

- 1 (a) Define *moment* of a force about a point.

[2]

- (b) Fig. 1.1 shows a force diagram that represents a load that is being lifted by the boom of a mobile crane.

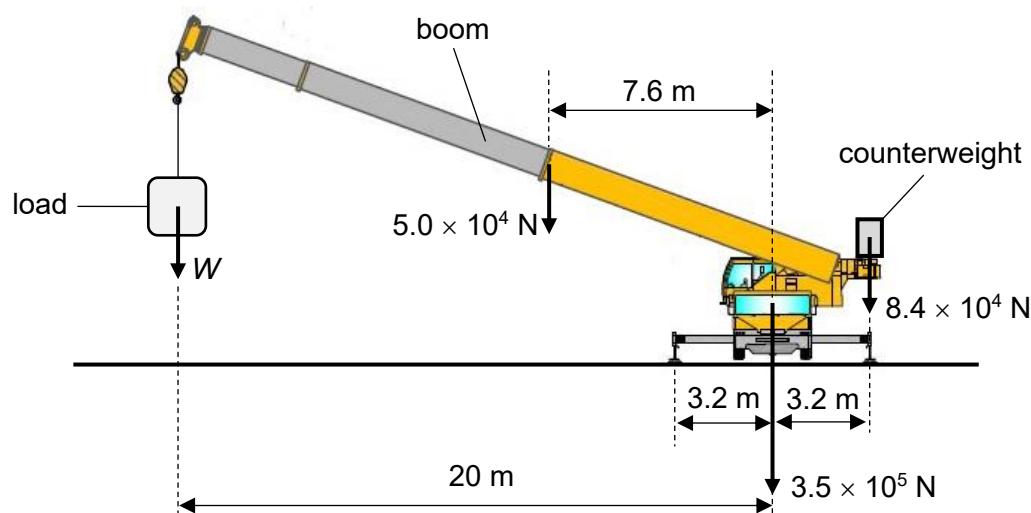


Fig. 1.1

The weight of the mobile crane is $3.5 \times 10^5 \text{ N}$, the weight of the boom is $5.0 \times 10^4 \text{ N}$ and the weight of the load is W . A counterweight of $8.4 \times 10^4 \text{ N}$ is placed onto the crane to allow heavier loads to be lifted.

- (i) The mobile crane will pivot about a point if the load is too heavy. On Fig. 1.1, mark this point and label it P.

[1]

- (ii) Explain why the addition of a counterweight enables the crane to lift heavier loads.

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[2]

- (iii) Use the principle of moments to determine the maximum weight of the load that can be lifted by the crane at a constant speed.

$$W = \text{N} \quad [2]$$

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