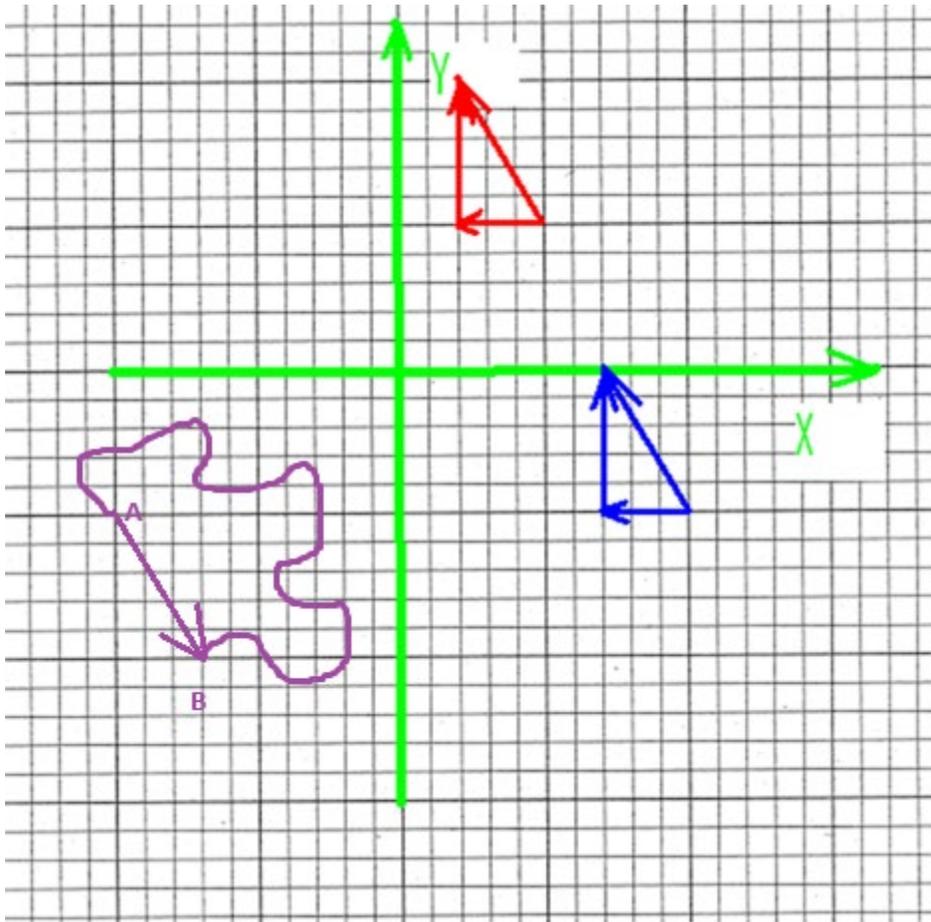


MATH 6: ASSIGNMENT 15. CARTESIAN PLANE and COORDINATES

February 1, 2026

Coordinates, Vectors, Lines

- **Vector** is a displacement in space which has direction and value. Since it is a displacement, it can start anywhere. It can be viewed as a combination of two numbers: displacement along X and displacement along Y. For example, $\overrightarrow{(-3, 5)}$ is a displacement (-3) steps along X and 5 steps along Y.



You can wonder along any path from A(-10, -5) to B(-7, -10), and regardless of your wonders you will have the same displacement.

$$\overrightarrow{(A, B)} = \overrightarrow{(x_B - x_A, y_B - y_A)} = \overrightarrow{(-7 - (-10), -10 - (-5))} = \overrightarrow{(3, -5)}$$

Displacing in x 3 units in positive direction and 5 units into the negative.

Homework

1. Point B is 5 units above and 2 units to the left of $A(7,5)$. What are the coordinates of point B ? What is the vector of displacement \overrightarrow{AB} ?

2. Plot on the coordinate plane the following, and connect each dot to the next one. If you did everything correctly, you will get a picture... Start at $(0,0)$ and connect to the next point following a vector:

$$\begin{array}{cccccccc} \overrightarrow{(1,3)}, & \overrightarrow{(1,0)}, & \overrightarrow{(1,-1)}, & \overrightarrow{(0,-2)}, & \overrightarrow{(-2,-1)}, & \overrightarrow{(1,0)}, & \overrightarrow{(-1,-2)}, & \overrightarrow{(-1,2)}, \\ \overrightarrow{(-1,-2)}, & \overrightarrow{(-1,2)}, & \overrightarrow{(1,0)}, & \overrightarrow{(-2,1)}, & \overrightarrow{(0,2)}, & \overrightarrow{(1,1)}, & \overrightarrow{(1,0)}, & \overrightarrow{(1,-3)}, \end{array}$$

3. Find the coordinates of the midpoint of the segment AB , where $A=(3,11)$ and $B=(7,5)$

4. Draw points $A(4,1)$, $B(3,5)$, $C(-1,4)$. If you did everything correctly, you will have 3 vertices of a square. What are the coordinates of the fourth vertex? What is the area of the square?

5. Find the missing coordinates:

(a) 3 points $A(0,0)$, $B(1,3)$, $D(5,-2)$ are vertices of a parallelogram $ABCD$. What are the coordinates of C ?

(b) 3 points $A(0,0)$, $B(2,3)$, $D(4,1)$ are vertices of a parallelogram $ABCD$. What are the coordinates of C ?

(c) 3 points $A(0,0)$, $B(1,5)$, $D(3,-2)$ are vertices of a parallelogram $ABCD$. What are the coordinates of C ?

(d) Can you guess the general rule: if $A(0,0)$, $B(b_1,b_2)$, $D(d_1,d_2)$ are vertices of a parallelogram $ABCD$. What are the coordinates of C ?

6. Point M has coordinates $(5,7)$

(a) Find the coordinates of the point M_I obtained from M by reflection about the x -axis.

(b) Find the coordinates of the point M_I obtained from M by reflection about the y -axis.

(c) Find the coordinates of the point M_I obtained from M by reflection about the diagonal line $x=y$.

7. Draw the following linear functions on the same graph:

a. $y = x$

b. $y = 3x$

c. $y = \frac{1}{3}x$

8. Draw the following linear functions on the same graph:

a. $y = 2x$

b. $y = 2x + 3$

c. $y = 2 - 3$