

Geometry in Coordinate Plane

EOC Treat

8 and 9 ·

Homework Check
Parallel and Perp. Quizlet

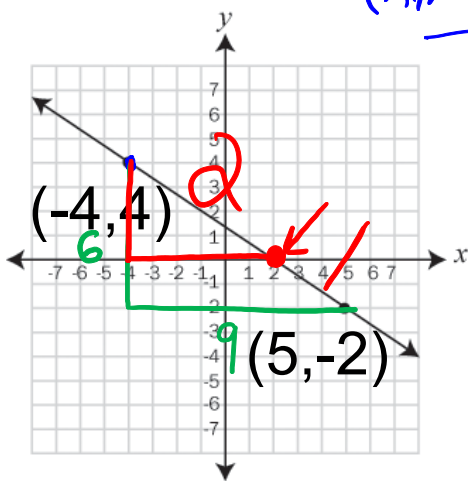
Goals For Today

GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.



Section Formula

$$(x, y) = \left(\frac{ax_2 + bx_1}{a+b}, \frac{ay_2 + by_1}{a+b} \right)$$



$$(x, y) = \left(\frac{ax_2 + bx_1}{a+b}, \frac{ay_2 + by_1}{a+b} \right) \quad \text{Geometry in Coordinate Plane}$$

Divide the following line segment into 2/3

or 2:1 ratio from $(-4, 4)$ to $(5, 2)$

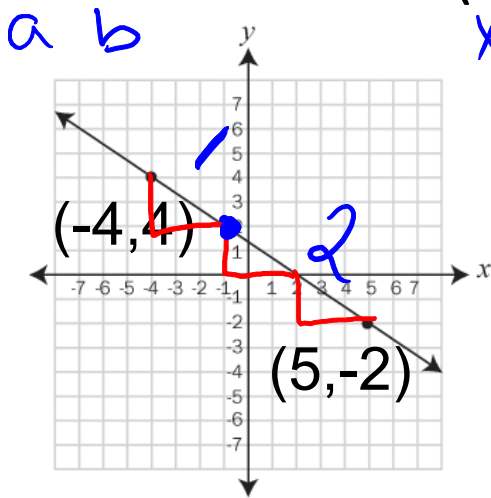
$a:b$

$$(x, y) = \left(\frac{2(5) + 1(-4)}{2+1}, \frac{2(2) + 1(4)}{2+1} \right)$$

Note: The diagram shows red annotations: (x_1, y_1) above (-4) , (x_2, y_2) above (5) , and -4 and $+4$ above the denominators.

$$(x, y) = (2, 0)$$

Divide the following line segment into 1/3 or 1:2 ratio from $(-4,4)$ to $(5,-2)$.



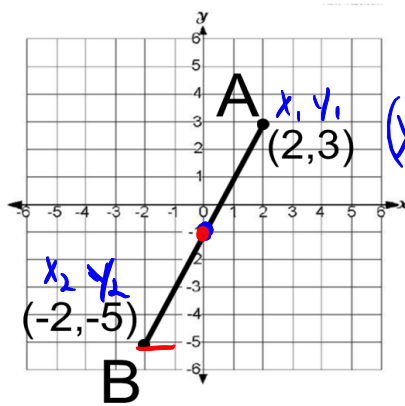
a b x_1 y_1 x_2 y_2

$$(x, y) = \left(\frac{1(5) + 2(-4)}{1+2}, \frac{1(-2) + 2(4)}{1+2} \right)$$

$$(x, y) = (-1, 2)$$

Geometry in Coordinate Plane

Find the coordinate that splits the segment AB in $\frac{1}{2}$ or a ratio of 1:1.

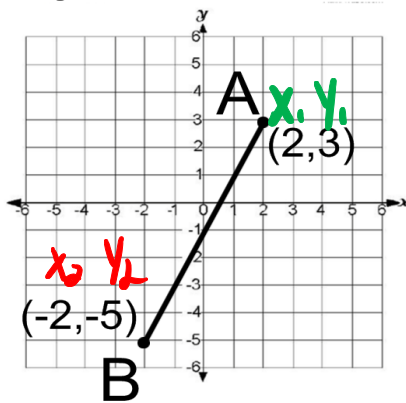


$$(x, y) = \left(\frac{-2 + 2}{1 + 1}, \frac{-5 + 3}{1 + 1} \right)$$

$$(0, -1)$$

Geometry in Coordinate Plane

Find the coordinates that divide the following segment into a ratio of 1:3 from A to B.

