Lesson 13 - 4 Vector

CHAPTER 13:
COORDINATE GEOMETRY

SECTION 13.4
VECTORS

Standards:

A vector is any quantity with both magnitude (size) and direction.

Vectors are often used to describe velocity, acceleration, and force.

If a vector is drawn on a coordinate plane, it looks very much like a ray

A vector can be represented by an ordered pair.

(x, y) NOT A POINT

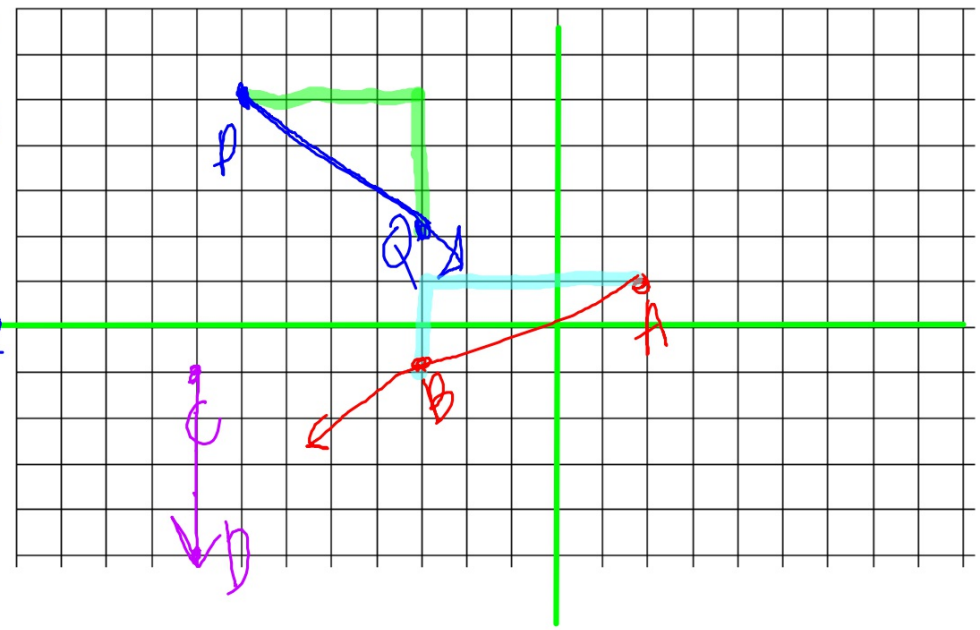
x represents change in x, y represent change in y

$\overrightarrow{PQ}$ = (4, -3)

$\overrightarrow{AB}$ = (-5, -2)

$\overrightarrow{CD}$ = (0, -4)

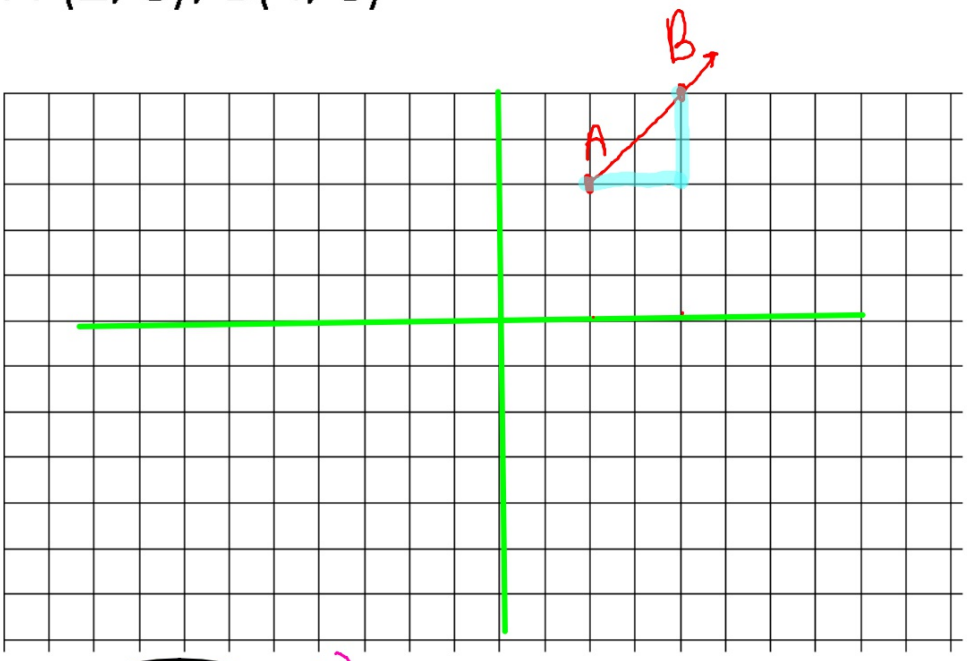
1) can start anywhere in the coordinate plane



