Name:

Exam Style Questions

Column Vectors

Corbettmaths

Ensure you have: Pencil, pen, ruler, protractor, pair of compasses and eraser

You may use tracing paper if needed

Guidance

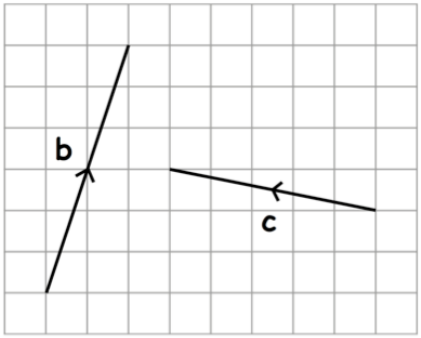
1. Read each question carefully before you begin answering it.
2. Don't spend too long on one question.
3. Attempt every question.
4. Check your answers seem right.
5. Always show your workings

Revision for this topic

www.corbettmaths.com/contents

Video 353a

1. Shown below are vectors **b** and **c**



(a) Write the column vector that represents **b**

$\begin{pmatrix} 2 \\ 6 \end{pmatrix}$

(1)

(b) Write the column vector that represents **c**

$\begin{pmatrix} -5 \\ 1 \end{pmatrix}$

(1)

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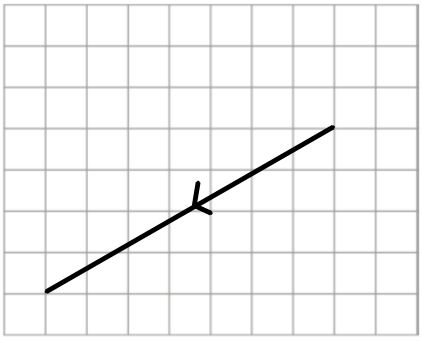
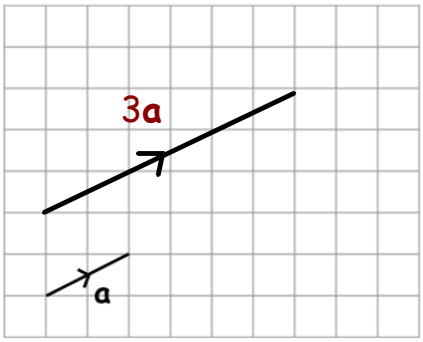
2. Draw and label the vector $\begin{pmatrix} -7 \\ -4 \end{pmatrix}$



(1)

3. The vector **a** is shown on the grid below.



On the grid, draw and label the vector 3**a**

(1)

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4. $\mathbf{a} = \begin{pmatrix} 8 \\ 3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$

Work out **a** + **b** as a column vector

$\begin{pmatrix} 9 \\ \dots \\ 7 \\ \dots \end{pmatrix}$

(1)

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5. $\mathbf{a} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 1 \\ -5 \end{pmatrix}$

Work out **a** + **b** as a column vector

$\begin{pmatrix} 3 \\ \dots \\ -4 \\ \dots \end{pmatrix}$

(1)

6. $\mathbf{a} = \begin{pmatrix} -7 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -6 \\ 10 \end{pmatrix}$

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

$\begin{pmatrix} -1 \\ \cdots \\ -6 \end{pmatrix}$

(1)

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7. $\mathbf{c} = \begin{pmatrix} 2 \\ -8 \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$

Work out $\mathbf{d} - \mathbf{c}$ as a column vector

$\begin{pmatrix} 1 \\ \cdots \\ 8 \end{pmatrix}$

(1)

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8. $\mathbf{c} = \begin{pmatrix} 5 \\ -7 \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} -1 \\ -3 \end{pmatrix}$

