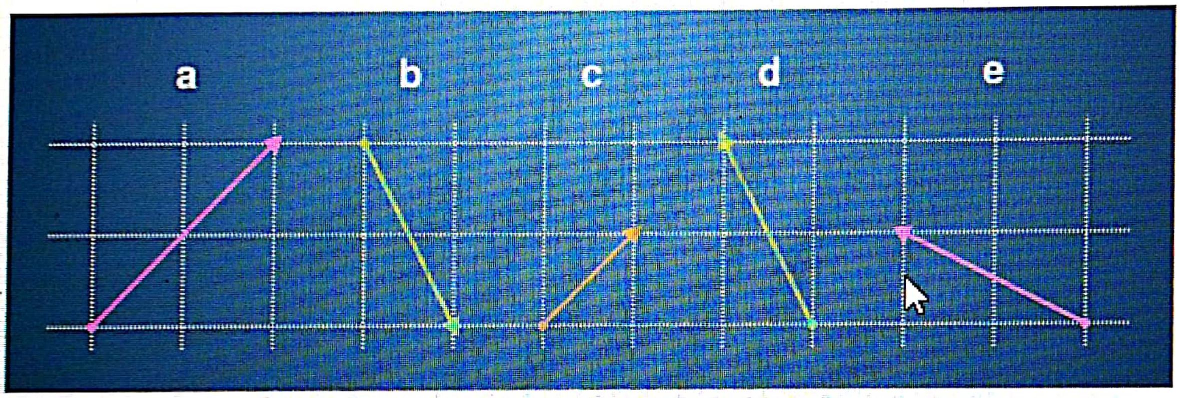
Doing some vector operations

TOTAL POINTS 7

1. This aim of this quiz is to familiarise yourself with vectors and some basic vector operations.

For the following questions, the vectors $\mathbf{a}$, $\mathbf{b}$, $\mathbf{c}$, $\mathbf{d}$ and $\mathbf{e}$ refer to those in this diagram:



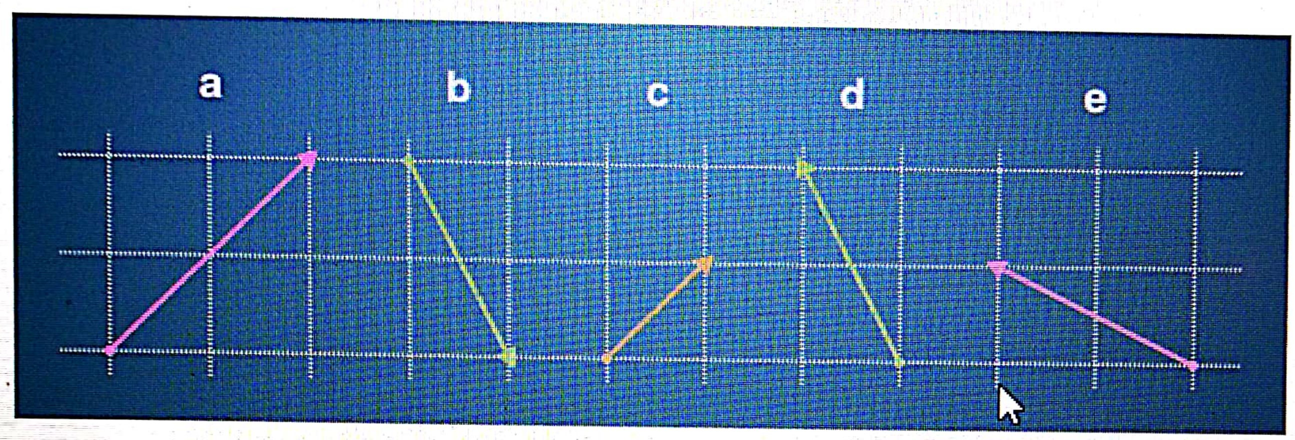
The sides of each square on the grid are of length 1. What is the numerical representation of the vector $\mathbf{a}$?

- ○ $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$
- ◉ $\begin{bmatrix} 2 \\ 2 \end{bmatrix}$

✓ **Correct**

You can get the numerical representation by following the arrow along the grid.

2.



Which vector in the diagram corresponds to $\begin{bmatrix} -1 \\ 2 \end{bmatrix}$?