Sketch $\overrightarrow{AB}$, then name $\overrightarrow{AB}$ as an ordered pair

Points

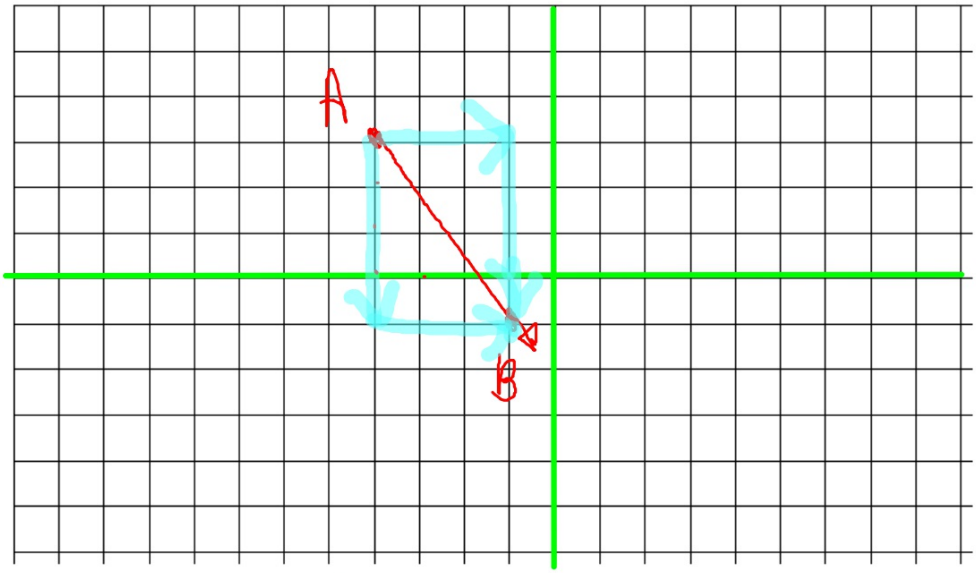
A (2, 3); B(4, 5)



Answer $\overrightarrow{AB}$ **(2, 2)**

Sketch $\overrightarrow{AB}$, then name $\overrightarrow{AB}$ as an ordered pair

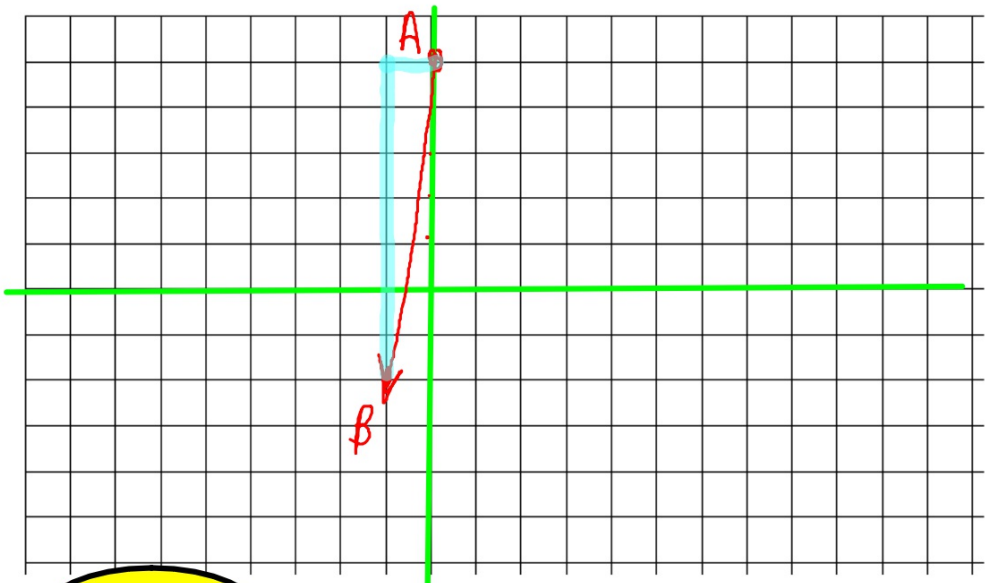
A(-4, 3); B(-1, -1)



