

VECTORS IN THREE DIMENSIONS

2 For each of the points P whose coordinates are given, find:

- (i) an $\underline{i}, \underline{j}, \underline{k}$ representation for the position vector \vec{OP} (ii) the magnitude of \vec{OP}
(iii) a unit vector in the direction of \vec{OP} .

(b) $P(6, 8)$ (c) $P(2, 2, 1)$ (d) $P(-3, 4, 5)$

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3 Given vectors $\underline{a} = 6\underline{i} + 3\underline{j} - 2\underline{k}$, $\underline{b} = -4\underline{i} + 3\underline{j} + \underline{k}$ and $\underline{c} = 2\underline{i} + 3\underline{k}$, write:

(b) $\underline{a} + \underline{b} - \underline{c}$ (c) $2\underline{c} + 3\underline{a} - 5\underline{b}$ (d) $3(\underline{c} - \underline{a})$

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- 6 The position vectors of the points P , Q , R and S are respectively $4\mathbf{i} + 3\mathbf{j} - \mathbf{k}$, $5\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$, $2\mathbf{i} - 2\mathbf{j} - 3\mathbf{k}$, $4\mathbf{i} - 4\mathbf{j} + 3\mathbf{k}$. Show that PQ is parallel to RS .

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9 $P(6, 3, -4)$, $Q(3, 1, 1)$ and $R(2, -1, 3)$ are the vertices of a triangle. Show that $|\overrightarrow{RP}| = 3|\overrightarrow{RQ}|$.

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- 10 If $\underline{a} = 2\underline{i} - 3\underline{j} + \underline{k}$, $\underline{b} = 2\underline{i} - 4\underline{j} + 5\underline{k}$, $\underline{c} = -\underline{i} - 4\underline{j} + 2\underline{k}$, find the values of p and q such that $\underline{a} + p\underline{b} + q\underline{c}$ is parallel to the x -axis.

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11 Find the distance of the point $P(1, 4, 3)$ from:

- (a) the y - z plane (b) the x - z plane (e) the y -axis