InkPhysics

QUESTION WORKBOOK

Scalars and vectors

Mechanics · Year 12

AQA 3.4.1.1 · CIE 1.4 · OCR A 2.3.1

11 questions · 38 marks

PRINT EDITION

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SECTION A · Warm-up

A1 For each quantity below, tick whether it is a scalar or a vector. [4]

	scalar	vector
distance	☐	☐
velocity	☐	☐
energy	☐	☐
momentum	☐	☐
temperature	☐	☐
force	☐	☐
speed	☐	☐
displacement	☐	☐

A2 State the difference between a scalar quantity and a vector quantity, giving one example of each. [2]

A3 Two forces act on a box along the same straight line: 9.0 N to the right and 4.0 N to the left. State the magnitude and direction of the resultant force. [2]

SECTION B · Standard

B1 Forces of 3.0 N and 4.0 N act on a particle at right angles to each other. Calculate the magnitude of the resultant force and the angle it makes with the 3.0 N force. [4]

B2 A force of 12.0 N acts at 30° above the horizontal. Calculate the horizontal and vertical components of the force. [3]

B3 An aircraft climbs with a velocity of 60 m s^{-1} at 25° above the horizontal. Calculate the horizontal and vertical components of its velocity. [3]

B4 A walker travels 3.0 km due east, then 4.0 km due north. Calculate (a) the total distance travelled, (b) the magnitude of the displacement, and (c) the bearing of the displacement. [4]

B5 A crate of weight 20 N rests on a slope inclined at 35° to the horizontal. Calculate the components of the weight parallel to and perpendicular to the slope. Show that your two components are consistent with the original weight. [4]

SECTION C · Stretch

C1 Two forces act on a particle: 6.0 N due east and 8.0 N due north. A third force keeps the particle in equilibrium. Determine the magnitude of the third force and its direction as a bearing. [4]

C2 Forces of 5.0 N and 8.0 N act on a point with an angle of 60° between their directions. By resolving into components (or otherwise), calculate the magnitude of the resultant and the angle it makes with the 8.0 N force. [5]

C3 Three forces of 5.0 N, 12 N and 13 N act on a particle which remains in equilibrium. Explain, using a vector triangle, how this is possible, and state the angle between the 5.0 N and 12 N forces. [3]