Answer $\overrightarrow{AB}$ **(3, -4)**

Sketch $\overrightarrow{AB}$, then name $\overrightarrow{AB}$ as an ordered pair

A(0, 5); B(-1, -2)



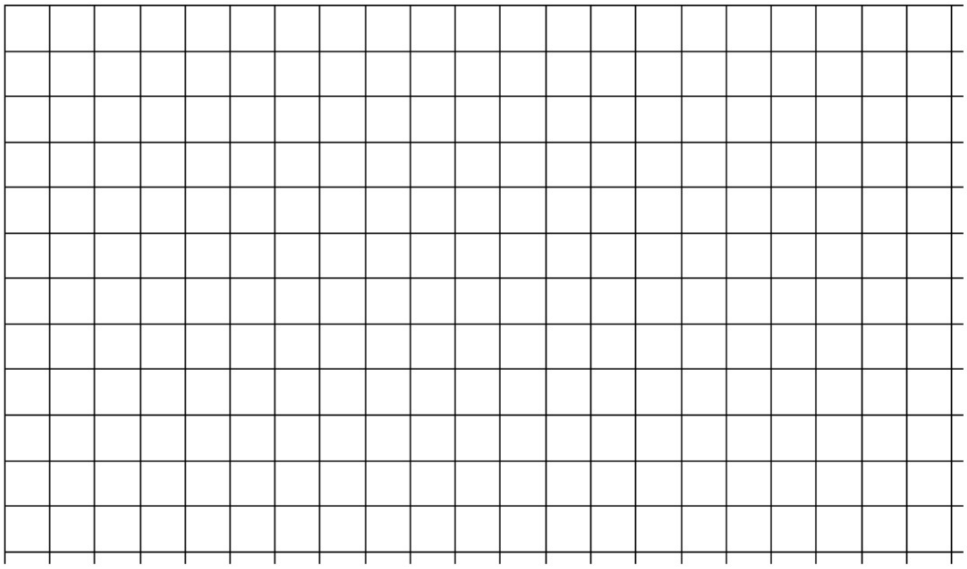
Answer **(-1, -7)**

Sketch $\overrightarrow{AB}$, then name $\overrightarrow{AB}$ as an ordered pair

A(4, 2); B(-1, 2)

B − A

(x,y) (x,y)



Answer **(-5, 0)**

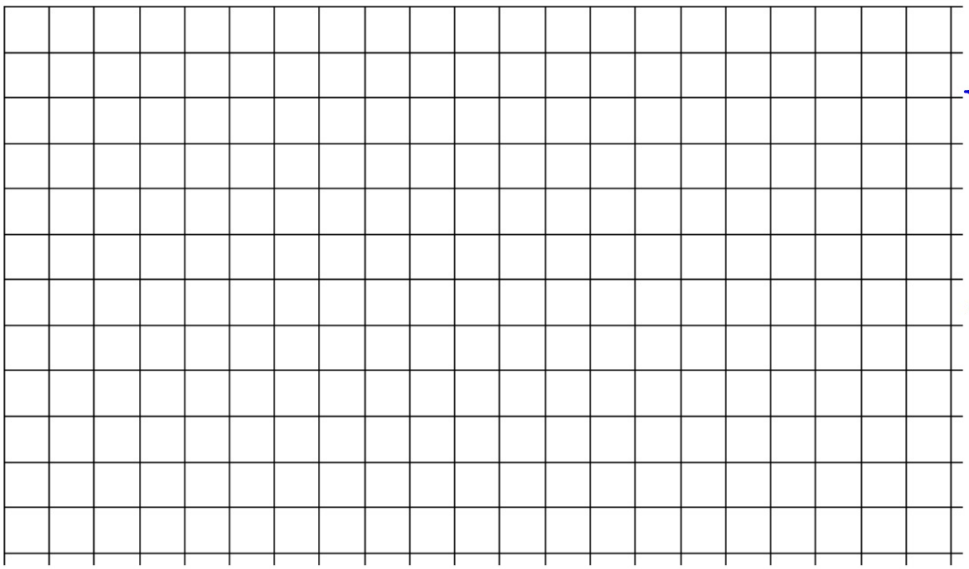
The magnitude $\overrightarrow{PQ}$ of a vector is its length