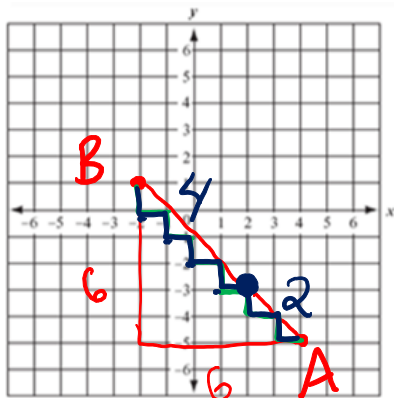


$$a:b$$

$$(x, y) = \left(\frac{1(-2) + 3(2)}{1+3}, \frac{1(-5) + 3(3)}{1+3} \right)$$

$$(x, y) = (1, 1)$$

$$(x, y) = \left(\frac{ax_2 + bx_1}{a+b}, \frac{ay_2 + by_1}{a+b} \right)$$



Line segment AB, point A is $(4, -5)$. Coordinate $(2, -3)$ divides A to B into $\frac{2}{6}$ or a ratio of 2:4. What is point B?

$$\left(\frac{2}{6}, \frac{-3}{2} \right) = \left(\frac{2(x_2) + 4(4)}{2+4}, \frac{2(y_2) + 4(-5)}{2+4} \right)$$

$$2 = \frac{2x_2 + 4(4)}{2+4}$$

$$2 = \frac{2x_2 + 16}{6}$$

$$12 = 2x_2 + 16$$

$$-2 = x_2$$

$$-3 = \frac{2y_2 + 4(-5)}{2+4}$$

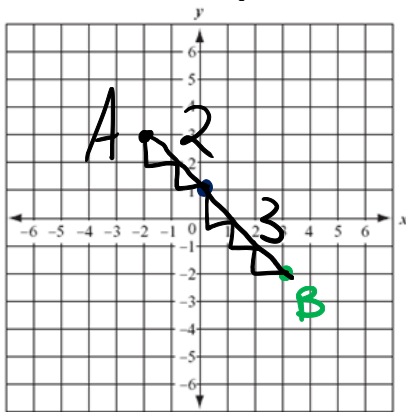
$$-3 = \frac{2y_2 - 20}{6}$$

$$-18 = 2y_2 - 20$$

$$1 = y_2$$

$(-2, 1)$

In line segment AB, point A is $(-2, 3)$. Coordinate $(0, 1)$ divides A to B in a ratio of $2:3$. What is point B?



$$(0, 1) = \left(\frac{2(x_2) + 3(-2)}{2+3}, \frac{2(y_2) + 3(3)}{2+3} \right)$$

$$(0, 1) = \left(\frac{2(x_2) - 6}{5}, \frac{2(y_2) + 9}{5} \right)$$

$$0 = \frac{2(x_2) - 6}{5}$$

$$1 = \frac{2(y_2) + 9}{5}$$

$$x_2 = 3$$

$$y_2 = -2$$

$$\boxed{B(3, -2)}$$

Review:

What is the section formula?

$$(X, Y) = \left(\frac{ax_2 + bx_1}{a+b}, \frac{ay_2 + by_1}{a+b} \right)$$

Determine x_1 , x_2 , y_1 , y_2 , a and b in the following problem.

Line segment AB has endpoints $(2,6)$ and $(-1,-3)$. What coordinate divides A to B in the ratio of $1:2$?

$$x_1 = 2$$

$$y_1 = 6$$

$$x_2 = -1$$

$$y_2 = -3$$

$$a = 1$$

$$b = 2$$

$$(X, Y) = \left(\frac{1(-1) + 2(2)}{1+2}, \frac{1(-3) + 2(6)}{1+2} \right)$$

$$(X, Y) = (1, 3)$$