

Non-calculator

Q1 Express each resultant vector in component form:

a) $\begin{pmatrix} 3 \\ -2 \end{pmatrix} + \begin{pmatrix} -1 \\ 5 \end{pmatrix}$

b) $\begin{pmatrix} 2 \\ -1 \end{pmatrix} + \begin{pmatrix} 0 \\ -3 \end{pmatrix} + \begin{pmatrix} -4 \\ 6 \end{pmatrix}$

c) $\begin{pmatrix} -2 \\ 6 \end{pmatrix} - \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

d) $\begin{pmatrix} 8 \\ 6 \end{pmatrix} - \begin{pmatrix} 3 \\ -1 \end{pmatrix} - \begin{pmatrix} -4 \\ 5 \end{pmatrix}$

e) $2\begin{pmatrix} 3 \\ 1 \end{pmatrix} + 3\begin{pmatrix} 3 \\ -2 \end{pmatrix}$

f) $4\begin{pmatrix} 1 \\ -2 \end{pmatrix} - 3\begin{pmatrix} -1 \\ -3 \end{pmatrix}$

g) $\frac{1}{2}\begin{pmatrix} 6 \\ -8 \end{pmatrix} - \frac{2}{3}\begin{pmatrix} -6 \\ 9 \end{pmatrix}$

h) $3\begin{pmatrix} 0 \\ -1 \end{pmatrix} + \begin{pmatrix} -3 \\ 1 \end{pmatrix} - \frac{1}{4}\begin{pmatrix} 12 \\ -8 \end{pmatrix}$

i) $-2\begin{pmatrix} 5 \\ -2 \end{pmatrix} - 5\begin{pmatrix} -3 \\ 4 \end{pmatrix}$

Q2 Express each resultant vector in component form:

a) $\begin{pmatrix} 2 \\ -1 \\ 4 \end{pmatrix} + \begin{pmatrix} 3 \\ 7 \\ -2 \end{pmatrix}$

b) $\begin{pmatrix} 3 \\ 0 \\ -1 \end{pmatrix} - \begin{pmatrix} -1 \\ -4 \\ 3 \end{pmatrix}$

c) $\begin{pmatrix} 1 \\ -2 \\ -3 \end{pmatrix} - \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix} + \begin{pmatrix} -5 \\ 5 \\ -2 \end{pmatrix}$

d) $3\begin{pmatrix} -1 \\ 2 \\ -2 \end{pmatrix} - 2\begin{pmatrix} 1 \\ -3 \\ -1 \end{pmatrix}$

e) $\frac{1}{2}\begin{pmatrix} -6 \\ 8 \\ 10 \end{pmatrix} + \frac{3}{4}\begin{pmatrix} 12 \\ -8 \\ 20 \end{pmatrix}$

f) $2\begin{pmatrix} -1 \\ 6 \\ -4 \end{pmatrix} + 3\begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix} - \begin{pmatrix} 5 \\ 3 \\ 2 \end{pmatrix}$

Q3 Four vectors are such that $\mathbf{a} + \mathbf{d} = \mathbf{c}$ and $2\mathbf{a} + 2\mathbf{b} = \mathbf{c}$.

a) Express \mathbf{d} in terms of \mathbf{a} and \mathbf{b} .

b) Express \mathbf{d} in terms of \mathbf{b} and \mathbf{c} .

Q4 In triangle PQR, $\overrightarrow{PR} = \begin{pmatrix} 6 \\ -4 \\ -2 \end{pmatrix}$, $\overrightarrow{RQ} = \begin{pmatrix} 5 \\ 2 \\ -3 \end{pmatrix}$ and M is the midpoint of PR.

a) Express \overrightarrow{PQ} in component form.

b) Express \overrightarrow{MQ} in component form.

Q5 Calculate the magnitude of each vector. Non-integer values should be expressed as exact surds.

a) $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$

b) $\begin{pmatrix} -5 \\ 12 \end{pmatrix}$

c) $\begin{pmatrix} -1 \\ -2 \end{pmatrix}$

d) $\begin{pmatrix} 2 \\ -2 \\ 1 \end{pmatrix}$

e) $\begin{pmatrix} 4 \\ 1 \\ -1 \end{pmatrix}$

f) $\begin{pmatrix} -2 \\ 4 \\ 4 \end{pmatrix}$

Q6 $\mathbf{u} = \begin{pmatrix} 1 \\ -3 \end{pmatrix}$ and $\mathbf{v} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$. Determine $|2\mathbf{u} + \mathbf{v}|$.