Topic: Combinations of vectors

Question: Find the combination.

$$\overrightarrow{ED} + \overrightarrow{DF}$$

Answer choices:

A $\overrightarrow{FED}$

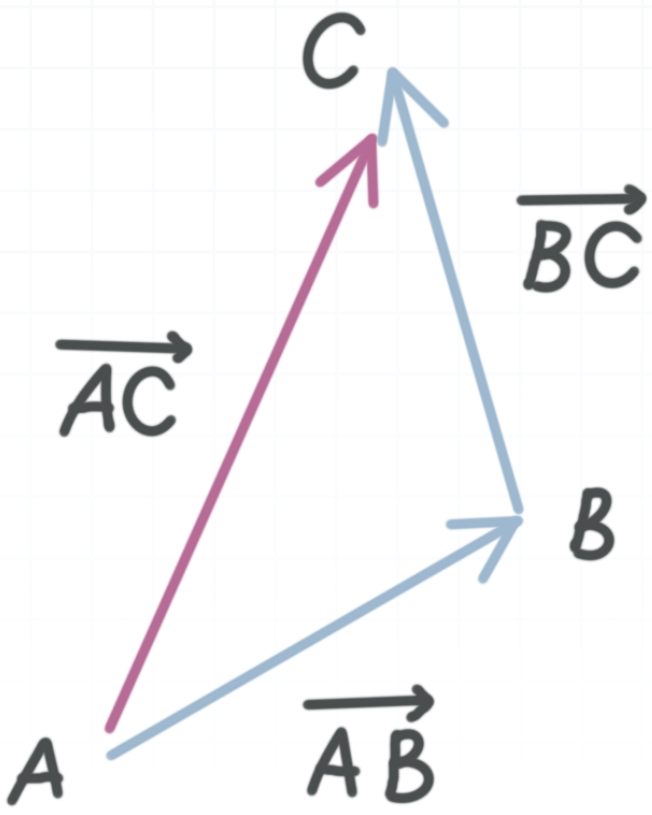
B $\overrightarrow{EF}$

C $\overrightarrow{FE}$

D $\overrightarrow{DEF}$

Solution: B

If you start with two vectors and then find their combination, what you're doing is placing the initial point of one of the vectors at the terminal point of the other vector, and then the combination is the vector that connects the initial point of the first with the terminal point of the second.



So $\overrightarrow{AC}$ is the combination of $\overrightarrow{AB}$ and $\overrightarrow{BC}$. In other words

$$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$$

And even if we didn't have a picture, we can look at $\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$ and tell that what we're really doing is just bypassing B and connecting A directly to C.

So when we're asked to find $\overrightarrow{ED} + \overrightarrow{DF}$, we can say that we're bypassing D and connecting E directly to F. So the combination is

$$\overrightarrow{ED} + \overrightarrow{DF} = \overrightarrow{EF}$$

Topic: Combinations of vectors

Question: Find the combination.

$$\overrightarrow{GH} - \overrightarrow{FH}$$

Answer choices:

A $\overrightarrow{HGF}$

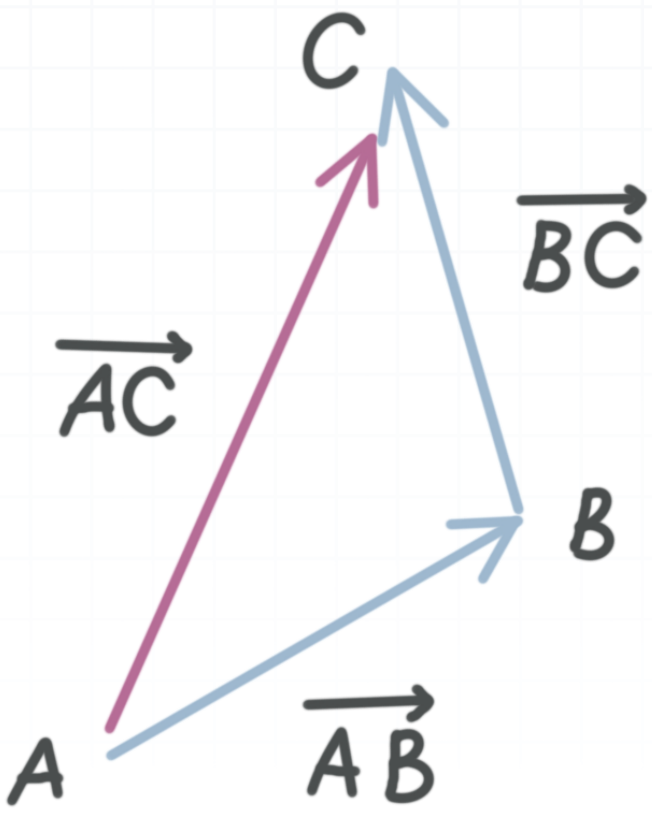
B $\overrightarrow{FGH}$

C $\overrightarrow{FG}$

D $\overrightarrow{GF}$

Solution: D

If you start with two vectors and then find their combination, what you're doing is placing the initial point of one of the vectors at the terminal point of the other vector, and then the combination is the vector that connects the initial point of the first with the terminal point of the second.



