Vectors: fact sheet

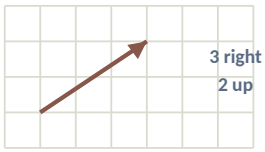
Extra topic (not on the planner) · Learn these facts

Column vector

$\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ top: across, bottom: up

Negative: left or down

Drawing



Count squares from the start

Arrow at the end

Adding

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

Add the tops, add the bottoms

Multiplying

$2 \begin{pmatrix} 5 \\ 2 \end{pmatrix} = \begin{pmatrix} 10 \\ 4 \end{pmatrix}$

Multiply both numbers

Subtracting

a − 2b

a: 5 and 2. 2b: 6 and −2

top: 5 − 6 = −1

bottom: 2 − −2 = 4

Take away top from top

Careful with negatives

Vectors in shapes

AB = AO + OB

= −a + b

Go round a route you know

Backwards: change the sign

Parallel

2b is parallel to b

and twice as long

Same direction

Writing vectors

a	bold letter (underline it)
AB	from A to B
−a	same length, opposite way

Key words

- **Vector** has a size and a direction
- **Column vector** (across over up)
- **Resultant** the vector you get by adding
- **Parallel** in the same direction

Exam tips

- Top number: right (+) or left (−).
- Bottom number: up (+) or down (−).
- Do the multiplying first, then add or subtract.
- Draw the arrow from the start point given.
- In shapes, find a route along vectors you know.
- Going backwards along a vector: negative.

Vectors: fact sheet

Vectors · Extra topic · Learn the method

Worked example

QUESTION

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

Work out $2\mathbf{a} - 3\mathbf{b}$ as a column vector.

ANSWER

$$\mathbf{a} = \begin{pmatrix} 3 \\ 4 \end{pmatrix} \qquad \mathbf{b} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

$$2\mathbf{a} = \begin{pmatrix} 6 \\ 8 \end{pmatrix} \qquad 3\mathbf{b} = \begin{pmatrix} 15 \\ -6 \end{pmatrix}$$

$$2\mathbf{a} - 3\mathbf{b} = \begin{pmatrix} 6 - 15 \\ 8 - -6 \end{pmatrix} = \begin{pmatrix} -9 \\ 14 \end{pmatrix}$$

Multiply first, then subtract top from top and bottom from bottom.

How to do it

1. Write each vector as a column.
2. Multiply both numbers by the number in front.
3. Add or subtract the tops.
4. Add or subtract the bottoms.
5. Drawing: across, then up, with an arrow.

Model answer:

$$\begin{pmatrix} -9 \\ 14 \end{pmatrix}$$

Watch out

- Only multiplying the top number.
- Subtracting a negative wrongly.
- Drawing the arrow the wrong way.