



Answer all the questions in the spaces provided.

- 1 (a) State the principle of moments.

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[1]

- (b) A metal sign of uniform thickness and of width 1.00 m at its upper edge hangs from two vertical, rigid supports, as shown in Fig. 1.1.

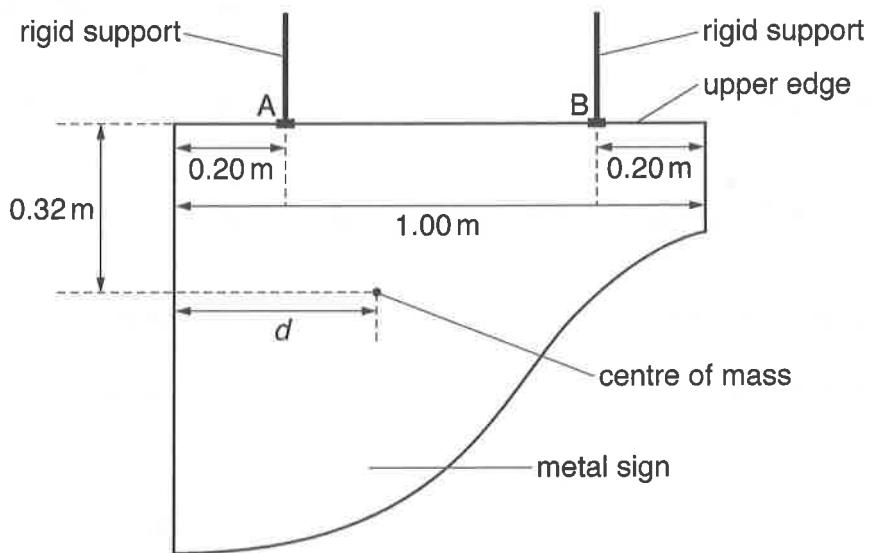


Fig. 1.1

The sign is hinged and swings freely from the rigid supports at points A and B.

The supports are 0.20 m from each edge of the sign.

The mass of the sign is 4.5 kg.

The centre of mass of the sign is 0.32 m below its upper edge.

- (i) The ratio of the tensions in the two supports is $\frac{3}{7}$.

Calculate the magnitude of each tension.

tension in the support at A = N

tension in the support at B = N
[2]



- (II) Using your answers to (b)(i), determine the horizontal distance d of the centre of mass from the left edge of the metal sign.

$$d = \dots \text{ m} [2]$$

- (c) A horizontal wind now blows on the face of the sign so it hangs at an angle θ to the vertical, as shown in Fig. 1.2.

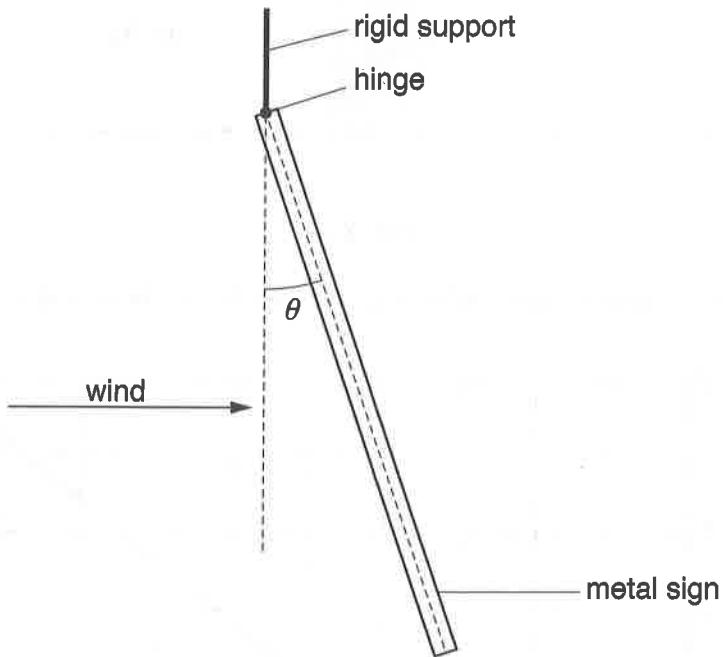


Fig. 1.2

Explain why the force exerted by each support on the sign now has a horizontal component.

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[1]

[Total: 6]

