Column Vectors

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Examples

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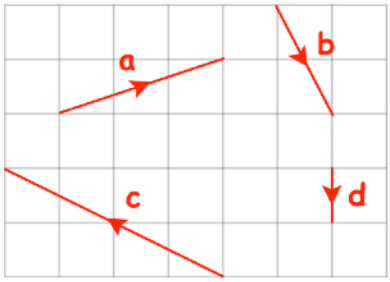
Workout

Question 1: The vectors **a**, **b**, **c** and **d** are shown on the grid.



(a) Write **a** as a column vector

(b) Write **b** as a column vector

(c) Write **c** as a column vector

(d) Write **d** as a column vector

Question 2: On a grid, draw and label the following vectors.

(a) $\mathbf{a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ (b) $\mathbf{b} = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$ (c) $\mathbf{c} = \begin{pmatrix} -3 \\ -7 \end{pmatrix}$ (d) $\mathbf{d} = \begin{pmatrix} 0 \\ -6 \end{pmatrix}$

(e) $\mathbf{e} = \begin{pmatrix} 8 \\ -1 \end{pmatrix}$ (f) $\mathbf{f} = \begin{pmatrix} -4 \\ 0 \end{pmatrix}$

Question 3: Shown on the grid is the vector **a**

$\mathbf{a} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$

(a) Draw the vector 2**a** on the grid.

(b) Write 2**a** as a column vector

(c) Draw the vector 3**a** on the grid.

(d) Write 3**a** as a column vector

(e) Write 5**a** as a column vector

Question 4: Given $\mathbf{a} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} -9 \\ -7 \end{pmatrix}$

Write the following as column vectors

(a) 3**a** (b) 2**b** (c) 5**c** (d) $\frac{1}{2}\mathbf{a}$ (e) $\frac{1}{4}\mathbf{b}$

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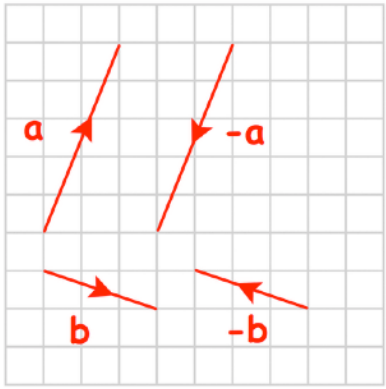
Question 5: Shown on the grid are vectors **a**, **−a**, **b** and **−b**



(a) Write **a** as a column vector
(b) Write **−a** as a column vector

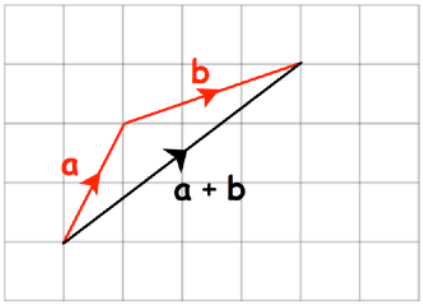
(c) Write **b** as a column vector
(d) Write **−b** as a column vector

Question 6: Given $\mathbf{a} = \begin{pmatrix} 2 \\ 11 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -8 \\ 3 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} -4 \\ -6 \end{pmatrix}$

Write the following as column vectors

(a) **−a** (b) **−b** (c) **−c** (d) **−2a** (e) **−4b** (f) $-\frac{1}{2}\mathbf{b}$

Question 7: Shown on the grid are the vector **a**, **b** and **a + b**



(a) Write **a** as a column vector

(b) Write **b** as a column vector

(c) Write **a + b** as a column vector

Question 8: Given $\mathbf{a} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ 7 \end{pmatrix}$ $\mathbf{c} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$ and $\mathbf{e} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$

