LESSON MAKER PRO

Which Way Apart?

Subtract vectors with components and tip-to-tip arrows.

HIGH SCHOOL · PC.NQ.F.12.c

PC.NQ.F.12.c "Explain vector subtraction, v – w, as v + (–w), where –w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction..."

NAME _____ DATE _____

SUBTRACT BY ADDING

To subtract w from v, add -w. The vector -w has the same length as w but points in the opposite direction. Subtract corresponding components. When v and w start at the same point, the arrow from the tip of w to the tip of v represents v - w.

WORKED EXAMPLE

Find v - w if v = (7, -6) and w = (2, -3).

1. Find the additive inverse: -w = (-2, 3).
2. Rewrite the subtraction: v - w = (7, -6) + (-2, 3).
3. Add components: (7 + (-2), -6 + 3) = (5, -3).

Answer: (5, -3)

PRACTICE 6 problems

1 Find v - w if v = (4, 1) and w = (1, 3).

ANSWER _____

2 Find v - w if v = (-3, 5) and w = (2, -1).

ANSWER _____

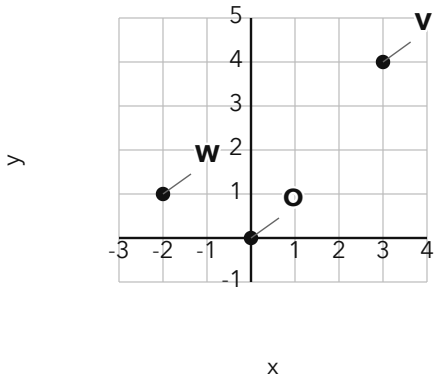
3 Find v - w if v = (-4, -2) and w = (-1, 3).

ANSWER _____

4 Find v - w if v = (0, 6) and w = (-2, 0).

ANSWER _____

5 On the grid, v points from O to V, and w points from O to W. Find the components of v - w. Name the directed segment from one tip to the other that represents v - w.



ANSWER _____

6 If v = (1, -4) and w = (-5, 2), find -w and v - w.

ANSWER _____

APPLY IT Show your work

1 In a video game, two characters start at the same point. Character A moves 6 spaces right and 2 spaces down. Character B moves 1 space right and 3 spaces up. What movement takes B directly to A? Give a vector and describe its direction.

WORK SPACE

ANSWER _____

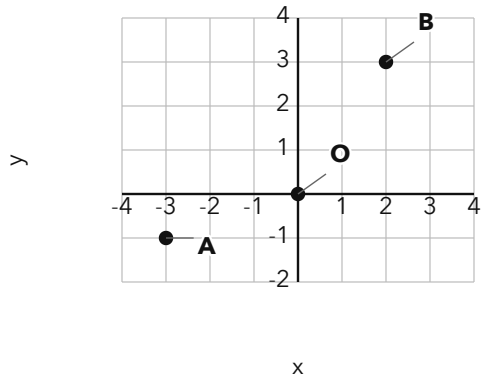
2 Two friends leave the same skate park. Maya rides 2 blocks west and 7 blocks north. Leo rides 3 blocks east and 4 blocks north. What movement takes Leo directly to Maya? Give a vector and describe its direction.

WORK SPACE

ANSWER _____

CHALLENGE One step up

On the grid, v points from O to A, and w points from O to B. A student says the arrow from A to B represents v - w. Find v - w and explain the student's mistake.



WORK SPACE AND ANSWER

Which Way Apart?

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find v - w if v = (4, 1) and w = (1, 3).	**(3, -2)**
2	Find v - w if v = (-3, 5) and w = (2, -1).	**(-5, 6)**
3	Find v - w if v = (-4, -2) and w = (-1, 3).	**(-3, -5)**
4	Find v - w if v = (0, 6) and w = (-2, 0).	**(2, 6)**
5	On the grid, v points from O to V, and w points from O to W. Find the components of v - w. Name the directed segment from one tip to the other that represents v - w.	**(5, 3); the directed segment from W to V**
6	If v = (1, -4) and w = (-5, 2), find -w and v - w.	**-w = (5, -2); v - w = (6, -6)**

PART 2 · APPLY IT

1. **(5, -5), or 5 spaces right and 5 spaces down** Subtract B's movement from A's: (6, -2) - (1, 3) = (5, -5).
2. **(-5, 3), or 5 blocks west and 3 blocks north** Use east and north as positive directions. Subtract Leo's movement from Maya's: (-2, 7) - (3, 4) = (-5, 3).

CHALLENGE

v - w = (-5, -4). The arrow from B to A represents v - w. The arrow from A to B represents w - v = (5, 4), which points in the opposite direction.

Accept equivalent direction words, such as east for right. For tip-to-tip arrows, check the order: the arrow for v - w starts at the tip of w.