Use the distance formula or the Pythagorean Theorem to find the magnitude.

A(2, 3); B(3, 6)

$\overrightarrow{AB}$ (1, 3)

Name as ordered pair



$\sqrt{1^2+3^2}$

$\sqrt{1+9}$

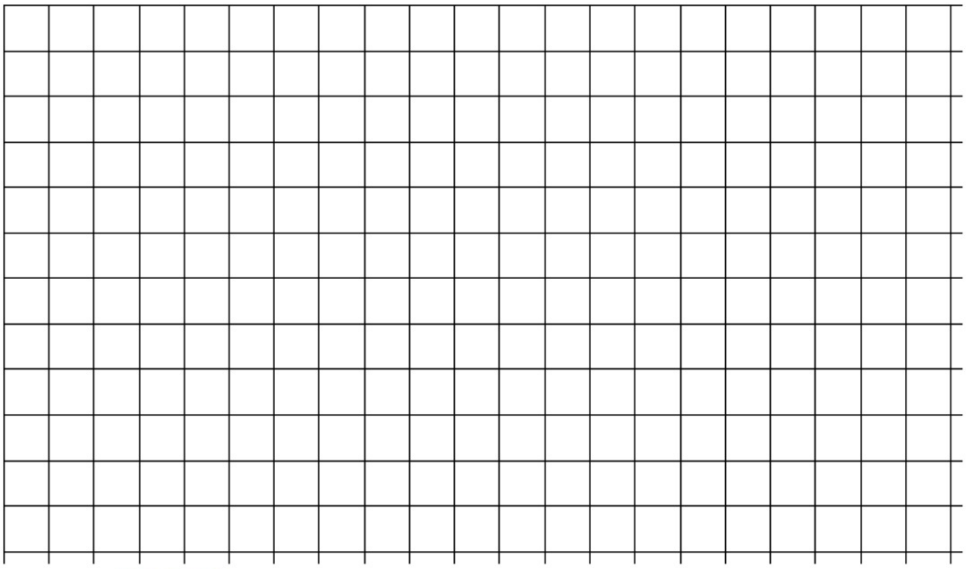
Answer $\sqrt{10}$

The magnitude $\overrightarrow{PQ}$ of a vector is its length

Use the distance formula or the Pythagorean Theorem to find the magnitude.

$\overrightarrow{AB} = (3,-4)$

$\sqrt{3^2+(-4)^2} = \sqrt{9+16} = \sqrt{25}$



Answer 5

The magnitude $\overrightarrow{PQ}$ of a vector is its length

Use the distance formula or the Pythagorean Theorem to find the magnitude

A(0, 5); B(-1, 2)

