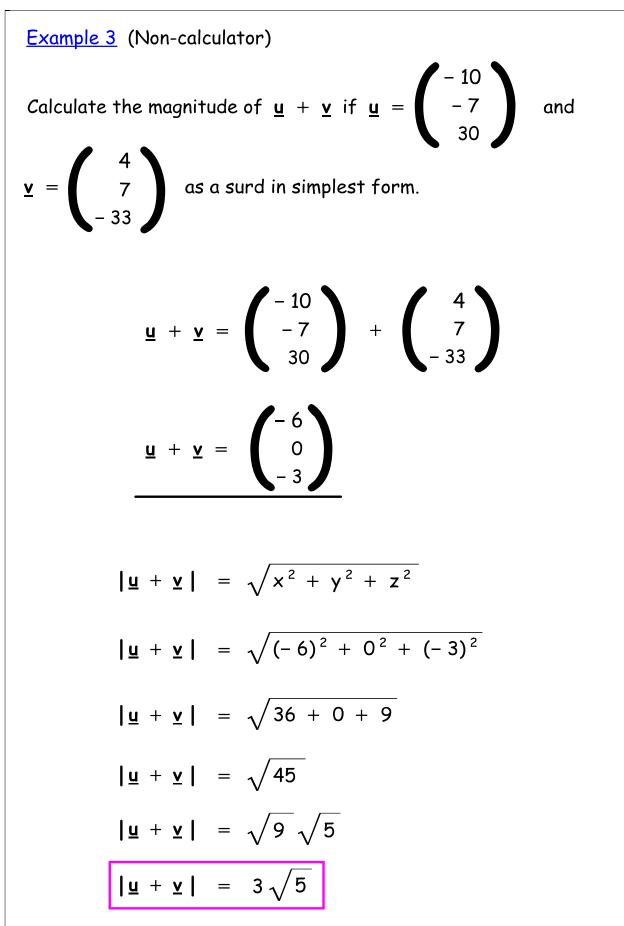
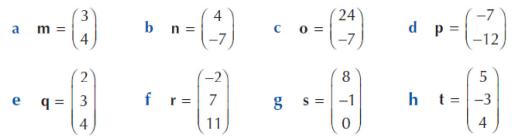


Example 2 (Calculator)
Calculate the magnitude of
$$3\underline{a} - 4\underline{b}$$
 if $\underline{a} = \begin{pmatrix} 2\\ -1 \end{pmatrix}$ and
 $\underline{b} = \begin{pmatrix} -6\\ -2 \end{pmatrix}$. Write the answer as a surd in simplest form.
 $3\underline{a} - 4\underline{b} = 3\begin{pmatrix} 2\\ -1 \end{pmatrix} - 4\begin{pmatrix} -6\\ -2 \end{pmatrix}$
 $3\underline{a} - 4\underline{b} = \begin{pmatrix} 6\\ -3 \end{pmatrix} - \begin{pmatrix} -24\\ -8 \end{pmatrix}$
 $3\underline{a} - 4\underline{b} = \begin{pmatrix} 30\\ 5 \end{pmatrix}$
 $|3\underline{a} - 4\underline{b}| = \sqrt{x^2 + y^2}$
 $|3\underline{a} - 4\underline{b}| = \sqrt{30^2 + 5^2}$
 $|3\underline{a} - 4\underline{b}| = \sqrt{900 + 25}$
 $|3\underline{a} - 4\underline{b}| = \sqrt{925}$
 $|3\underline{a} - 4\underline{b}| = \sqrt{25}\sqrt{37}$
 $|3\underline{a} - 4\underline{b}| = 5\sqrt{37}$



