Vectors – Questions

Q1) a) Show that the points A$(-7,-8,1)$, B$(18,17,11)$, and T$(3,2,5)$ are collinear.

b) Hence calculate the ratio in which T divides AB.

Q2) a) Show that the points M$(2,5,3)$, N$(4,1,7)$, and P$(5,-1,9)$ are collinear.

b) Hence calculate the ratio in which N divides MP.

Q3) A and C are the points $(1,3,-2)$ and $(4,-3,4)$ respectively.

Point B divides AC in the ratio 1: 2. Find the coordinates of B.

Q4) $A=(-2,3,5), B=(4,0,7)$ and $C=(2,2,1)$

Calculate the angle ABC.

Q5) $P=(3,2,0), Q=(5,-6,1)$ and $R=(4,0,-9)$

Calculate the angle PQR.

Q6) Determine whether the following pairs of vectors are perpendicular.

a) $\underline{p}=\begin{pmatrix}-1\\-3\\-2\end{pmatrix}$ and $q=\begin{pmatrix}8\\-10\\11\end{pmatrix}$

b) $\underline{c}=\begin{pmatrix}6\\8\\9\end{pmatrix}$ and $\underline{d}=\begin{pmatrix}5\\3\\-6\end{pmatrix}$

Q7) $\underline{p}=\begin{pmatrix}2\\p\\-1\end{pmatrix}$ and $\underline{q}=\begin{pmatrix}3\\-4\\4\end{pmatrix}$ are perpendicular. Find the value of p.

Vectors – Solutions

Q1) a) $\overrightarrow{AT} = \frac{2}{3}\overrightarrow{TB}$ showing that $\overrightarrow{AT}$ and $\overrightarrow{TB}$ are parallel, but since T is a common point, A, T, and B, are collinear.

b) T divides AB in a ratio of 2:3

Q2) a) $\overrightarrow{MN} = 2\overrightarrow{NP}$ showing that $\overrightarrow{MN}$ and $\overrightarrow{NP}$ are parallel, but since N is a common point, M, N, and P, are collinear.

b) N divides MP in a ratio of 2:1

Q3) $B = (2, 1, 0)$

Q4) $ABC = 96°$

Q5) $PQR = 79°$

Q6) a) Since $\underline{p} \cdot \underline{q} = 0$, $\underline{p}$ and $\underline{q}$ are perpendicular

b) Since $\underline{c} \cdot \underline{d} = 0$, $\underline{c}$ and $\underline{d}$ are perpendicular

Q7) $p = \frac{1}{2}$