$\overrightarrow{AB} = (-1, -3)$

$(-1-0), (2-5)$

$(-1)^2 + (-3)^2 = \sqrt{10}$

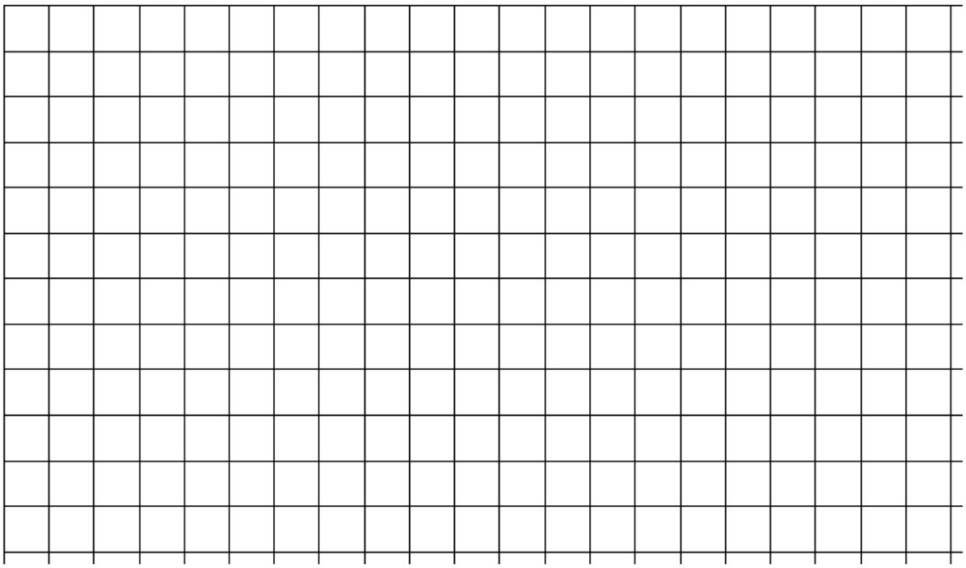
$\sqrt{1+9} =$

Answer $\sqrt{10}$

The magnitude $\overrightarrow{PQ}$ of a vector is its length

Use the distance formula or the Pythagorean Theorem to find the magnitude.

$\overrightarrow{AB} = (5,0)$



Answer

5

Vectors are parallel when **the slopes are the same**

Vectors are perpendicular when

flip over, change sign

the product of the slopes = -1

Are the given vectors parallel, perpendicular, or

(10,2), (1, 5)

not same

$\frac{2}{10}$ $\frac{5}{1}$

$\frac{2}{10} = \frac{1}{5} \cdot \frac{5}{1} \neq -1$?

$\frac{1}{5} \cdot \frac{5}{1} \neq -1$

Answer **Neither**

Vectors are parallel when the slopes are the same

Vectors are perpendicular when the product of the slopes = -1

Are the given vectors parallel, perpendicular, or

(3, 7); (21,-9)

$\frac{7}{3}$ $\frac{-9}{21} = \frac{-3}{7}$

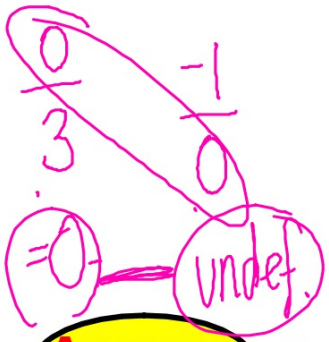
Answer Perpendicular

Vectors are parallel when the slopes are the same

Vectors are perpendicular when
the product of the slopes = -1

Are the given vectors parallel, perpendicular, or

(3,0), (0, -1)



Answer Perpendicular

Vectors are parallel when the slopes are the same

Vectors are perpendicular when the product of the slopes = -1

Are the given vectors parallel, perpendicular, or

(-2, -4); (3, 6)

$\frac{-4}{-2} = 2$ $\frac{6}{3} = 2$

Answer Parallel

Two vectors are equal if they have
the same magnitude and the same direction

Vectors can be added by following the rule:

(a,b) + (c, d) = (a+c, b+d)

The product of a vector and a real number k is called
the scalar multiple of a vector

A scalar multiple is **parallel to the original vector.**

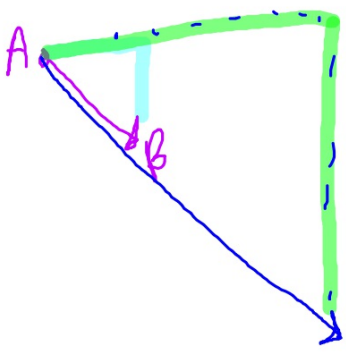
If k < 0, the direction of k $\overrightarrow{AB}$ **opposite the direction of AB**

