

- 3 (a) A cylinder is made from a material of density 2.7 g cm^{-3} . The cylinder has diameter 2.4 cm and length 5.0 cm .

Show that the cylinder has weight 0.60 N .

[3]

- (b) The cylinder in (a) is hung from the end A of a non-uniform bar AB, as shown in Fig. 3.1.

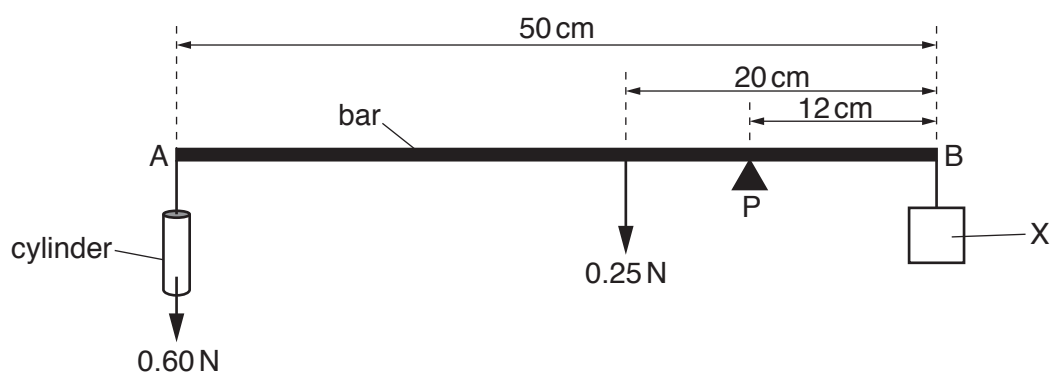


Fig. 3.1

The bar has length 50 cm and has weight 0.25 N . The centre of gravity of the bar is 20 cm from B. The bar is pivoted at P. The pivot is 12 cm from B.

An object X is hung from end B. The weight of X is adjusted until the bar is horizontal and in equilibrium.

- (i) Explain what is meant by *centre of gravity*.

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.....[1]

- (ii) Calculate the weight of X.

weight of X = N [3]

- (c) The cylinder is now immersed in water, as illustrated in Fig. 3.2.



Fig. 3.2

An upthrust acts on the cylinder and the bar is not in equilibrium.

- (i) Explain the origin of the upthrust.

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[2]

- (ii) Explain why the weight of X must be reduced in order to obtain equilibrium for AB.

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[1]

[Total: 10]