(a) Work out $3\mathbf{c}$

$\begin{pmatrix} 15 \\ \cdots \\ -21 \end{pmatrix}$

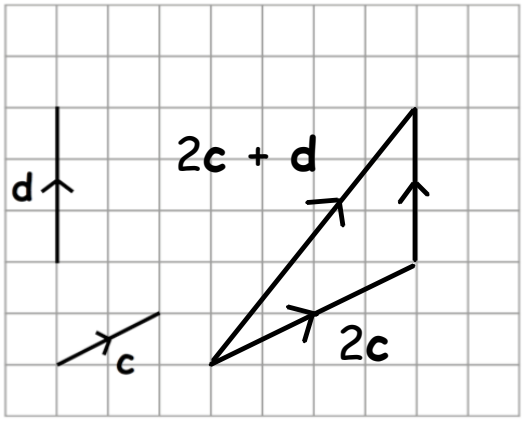
(1)

(b) Work out $-\mathbf{d}$

$\begin{pmatrix} 1 \\ \cdots \\ 3 \end{pmatrix}$

(1)

9. Shown below are the vectors **c** and **d**



(a) Draw and label the vector 2**c**

(1)

(b) Work out 2**c** + **d**

$\begin{pmatrix} 4 \\ \cdots \\ 5 \\ \cdots \end{pmatrix}$

(1)

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10. $\mathbf{a} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$

Work out 4**a** + 2**b**

$4\mathbf{a} = \begin{pmatrix} 8 \\ 0 \end{pmatrix}$ $2\mathbf{b} = \begin{pmatrix} 2 \\ 10 \end{pmatrix}$

$\begin{pmatrix} 10 \\ \cdots \\ 10 \\ \cdots \end{pmatrix}$

(2)

11. $\mathbf{c} = \begin{pmatrix} -7 \\ 3 \end{pmatrix}$ and $\mathbf{d} = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$

Work out $3\mathbf{c} + 2\mathbf{d}$

$$3\mathbf{c} = \begin{pmatrix} -21 \\ 9 \end{pmatrix} \quad 2\mathbf{d} = \begin{pmatrix} 8 \\ 16 \end{pmatrix}$$

$\begin{pmatrix} -13 \\ \vdots \\ 25 \\ \vdots \end{pmatrix}$

(2)

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12. $\mathbf{e} = \begin{pmatrix} -4 \\ 5 \end{pmatrix}$ and $\mathbf{f} = \begin{pmatrix} -5 \\ -3 \end{pmatrix}$

Work out $5\mathbf{e} + 3\mathbf{f}$

$$5\mathbf{e} = \begin{pmatrix} -20 \\ 25 \end{pmatrix} \quad 3\mathbf{f} = \begin{pmatrix} -15 \\ -9 \end{pmatrix}$$

$\begin{pmatrix} -35 \\ \vdots \\ 16 \\ \vdots \end{pmatrix}$

(2)

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13. $\mathbf{a} = \begin{pmatrix} 9 \\ 6 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$

Work out $3\mathbf{a} - \mathbf{b}$

$$3\mathbf{a} = \begin{pmatrix} 27 \\ 18 \end{pmatrix}$$

$\begin{pmatrix} 23 \\ \vdots \\ 19 \\ \vdots \end{pmatrix}$

(2)

14. $\mathbf{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$

Work out $5\mathbf{a} - 4\mathbf{b}$

$5\mathbf{a} = \begin{pmatrix} 10 \\ -15 \end{pmatrix}$ $4\mathbf{b} = \begin{pmatrix} -8 \\ -4 \end{pmatrix}$

$\begin{pmatrix} 18 \\ \cdots \\ -11 \\ \cdots \end{pmatrix}$

(2)

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15. $\mathbf{a} = \begin{pmatrix} -5 \\ 6 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 7 \\ -8 \end{pmatrix}$

Work out $9\mathbf{b} + 4\mathbf{a}$

$9\mathbf{b} = \begin{pmatrix} 63 \\ -72 \end{pmatrix}$ $4\mathbf{a} = \begin{pmatrix} -20 \\ 24 \end{pmatrix}$