So $\overrightarrow{AC}$ is the combination of $\overrightarrow{AB}$ and $\overrightarrow{BC}$. In other words

$$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$$

And even if we didn't have a picture, we can look at $\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$ and tell that what we're really doing is just bypassing B and connecting A directly to C.

When we've been asked to find the difference between two vectors, we want to turn the subtraction problem into an addition problem, which we can do by flipping the direction of the vector that's being subtracted.

So when we're asked to find $\overrightarrow{GH} - \overrightarrow{FH}$, we can flip around the vector being subtracted and change the subtraction to addition.

$$\overrightarrow{GH} - \overrightarrow{FH}$$

$$\overrightarrow{GH} + \overrightarrow{HF}$$

Then we can say that we're bypassing H and connecting G directly to F. So the combination is

$$\overrightarrow{GH} - \overrightarrow{FH} = \overrightarrow{GF}$$

Topic: Combinations of vectors

Question: Find the combination.

$$\overrightarrow{BC} - \overrightarrow{DC} + \overrightarrow{DA}$$

Answer choices:

A $\overrightarrow{BA}$

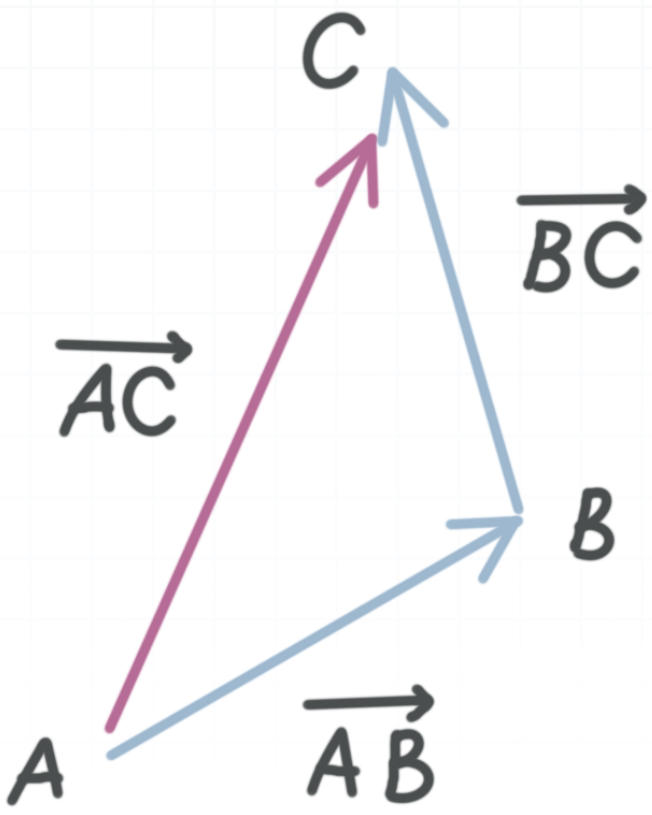
B $\overrightarrow{DB}$

C $\overrightarrow{AC}$

D $\overrightarrow{CD}$

Solution: A

If you start with two vectors and then find their combination, what you're doing is placing the initial point of one of the vectors at the terminal point of the other vector, and then the combination is the vector that connects the initial point of the first with the terminal point of the second.



So $\overrightarrow{AC}$ is the combination of $\overrightarrow{AB}$ and $\overrightarrow{BC}$. In other words

$$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$$

And even if we didn't have a picture, we can look at $\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$ and tell that what we're really doing is just bypassing B and connecting A directly to C.

When we've been asked to find the difference between two vectors, we want to turn the subtraction problem into an addition problem, which we can do by flipping the direction of the vector that's being subtracted.

So when we're asked to find $\overrightarrow{BC} - \overrightarrow{DC} + \overrightarrow{DA}$, we can flip around the vector being subtracted and change the subtraction to addition.

$$\overrightarrow{BC} - \overrightarrow{DC} + \overrightarrow{DA}$$

$$\overrightarrow{BC} + \overrightarrow{CD} + \overrightarrow{DA}$$

Then we can say that we're bypassing C and connecting B directly to D. So the combination becomes

$$\overrightarrow{BD} + \overrightarrow{DA}$$

From here we know that we're bypassing D and connecting B directly to A. So the combination is

$$\overrightarrow{BC} - \overrightarrow{DC} + \overrightarrow{DA} = \overrightarrow{BA}$$