## Vectors

1. Work out the magnitude of the vector $2 \mathbf{i}-3 \mathbf{j}+4 \mathbf{k}$.
2. $P, Q$ and $R$ have the coordinates $(2,-4,5),(3,1,3)$ and $(6,16,-3)$ respectively.
a) Write down the components of $\overrightarrow{P Q}$.
b) Hence show that the points $P, Q$ and $R$ are collinear.
3. The point $S$ divides $\overrightarrow{X Y}$ in the ratio 3:2. Find the coordinates of $S$.
4. Prove that the triangle $X Y Z$ is right-angled at $Y$.

5. In triangle $F G H, F$ has coordinates $(2,3,1), G$ is $(5,-2,3)$ and $H$ is $(-1,0,3)$. Calculate the angle GFH.

6. $V A B C D$ is a pyramid with rectangular base $A B C D$.

The vector $\overrightarrow{A B}, \overrightarrow{A D}$ and $\overrightarrow{A V}$ are given by:
$\overrightarrow{A B}=8 i+2 j+2 k$
$\xrightarrow{\overrightarrow{A D}}=-2 i+10 j-2 k$
$\overrightarrow{A V}=I+7 j+7 k$.


Express $\overrightarrow{C V}$ in component form.
7. The diagram shows two vectors $p$ and $q$, with $|p|=2$ and $|q|=3$. The angle between the vectors is $60^{\circ}$.
a) Evaluate
i) p.p
ii) $\quad 9.9$
iii) p.q
b) Another vector $v$ is defined by $v=3 p+2 q$. Evaluate $v . v$ and hence write down $|\mathbf{v}|$.

## Revision

8. The line with equation $y=5 x+k$, where $k$ is a constant, is a tangent to the curve with equation $y=2 x^{2}+x-5$.
Calculate the value of $k$ and hence find the point of contact.