○ Vector $\mathbf{a}$

○ Vector $\mathbf{b}$

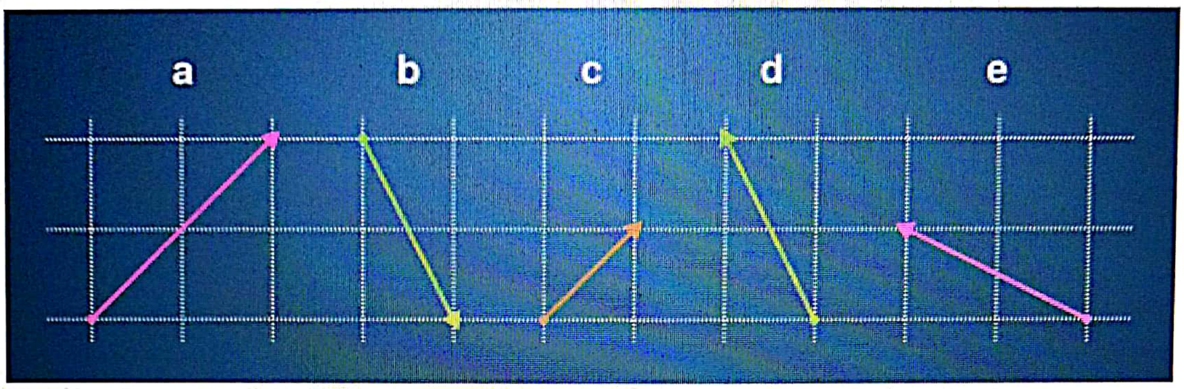
○ Vector $\mathbf{c}$

◉ Vector $\mathbf{d}$

✓ **Correct**

You can get the numerical representation by following the arrow along the grid.

3.



What vector is $2\mathbf{c}$?

Please select all correct answers.

- [ ] $\mathbf{e}$
- [ ] $\begin{bmatrix} -2 \\ 2 \end{bmatrix}$
- [x] $\begin{bmatrix} 2 \\ 2 \end{bmatrix}$

✓ **Correct**

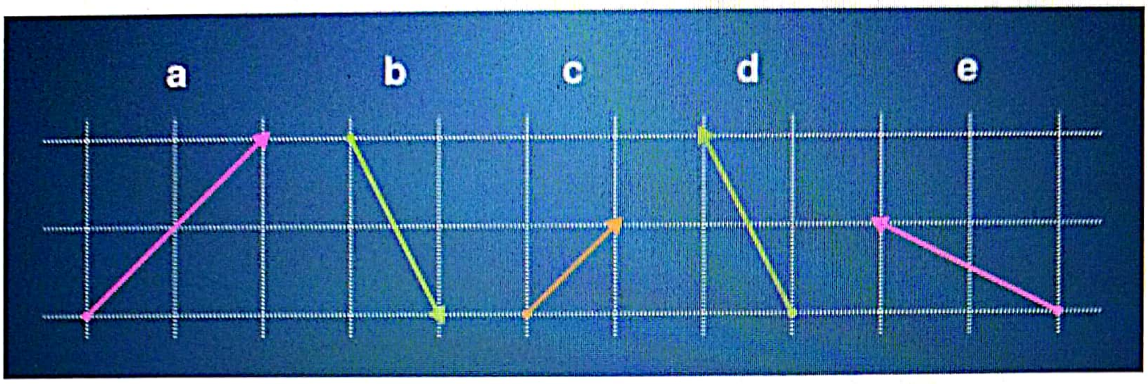
A scalar multiple of a vector can be calculated by multiplying each component.

- [x] $\mathbf{a}$

✓ **Correct**

Multiplying by a positive scalar is like stretching out a vector in the same direction.

4.



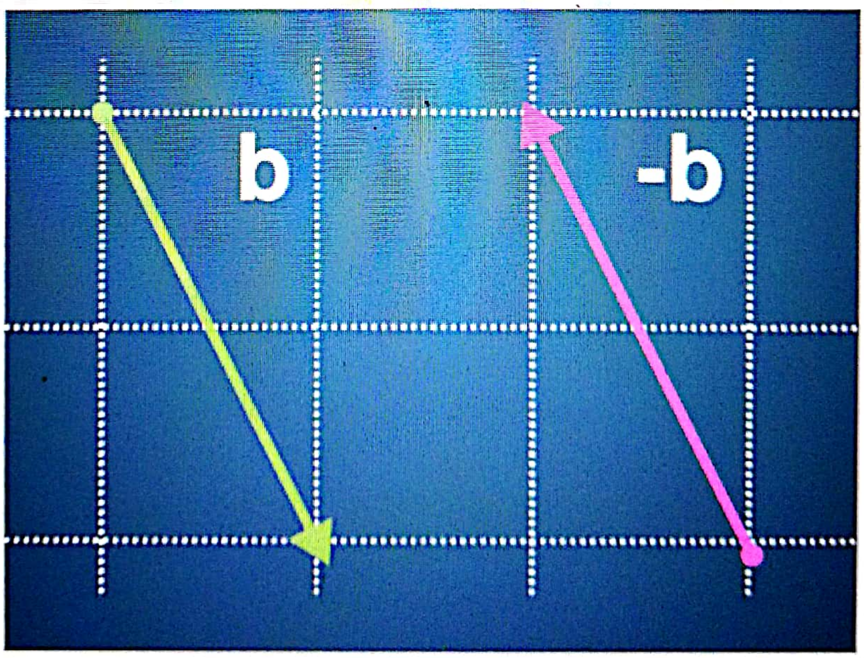
What vector is $-\mathbf{b}$?