Questions

1 Calculate the magnitude of each vector leaving your answer as a surd in simplest form where appropriate.



- 2 Calculate the magnitude of the resultant vectors leaving your answer as a surd in simplest form where appropriate.
 - $\begin{array}{c} \mathbf{a} & \begin{pmatrix} 4\\ 5 \end{pmatrix} + \begin{pmatrix} 3\\ 7 \end{pmatrix} & \mathbf{b} & \begin{pmatrix} 2\\ 9 \end{pmatrix} + \begin{pmatrix} -1\\ 2 \end{pmatrix} & \mathbf{c} & \begin{pmatrix} 4\\ -6 \end{pmatrix} + \begin{pmatrix} -5\\ 7 \end{pmatrix} \\ \\ \begin{pmatrix} -6\\ 2 \end{pmatrix} + \begin{pmatrix} -12\\ -7 \end{pmatrix} & \mathbf{e} & \begin{pmatrix} 4\\ 2\\ 3 \end{pmatrix} + \begin{pmatrix} 5\\ 1\\ 1 \end{pmatrix} & \mathbf{f} & \begin{pmatrix} 2\\ 7\\ -1 \end{pmatrix} + \begin{pmatrix} -2\\ 4\\ 4 \end{pmatrix} \\ \\ \begin{array}{c} g\\ (-2\\ -1\\ -1 \end{pmatrix} + \begin{pmatrix} -1\\ 2\\ 2 \end{pmatrix} + \begin{pmatrix} 1\\ 1.5\\ 3 \end{pmatrix} & \mathbf{h} & \begin{pmatrix} 3\\ 5 \end{pmatrix} \begin{pmatrix} 2\\ 2 \end{pmatrix} & \mathbf{i} & \begin{pmatrix} 3\\ 2 \end{pmatrix} \begin{pmatrix} 4\\ 1 \end{pmatrix} \\ \\ \begin{array}{c} g\\ (-2\\ -1\\ -1 \end{pmatrix} + \begin{pmatrix} -1\\ 2\\ 2 \end{pmatrix} + \begin{pmatrix} 1\\ 1.5\\ 3 \end{pmatrix} & \mathbf{h} & \begin{pmatrix} 3\\ 5 \end{pmatrix} \begin{pmatrix} 2\\ 2 \end{pmatrix} & \mathbf{i} & \begin{pmatrix} 3\\ 2 \end{pmatrix} \begin{pmatrix} 4\\ 1 \end{pmatrix} \\ \\ \begin{array}{c} f\\ 4 \end{pmatrix} & \mathbf{j} \\ \\ \begin{array}{c} f\\ (-2) \begin{pmatrix} 3\\ -1 \end{pmatrix} & \mathbf{k} & \begin{pmatrix} -1\\ -5 \end{pmatrix} \begin{pmatrix} 6\\ -3 \end{pmatrix} & \mathbf{l} & \begin{pmatrix} 5\\ 4\\ 2 \end{pmatrix} \begin{pmatrix} 3\\ 3\\ 3 \end{pmatrix} \\ \\ \end{array} \right$

3 Calculate the length of side *AC* of triangle *ABC* where $\overrightarrow{AB} = \begin{pmatrix} 2 \\ 7 \end{pmatrix}$ and $\overrightarrow{BC} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$.

4 If vector $\mathbf{v} = \begin{pmatrix} 2 \\ -2 \\ 4 \end{pmatrix}$ and $\mathbf{u} = \begin{pmatrix} 3 \\ 5 \\ 1 \end{pmatrix}$, calculate the magnitude of: **a** \mathbf{v} **b** \mathbf{u} **c** $\mathbf{v} + \mathbf{u}$ **d** $2\mathbf{v}$ **e** $3\mathbf{u}$ **f** $2\mathbf{v} + 3\mathbf{u}$ **g** $3\mathbf{v} - 2\mathbf{u}$ **h** $5\mathbf{v} - \mathbf{u}$ 5 A ship's journey can be represented by the vectors $\mathbf{a} = \begin{pmatrix} 12 \\ 0 \end{pmatrix}$ then $\mathbf{b} = \begin{pmatrix} 0 \\ 5 \end{pmatrix}$.

Calculate the displacement of the ship assuming distances are in kilometres.

$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3 $2\sqrt{13}$ 4 a $2\sqrt{6}$ b $\sqrt{35}$ c $\sqrt{59}$ d $4\sqrt{6}$ e $3\sqrt{35}$ f $\sqrt{411}$ g $2\sqrt{89}$ h $\sqrt{635}$	
	k $\sqrt{53}$ l $\sqrt{6}$ m $3\sqrt{6}$ n $\sqrt{59}$	5 13 km	