



QUESTION WORKBOOK

Vectors in three dimensions

Vectors · Year 12–13

7 questions · 20 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 For the same vector, write down the unit vector in its direction, and find a vector of magnitude 21 parallel to it. [2]

SECTION B · Standard

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

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. [4]

C2 Explain why the three-dimensional magnitude formula is Pythagoras applied twice, using the vector $2\mathbf{i} + 3\mathbf{j} + 6\mathbf{k}$ as your example. [3]