

Year 2 Pure Chapter 12: Vectors – Exam Questions (Total Marks 22)

- 1 The points $A(2, 7, 3)$ and $B(4, 3, 5)$ are joined to form the line segment AB . The point M is the midpoint of AB . Find the distance from M to the point $C(5, 8, 7)$.

(3 Marks)

- 2 The coordinates of P and Q are $(2, 3, a)$ and $(a - 2, 6, 7)$. Given that the distance from P to Q is $\sqrt{14}$, find the possible values of a .

(3 Marks)

- 3 $\overrightarrow{AB}$ is the vector $-3\mathbf{i} + t\mathbf{j} + 5\mathbf{k}$, where $t > 0$. Given that $|\overrightarrow{AB}| = 5\sqrt{2}$, show that $\overrightarrow{AB}$ is parallel to $6\mathbf{i} - 8\mathbf{j} - \frac{5}{2}t\mathbf{k}$.

(3 Marks)

4 P is the point $(5, 6, -2)$, Q is the point $(2, -2, 1)$ and R is the point $(2, -3, 6)$.

a Find the vectors $\overrightarrow{PQ}$, $\overrightarrow{PR}$ and $\overrightarrow{QR}$.

b Hence, or otherwise, find the area of triangle PQR .

(2 Marks Each)

5 The points D , E and F have position vectors $\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$, $\begin{pmatrix} 5 \\ 3 \\ 4 \end{pmatrix}$ and $\begin{pmatrix} 2 \\ -1 \\ 8 \end{pmatrix}$ respectively.

- a** Find the vectors $\overrightarrow{DE}$, $\overrightarrow{EF}$ and $\overrightarrow{FD}$.
- b** Find $|\overrightarrow{DE}|$, $|\overrightarrow{EF}|$ and $|\overrightarrow{FD}|$ giving your answers in exact form.
- c** Describe triangle DEF .

(2 Marks Each)

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A particle of mass 2 kg is acted upon by three forces:

$$\mathbf{F}_1 = (b\mathbf{i} + 2\mathbf{j} + \mathbf{k}) \text{ N}$$

$$\mathbf{F}_2 = (3\mathbf{i} - b\mathbf{j} + 2\mathbf{k}) \text{ N}$$

$$\mathbf{F}_3 = (-2\mathbf{i} + 2\mathbf{j} + (4 - b)\mathbf{k}) \text{ N}$$

Given that the particle accelerates at 3.5 m s^{-2} , work out the possible values of b .

(3 Marks)