



QUESTION WORKBOOK

Moments and equilibrium

Mechanics · Year 12

AQA 3.4.1.2 · CIE 4.1, 4.2 · OCR A 3.2.3

10 questions · 30 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 Define the moment of a force about a point, and state its SI unit. [2]

A2 A force of 15 N acts at a perpendicular distance of 0.40 m from a pivot. Calculate the moment of the force. [2]

A3 State the principle of moments for a body in equilibrium. [2]

SECTION B · Standard

B1 A uniform metre rule is pivoted at its centre. A 2.0 N weight hangs 0.20 m to the left of the pivot. How far from the pivot must a 4.0 N weight hang on the right to balance the rule? [3]

- B2** Two children sit on a see-saw pivoted at its centre. One of weight 300 N sits 1.2 m from the pivot. At what distance from the pivot must a child of weight 450 N sit on the other side to balance it? [3]

- B3** A uniform beam of weight 120 N and length 4.0 m rests horizontally on two supports, one at each end (A on the left, B on the right). A load of 200 N is placed 1.0 m from A. Calculate the upward force provided by each support. [4]

- B4** Two antiparallel forces of 8.0 N act on a bar, separated by a perpendicular distance of 0.25 m. State what this pair of forces is called and calculate its turning effect. [3]

SECTION C · Stretch

- C1** A uniform rod of weight 40 N and length 2.0 m is hinged at one end and held horizontal by a vertical cable attached at the other end. Calculate the tension in the cable and the vertical force exerted by the hinge on the rod. [4]

- C2** A non-uniform beam balances on a pivot placed 0.40 m from its left-hand end when a 2.0 N weight hangs from that end. The centre of mass of the beam is 0.65 m from the left-hand end. Calculate the weight of the beam. [4]

- C3** A door handle is fitted on the edge of the door furthest from the hinge. Explain, in terms of moments, why this makes the door easier to open. [3]