Work out the following as column vectors

(a) **a + b** (b) **b + c** (c) **a + c** (d) **c + d**

(e) **b + e** (f) **d + a** (g) **e + d** (h) **2a + b**

(i) **3c + b** (j) **a + 5b** (k) **4b + 3c** (l) **7c + d**

(m) **a + 2e** (n) **8e + 3d** (o) **a + c + e** (p) **2b + 3d + 10e**

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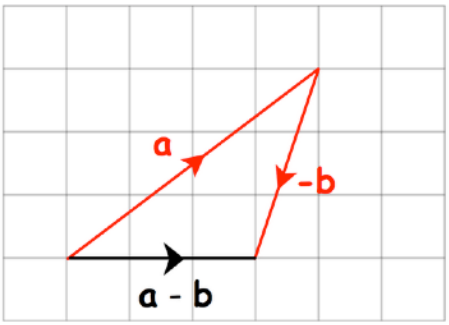
Question 9: $\mathbf{a} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$



Shown on the grid are the vector $\mathbf{a}$, $-\mathbf{b}$ and $\mathbf{a} - \mathbf{b}$

Write down the vector $\mathbf{a} - \mathbf{b}$ as a column vector.

Question 10: Given $\mathbf{a} = \begin{pmatrix} 12 \\ 15 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 7 \\ 3 \end{pmatrix}$ $\mathbf{c} = \begin{pmatrix} 1 \\ 8 \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$ and $\mathbf{e} = \begin{pmatrix} -8 \\ -9 \end{pmatrix}$

Work out the following as column vectors

(a) $\mathbf{a} - \mathbf{b}$ (b) $\mathbf{a} - \mathbf{c}$ (c) $\mathbf{b} - \mathbf{c}$ (d) $\mathbf{c} - \mathbf{b}$

(e) $\mathbf{a} - \mathbf{d}$ (f) $\mathbf{e} - \mathbf{b}$ (g) $\mathbf{e} - \mathbf{d}$ (h) $3\mathbf{a} - \mathbf{b}$

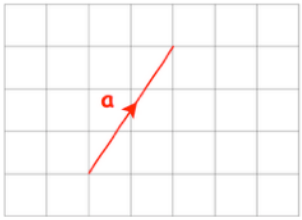
(i) $2\mathbf{c} - 2\mathbf{b}$ (j) $6\mathbf{b} - 4\mathbf{a}$ (k) $3\mathbf{d} - 4\mathbf{b}$ (l) $7\mathbf{e} - 10\mathbf{d}$

Question 11: $\mathbf{a} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 8 \\ -1 \end{pmatrix}$

Work out $2\mathbf{a} + \mathbf{b}$ as a column vector

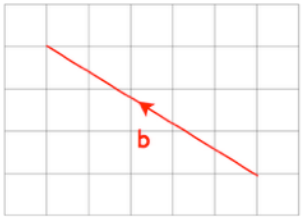
Apply

Question 1: Mark has been asked to draw the vector $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$



What mistake(s) has Mark made?

Question 2: Abby has been asked to draw the vector $\mathbf{b} = \begin{pmatrix} 5 \\ -3 \end{pmatrix}$



What mistake(s) has Abby made?

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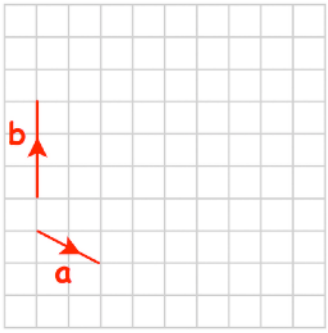
Question 3: The vectors **a** and **b** are shown on the grid.



(a) On the grid, draw the vector $-2\mathbf{a}$

(b) On the grid, draw the vector $\mathbf{a} + \mathbf{b}$

(c) Work out $3\mathbf{a} + 4\mathbf{b}$ as a column vector

Question 4: $\mathbf{a} = \begin{pmatrix} -5 \\ p \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} q \\ 1 \end{pmatrix}$

Given $\mathbf{a} + \mathbf{b} = \begin{pmatrix} 1 \\ -7 \end{pmatrix}$

Work out the values of p and q

Question 5: $\mathbf{c} = \begin{pmatrix} -3 \\ q \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} p \\ 2 \end{pmatrix}$

Given $4\mathbf{d} - \mathbf{c} = \begin{pmatrix} 1 \\ -7 \end{pmatrix}$

Work out the values of p and q

Answers

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