}{3}g \text{ N upwards}$$

Resolving vertically: $Q - P - 5g = 0$

$$P = \frac{40}{3}g - 5g = \frac{25}{3}g \text{ N downwards}$$

2.

Taking moments about M: $0.6P + 30 \times 0.3 - 20 \times 0.6 = 0$

$$0.6P + 9 - 12 = 0$$
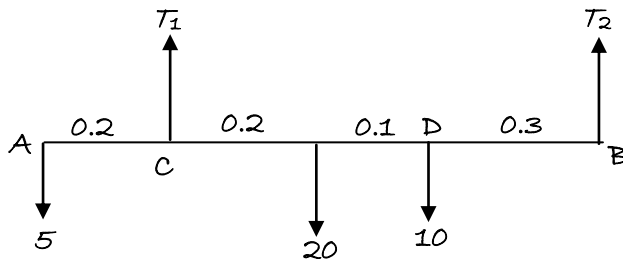
$$0.6P = 3$$

$$P = 5$$

The magnitude of P is 5 N.

Resolving vertically: $R - P - 30 - 50 - 20 = 0$

$$R = 100 + P = 105$$

The reaction at the fulcrum is 105 N.

3.

Taking moments about B: $(5 \times 0.8) + (20 \times 0.4) + (10 \times 0.3) - 0.6T_1 = 0$
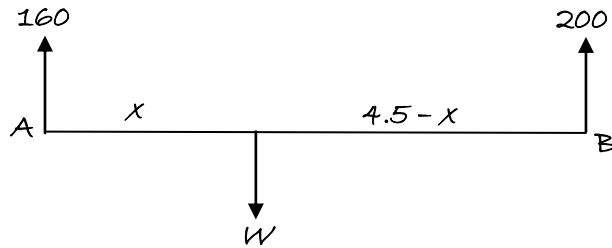
$$0.6T_1 = 15$$

$$T_1 = 25$$

$T_1 + T_2 - 5 - 20 - 10 = 0$

$T_2 = 35 - 25 = 10$

The tensions in the strings are 25 N and 10 N.

4.

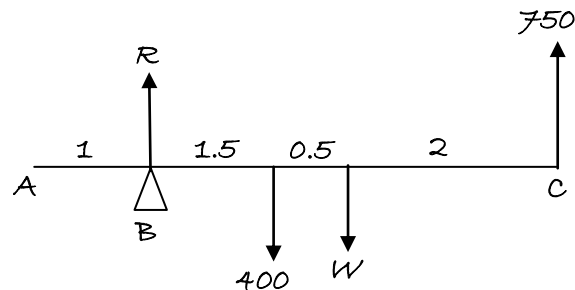Resolving vertically: $160 + 200 - W = 0$

$$W = 360$$

Taking moments about A: $(200 \times 4.5) - Wx = 0$
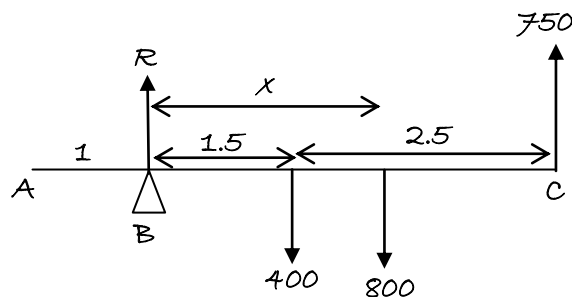
$$360x = 900$$

$$x = 2.5$$

5. (i)

Taking moments about B: $(4 \times 750) - (1.5 \times 400) - 2W = 0$

$$2W = 3000 - 600$$

$$W = 1200$$

The maximum weight is 1200 N.

(ii)

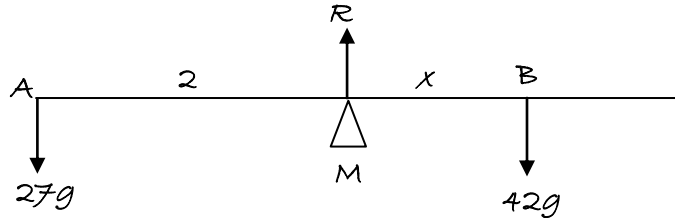# Edexcel A level Maths Moments 1 Exercise solutions

Taking moments about B: $(4 \times 750) - (1.5 \times 400) - 800x = 0$

$$800x = 2400$$
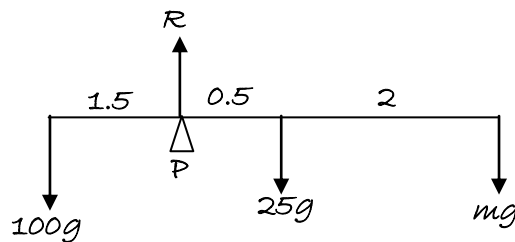
$$x = 3$$

He can walk 3 m from B towards C.

6.

Taking moments about M: $(27g \times 2) - 42gx = 0$

$$x = \frac{27 \times 2}{42} = \frac{9}{7}$$

He must sit $\frac{9}{7}$ m from the other end.
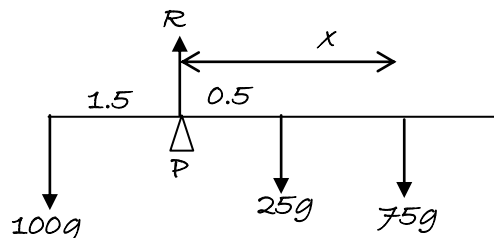
7. (i)

Taking moments about P: $100g \times 1.5 - 25g \times 0.5 - 2.5mg = 0$

$$2.5m = 150 - 12.5$$

$$m = 55$$

The maximum mass is 55 kg.

(ii)

Taking moments about P: $100g \times 1.5 - 25g \times 0.5 - 75gx = 0$
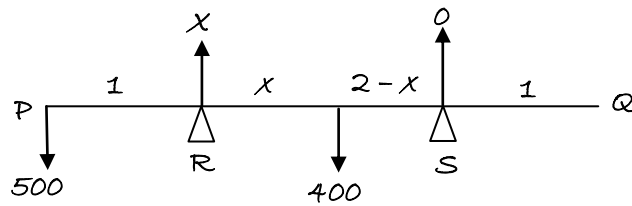
$$75x = 150 - 12.5$$

$$x = 1.83$$

He can walk 1.83 m from the side of the ship.

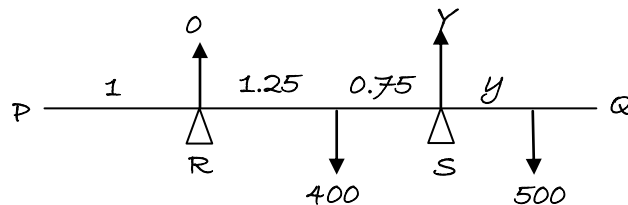8.   (i) If the beam is just about to tip about R, the reaction force at S is zero.

Taking moments about R: $500 \times 1 = 400x = 0$

$$x = 1.25$$

The centre of mass of the beam is 2.25 m from P.

(ii) The beam will tip about S when the reaction force at R = 0.

Taking moments about S: $400 \times 0.75 - 500y = 0$

$$y = 0.6$$

He is 0.4 m from Q when the beam is about to tip.