$\overrightarrow{YZ} = (a, b)$

$k\overrightarrow{YZ} = (k \cdot a, k \cdot b)$

$\overrightarrow{AB}$ (3, -2)

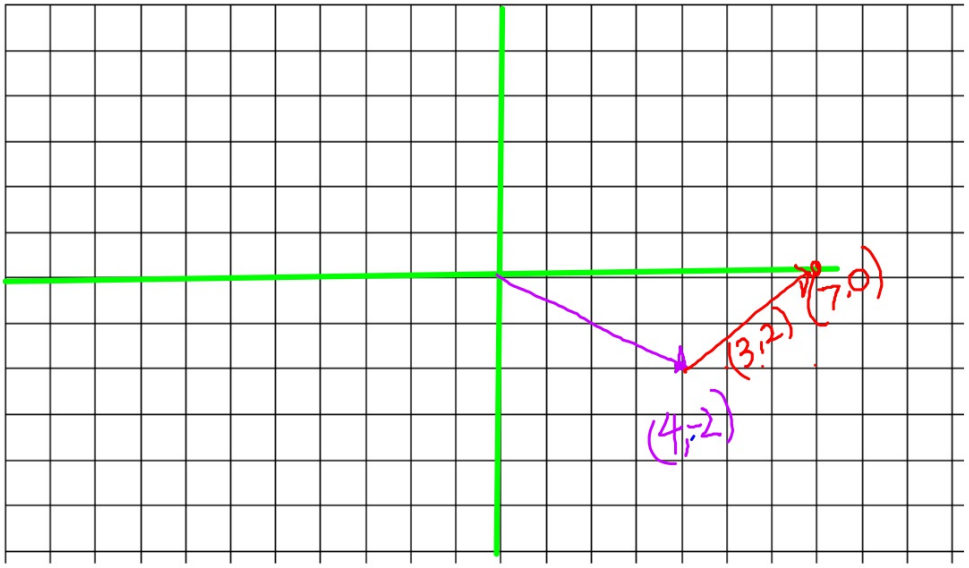
$4\overrightarrow{AB}$ (12, -8)



Find each vector sum. Then illustrate each sum with a diagram.

(4, -2) + (3, 2)

$\vec{AB} = (7, 0)$



Answer

Find each vector sum. Then illustrate each sum with a diagram.

(-5, 3) + (2, 2)

(-3, 5)

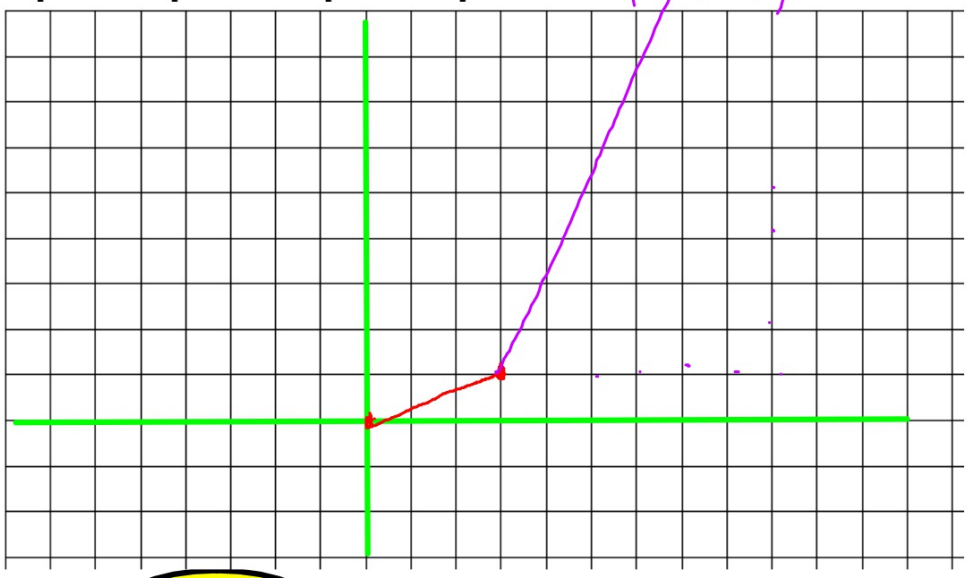
Answer

Find each vector sum. Then illustrate each sum with a diagram.

