

Year 10 Vector Starters

Contents

Questions and short answers



▶ Starter 1

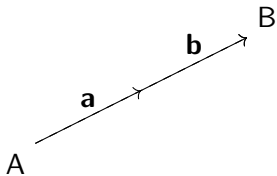
Worked solutions



▶ Starter 1

Starter 1

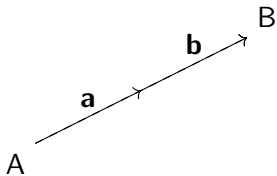
1. Start with zero, add 7, subtract 10, add 6, subtract 3, what is the result?
2. What if you started with -5 ?
3. Add: $\begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix}$



4. Find: $-\begin{pmatrix} 5 \\ 2 \end{pmatrix}$
5. What column vector represents the reverse of the following vector:
 $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$?
6. Write an expression in terms of **a** and **b** that represents the whole journey from A to B.
7. Which vector would undo that journey? How many different ways can you write it?

Starter 1

1. Start with zero, add 7, subtract 10, add 6, subtract 3, what is the result? **0**
2. What if you started with -5 ? **-5**
3. Add: $\begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ **$\begin{pmatrix} 6 \\ 4 \end{pmatrix}$**



4. Find: $-\begin{pmatrix} 5 \\ 2 \end{pmatrix}$ **$\begin{pmatrix} -5 \\ -2 \end{pmatrix}$**
5. What column vector represents the reverse of the following vector:
 $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$? **$\begin{pmatrix} -3 \\ 4 \end{pmatrix}$**
6. Write an expression in terms of **a** and **b** that represents the whole journey from A to B.
 $a + b$
7. Which vector would undo that journey? How many different ways can you write it?

$$\overrightarrow{BA} = -(\mathbf{a} + \mathbf{b}) = -\mathbf{a} - \mathbf{b}$$

Worked Solution: Starter 1, Question 1

Question: Start with zero, add 7, subtract 10, add 6, subtract 3.
What is the result?

Worked Solution:

$$0 + 7 - 10 + 6 - 3 = 7 - 10 + 6 - 3 = -3 + 6 - 3 = 3 - 3 = 0.$$

So the result is 0.

Worked Solution: Starter 1, Question 2

Question: What if you started with -5 ?

Worked Solution:

$$-5 + 7 - 10 + 6 - 3 = 2 - 10 + 6 - 3 = -8 + 6 - 3 = -2 - 3 = -5.$$

The operations have total change 0, so the starting value is unchanged; the result is -5 .

Worked Solution: Starter 1, Question 3

Question: Add $\begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix}$.

Worked Solution: Add corresponding components:

$$\begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 4 + 2 \\ 1 + 3 \end{pmatrix} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}.$$

Worked Solution: Starter 1, Question 4

Question: Find $-\begin{pmatrix} 5 \\ 2 \end{pmatrix}$.

Worked Solution: Multiplying a vector by -1 changes the sign of each component:

$$-\begin{pmatrix} 5 \\ 2 \end{pmatrix} = \begin{pmatrix} -5 \\ -2 \end{pmatrix}.$$

Worked Solution: Starter 1, Question 5

Question: What column vector represents the reverse of the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$?

Worked Solution: The reverse vector has the same length but the opposite direction, so take the negative:

$$-\begin{pmatrix} 3 \\ -4 \end{pmatrix} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}.$$

So the reverse vector is $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$.

Worked Solution: Starter 1, Question 6

Question: Write an expression in terms of **a** and **b** that represents the whole journey from A to B.

Worked Solution: The diagram shows $\overrightarrow{AC} = \mathbf{a}$ and $\overrightarrow{CB} = \mathbf{b}$. The journey from A to B goes via C, so the vectors are added tip-to-tail:

$$\overrightarrow{AB} = \overrightarrow{AC} + \overrightarrow{CB} = \mathbf{a} + \mathbf{b}.$$

So the required expression is **a + b**.

Worked Solution: Starter 1, Question 7

Question: Which vector would undo that journey? How many different ways can you write it?

Worked Solution: The vector that undoes $\overrightarrow{AB}$ is its reverse, $\overrightarrow{BA}$.
Since $\overrightarrow{AB} = \mathbf{a} + \mathbf{b}$,

$$\overrightarrow{BA} = -\overrightarrow{AB} = -(\mathbf{a} + \mathbf{b}) = -\mathbf{a} - \mathbf{b}.$$

So the undo vector can be written in two equivalent forms:

$$\overrightarrow{BA} = -(\mathbf{a} + \mathbf{b}) = -\mathbf{a} - \mathbf{b}.$$