# 12B ijk and unit vectors

1. Consider the points $A(1,5,-2)$ and $B(0,-3,7)$.

a) Find the position vectors of $A$ and $B$ in $ijk$ notation.

b) Find the vector $\overrightarrow{AB}$ as a column vector

2. The vectors $\boldsymbol{a}$ and $\boldsymbol{b}$ are given as:

$\boldsymbol{a} = \begin{pmatrix} 2 \\ -3 \\ 5 \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} 4 \\ -2 \\ 0 \end{pmatrix}$.

a) Find:

i) $4\boldsymbol{a} + \boldsymbol{b}$ ii) $2\boldsymbol{a} - 3\boldsymbol{b}$

b) State, with a reason, whether either of these vectors is parallel to $4\boldsymbol{i} - 5\boldsymbol{k}$

3. Find the magnitude of
   $\boldsymbol{a} = 2\boldsymbol{i} - \boldsymbol{j} + 4\boldsymbol{k}$, and hence find $\hat{\boldsymbol{a}}$, the unit vector in the direction of $\boldsymbol{a}$.

4. Given the vector:
   $\boldsymbol{a} = 2\boldsymbol{i} - \boldsymbol{j} + 4\boldsymbol{k}$, with magnitude $\sqrt{21}$, calculate the angle between the vector and the $x$, $y$, and $z$ axes

5. The points $A$ and $B$ have position vectors $4\boldsymbol{i} + 2\boldsymbol{j} + 7\boldsymbol{k}$ and $3\boldsymbol{i} + 4\boldsymbol{j} - \boldsymbol{k}$ relative to a fixed origin O. Find $\overrightarrow{AB}$ and show that $\Delta OAB$ is isosceles.