$\begin{pmatrix} 43 \\ \cdots \\ -48 \\ \cdots \end{pmatrix}$

(2)

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16. $\mathbf{c} = \begin{pmatrix} 0 \\ 7 \end{pmatrix}$ and $\mathbf{d} = \begin{pmatrix} -3 \\ 11 \end{pmatrix}$

Work out $7\mathbf{d} - 2\mathbf{c}$

$7\mathbf{d} = \begin{pmatrix} -21 \\ 77 \end{pmatrix}$ $2\mathbf{c} = \begin{pmatrix} 0 \\ 14 \end{pmatrix}$

$\begin{pmatrix} -21 \\ \cdots \\ 63 \\ \cdots \end{pmatrix}$

(2)

17. $\mathbf{c} = \begin{pmatrix} 5 \\ -3 \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$ $\mathbf{e} = \begin{pmatrix} 12 \\ 6 \end{pmatrix}$

Work out $8\mathbf{c} + \mathbf{d} + 2\mathbf{e}$

$8\mathbf{c} = \begin{pmatrix} 40 \\ -24 \end{pmatrix}$ $2\mathbf{e} = \begin{pmatrix} 24 \\ 12 \end{pmatrix}$

$\begin{pmatrix} 62 \\ \dots \\ -7 \\ \dots \end{pmatrix}$

(3)

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18. $\mathbf{a} = \begin{pmatrix} -4 \\ p \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} q \\ 1 \end{pmatrix}$

Given $\mathbf{a} + \mathbf{b} = \begin{pmatrix} -1 \\ -8 \end{pmatrix}$

Work out the values of p and q.

p = -9 q = 3

(2)

19. $\mathbf{c} = \begin{pmatrix} -2 \\ q \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} p \\ 3 \end{pmatrix}$

Given $6\mathbf{d} - \mathbf{c} = \begin{pmatrix} 26 \\ 22 \end{pmatrix}$

Work out the values of p and q.

$6\mathbf{d} = \begin{pmatrix} 6p \\ 18 \end{pmatrix}$

6p + 2 = 26
6p = 24
p = 4

18 - q = 22
q = -4

p = 4 q = -4

(2)

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20. $\mathbf{a} = \begin{pmatrix} 7 \\ p \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} q \\ -5 \end{pmatrix}$

Given $7\mathbf{a} - 2\mathbf{b} = \begin{pmatrix} 50 \\ 1.25 \end{pmatrix}$

Work out the values of p and q.

$7\mathbf{a} = \begin{pmatrix} 49 \\ 7p \end{pmatrix}$ $2\mathbf{b} = \begin{pmatrix} 2q \\ -10 \end{pmatrix}$

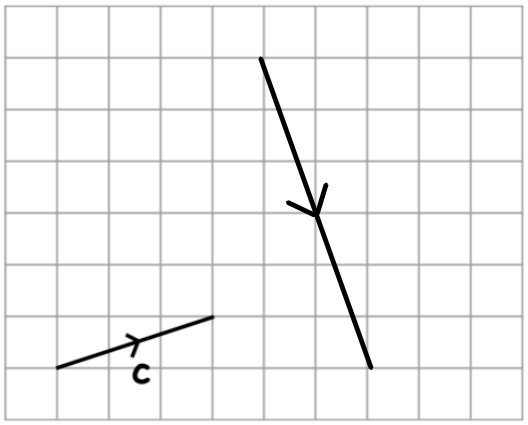
7p + 10 = 1.25
7p = -8.75
p = -1.25

49 - 2q = 50
q = -0.5

p = -1.25 q = -0.5

(2)

21. The vector **c** = $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$ is shown on the grid.



Find a vector that is perpendicular to **c** and twice the length.

$\begin{pmatrix} -2 \\ 6 \end{pmatrix}$ or $\begin{pmatrix} 2 \\ \cdots \\ -6 \\ \cdots \end{pmatrix}$

(2)