Please select all correct answers.

- [ ] $\mathbf{e}$
- [x] $\mathbf{d}$

✓ **Correct**

Multiplying by a negative number points the vector in the opposite direction.



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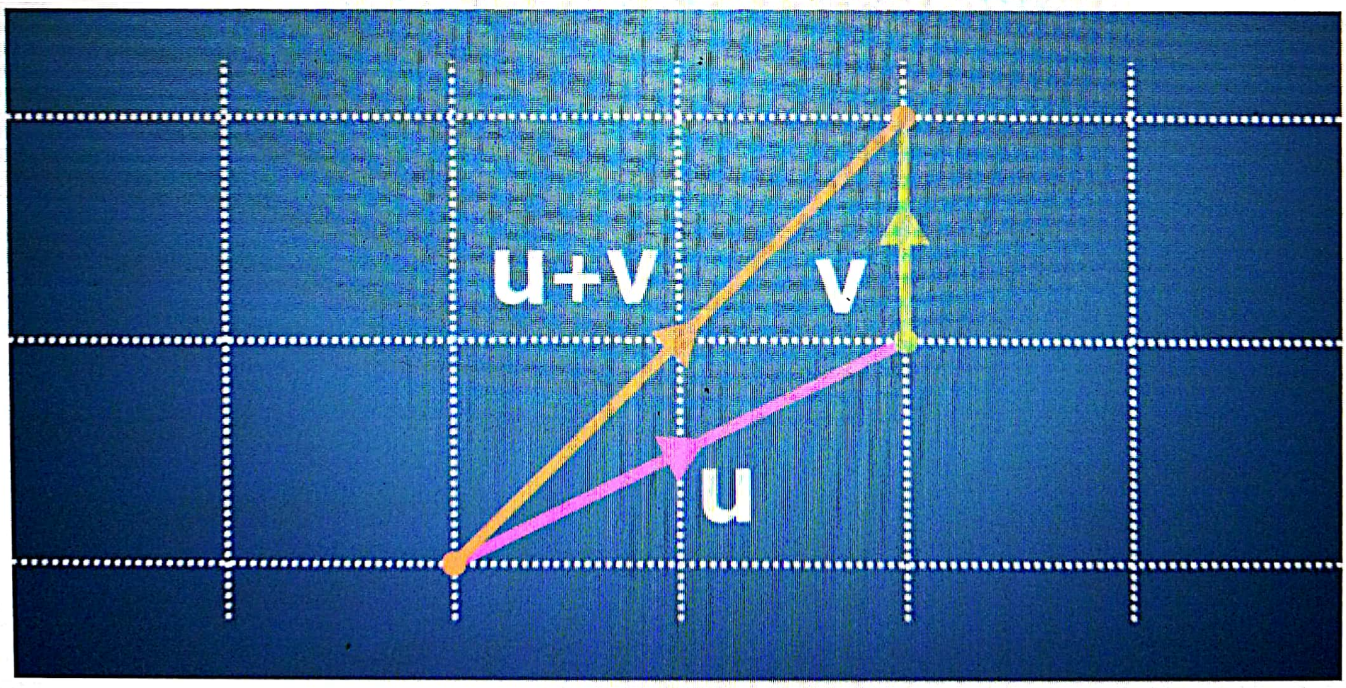
☐ $\begin{bmatrix} -2 \\ 1 \end{bmatrix}$

☑ $\begin{bmatrix} -1 \\ 2 \end{bmatrix}$

✓ **Correct**

A scalar multiple of a vector can be calculated by multiplying each component.

5. In the previous videos you saw that vectors can be added by placing them start-to-end. For example, the following diagram represents the sum of two new vectors, $\mathbf{u} + \mathbf{v}$:



The sides of each square on the grid are still of length 1. Which of the following equations does the diagram represent?