$(3, 1) + 2(3, 6)$

(6, 12)

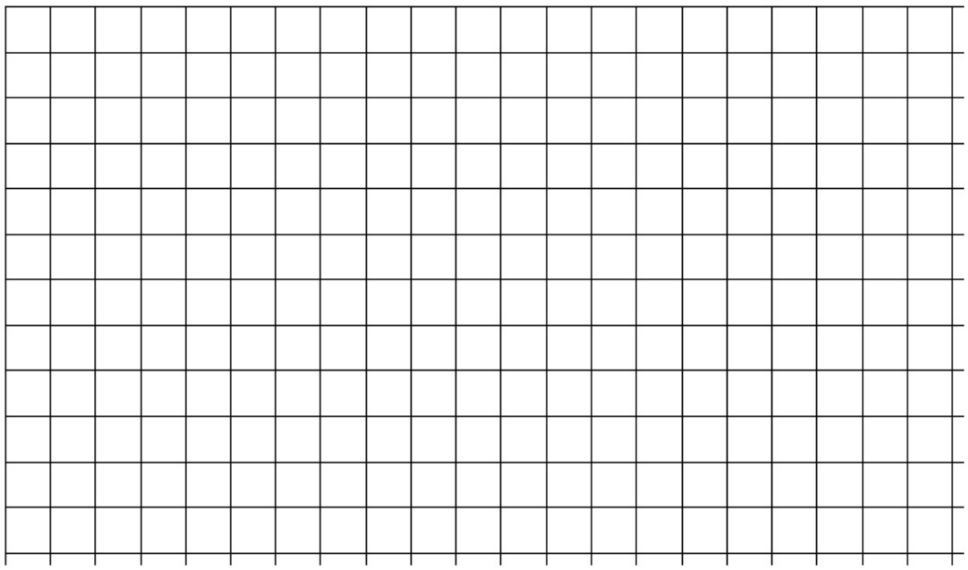
(9, 13)



Answer (9,13)

Find each vector sum. Then illustrate each sum with a diagram.

$(-6, 3) + 5(0, -1)$



Answer

Name two vectors parallel to (4, -3)

Name 2 vectors perpendicular to (-14, 16)

Answer

The vectors (3, 5) and (7, k) are parallel.
Find k

$$\frac{5}{3} = \frac{k}{7}$$

Answer 35/3

The vectors (5, 8) and (k, 2) are perpendicular. Find k

$$\frac{8}{5} = -\frac{k}{2}$$

Answer -16/5

HOMEWORK

Assignment #13.4

- Pages 541-542

  WE #1-15 odd, 16-19, 22-25

Pages 541-542

WE #1-15 odd, 16-19, 22-2

Written Exercises

In Exercises 1–9 points A and B are given. Make a sketch. Then find $\overrightarrow{AB}$ and $|\overrightarrow{AB}|$.

1. $A(1, 1), B(5, 4)$ **2.** $A(2, 0), B(8, 8)$ **3.** $A(6, 1), B(4, 3)$

4. $A(0, 5), B(-3, 2)$ **5.** $A(3, 5), B(-1, 7)$ **6.** $A(4, -2), B(0, 0)$

7. $A(0, 0), B(5, -9)$ **8.** $A(-3, 5), B(3, 0)$ **9.** $A(-1, -1), B(-4, -7$

16. Name two vectors parallel to $(3, -8)$.

17. The vectors $(8, 6)$ and $(12, k)$ are parallel. Find the value of k.

18. Show that $(4, -5)$ and $(15, 12)$ are perpendicular.

19. The vectors $(8, k)$ and $(9, 6)$ are perpendicular. Find the value of k.

22. $(-8, 2) + (4, 6)$ **23.** $(-3, -3) + (7, 7)$

24. $(1, 4) + 2(3, 1)$ **25.** $(7, 2) + 3(-1, 0)$