

Vector Moves

Combine directions one component at a time.

HIGH SCHOOL • HSN-VM.B.4

CCSS.Math.Content.HSN-VM.B.4 "(+) Add and subtract vectors."

NAME _____

DATE _____

ADD BY COMPONENTS

To add vectors, add the x-components and add the y-components. To subtract a vector, add its opposite, which changes the sign of each component.

WORKED EXAMPLE

Find $\langle 17, -16 \rangle + \langle 19, 18 \rangle$.

1. Add the x-components: $17 + 19 = 36$.
2. Add the y-components: $-16 + 18 = 2$.
3. Write the sums in order: $\langle 36, 2 \rangle$.

Answer: $\langle 36, 2 \rangle$

PRACTICE 6 problems

1 Find $\langle 5, -8 \rangle + \langle 9, 4 \rangle$.

ANSWER _____

2 Find $\langle 7, 6 \rangle - \langle -3, 10 \rangle$.

ANSWER _____

3 Find $\langle 15, -7 \rangle + \langle -6, -5 \rangle$.

ANSWER _____

4 Find $\langle 1, 13 \rangle - \langle 8, -9 \rangle$.

ANSWER _____

5 Let $a = \langle 6, 11 \rangle$ and $b = \langle -4, 7 \rangle$. Find $a - b$.

ANSWER _____

6 Find $\langle -10, 3 \rangle - \langle 5, -6 \rangle$.

ANSWER _____

APPLY IT Show your work

- 1** On a map, positive x is east and positive y is north. At a music festival, a student walks $\langle 14, 6 \rangle$ blocks from the main gate to a stage, then walks $\langle -5, 9 \rangle$ blocks to a food stand. What is the student's displacement from the main gate?

WORK SPACE

ANSWER _____

- 2** In a coding club, a robot begins at the origin. Its final displacement is $\langle 22, 9 \rangle$ centimeters. Its first command moves it $\langle 7, -4 \rangle$ centimeters. What displacement must its next command make?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Compute $\langle 9, -11 \rangle - \langle -4, 6 \rangle + \langle 7, -4 \rangle$. Explain why subtracting $\langle -4, 6 \rangle$ changes both signs before you combine the vectors.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Find $\langle 5, -8 \rangle + \langle 9, 4 \rangle$.	$\langle 14, -4 \rangle$
2	Find $\langle 7, 6 \rangle - \langle -3, 10 \rangle$.	$\langle 10, -4 \rangle$
3	Find $\langle 15, -7 \rangle + \langle -6, -5 \rangle$.	$\langle 9, -12 \rangle$
4	Find $\langle 1, 13 \rangle - \langle 8, -9 \rangle$.	$\langle -7, 22 \rangle$
5	Let $a = \langle 6, 11 \rangle$ and $b = \langle -4, 7 \rangle$. Find $a - b$.	$\langle 10, 4 \rangle$
6	Find $\langle -10, 3 \rangle - \langle 5, -6 \rangle$.	$\langle -15, 9 \rangle$

PART 2 • APPLY IT

- $\langle 9, 15 \rangle$ blocks, or 9 blocks east and 15 blocks north** Add the displacements component by component:
 $\langle 14, 6 \rangle + \langle -5, 9 \rangle = \langle 9, 15 \rangle$.
- $\langle 15, 13 \rangle$ centimeters** Subtract the first displacement from the final displacement: $\langle 22, 9 \rangle - \langle 7, -4 \rangle = \langle 15, 13 \rangle$.

CHALLENGE

$\langle 20, -21 \rangle$. Subtracting a vector means adding its opposite, so $-\langle -4, 6 \rangle = \langle 4, -6 \rangle$. Then $\langle 9, -11 \rangle + \langle 4, -6 \rangle + \langle 7, -4 \rangle = \langle 20, -21 \rangle$.

Accept equivalent component-vector notation, including ordered pairs when the component order is clear. For word problems, accept the component vector alone or the vector with correct directional language.