○ $\begin{bmatrix} 1 \\ 2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$

○ $\begin{bmatrix} 1 \\ 2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$

$\bigcirc$ $\begin{bmatrix}1\\2\end{bmatrix}+\begin{bmatrix}1\\0\end{bmatrix}=\begin{bmatrix}2\\2\end{bmatrix}$

$\bigcirc$ $\begin{bmatrix}1\\2\end{bmatrix}+\begin{bmatrix}0\\1\end{bmatrix}=\begin{bmatrix}2\\2\end{bmatrix}$

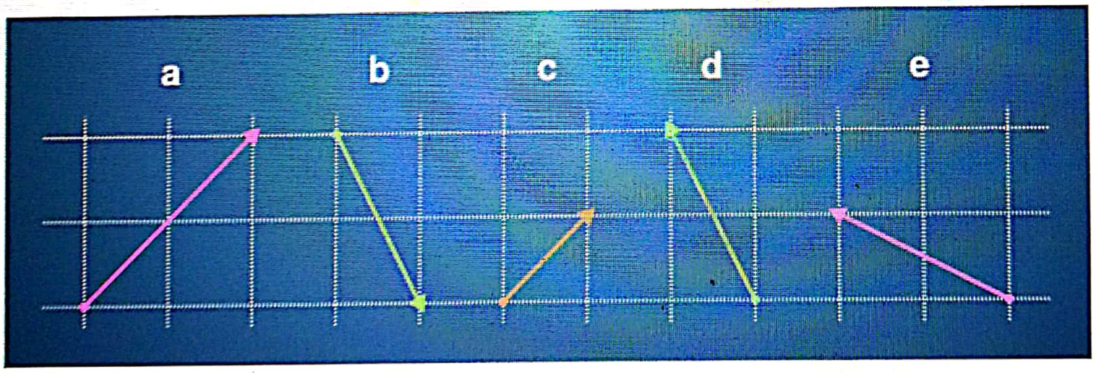
$\odot$ $\begin{bmatrix}2\\1\end{bmatrix}+\begin{bmatrix}0\\1\end{bmatrix}=\begin{bmatrix}2\\2\end{bmatrix}$

$\bigcirc$ $\begin{bmatrix}1\\1\end{bmatrix}+\begin{bmatrix}1\\0\end{bmatrix}=\begin{bmatrix}2\\1\end{bmatrix}$

✓ **Correct**

We can see that summing the vectors by adding them start-to-end and adding up the individual components gives us the same answer.

6. Let's return to our vectors defined by the diagram below:



What is the vector $\mathbf{b}+\mathbf{e}$?

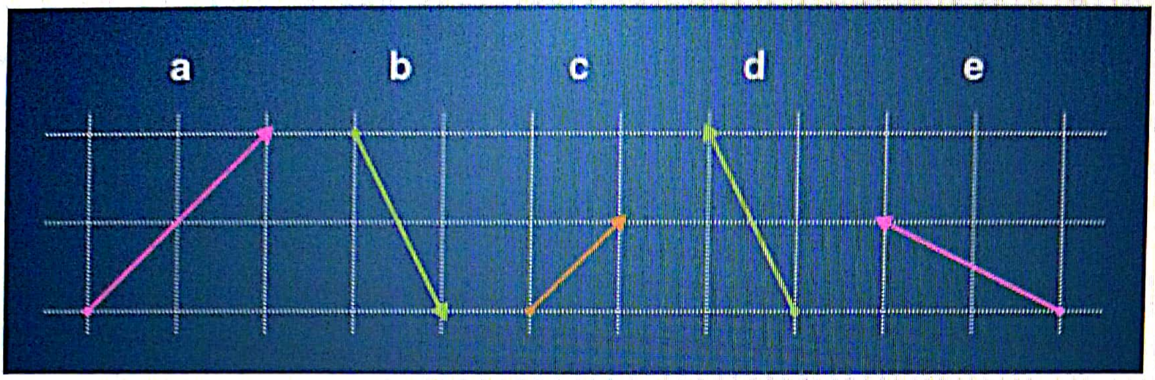
$\bigcirc$ $\begin{bmatrix}2\\-1\end{bmatrix}$

$\bigcirc$ $\begin{bmatrix}1\\3\end{bmatrix}$

$\odot$ $\begin{bmatrix}-1\\-1\end{bmatrix}$

$\bigcirc$ $\begin{bmatrix}-1\\2\end{bmatrix}$

7.



What is the vector $\mathbf{d} - \mathbf{b}$?

- ○ $\begin{bmatrix} 2 \\ -4 \end{bmatrix}$
- ○ $\begin{bmatrix} -4 \\ 2 \end{bmatrix}$
- ○ $\begin{bmatrix} 4 \\ -2 \end{bmatrix}$
- ◉ $\begin{bmatrix} -2 \\ 4 \end{bmatrix}$

✓ **Correct**

Remember that vectors add by attaching the end of one to the start of the other, and that multiplying by a negative number points the vector in the opposite direction.