



QUESTION WORKBOOK

Vectors in three dimensions

Vectors · Year 12–13

7 questions · 24 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 Find the magnitude of the vector $6\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$. [2]

A2 Given $\mathbf{a} = 6\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$, write down the unit vector in the direction of $\mathbf{a}$, and find a vector of magnitude 21 that is parallel to $\mathbf{a}$. [3]

SECTION B · Standard

B1 The points $A(1, 2, -1)$ and $B(3, -2, 5)$ have position vectors $\mathbf{a}$ and $\mathbf{b}$ respectively. Find AB , the exact distance AB , and the midpoint of AB . [4]

B2 The vector $a\mathbf{i} + 4\mathbf{j} + 8\mathbf{k}$ has magnitude 12. Find the possible values of a . [3]

B3 Show that the points $P(1, 1, 2)$, $Q(3, 5, 4)$ and $R(6, 11, 7)$ are collinear. [3]

SECTION C · Stretch

C1 The points $A(1, 1, 1)$, $B(2, 3, 3)$ and $C(3, -1, 2)$ form a triangle. Show that the triangle is right-angled and isosceles. [6]

C2 The triangle ABC has vertices $A(1, 1, 1)$, $B(2, 3, 3)$ and $C(3, -1, 2)$. Given that the angle at A is a right angle, find the exact area of the triangle. [3]