P 4.31 B(-1, -2)

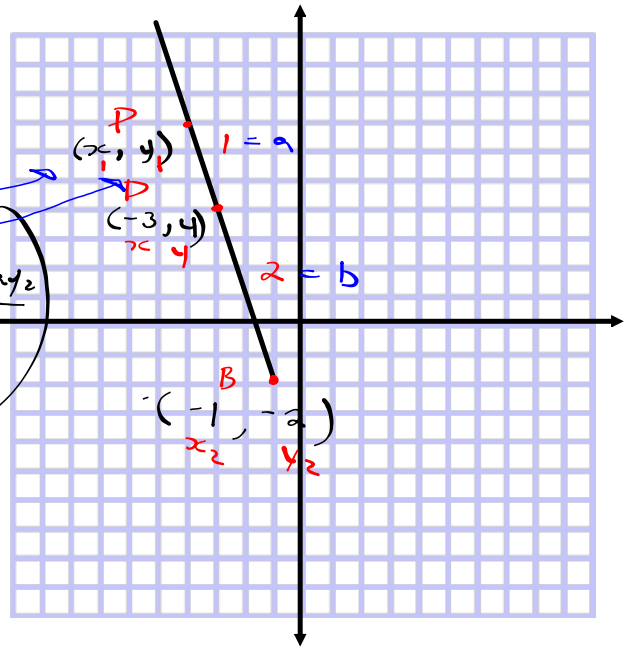
D(-3, 4)

P (x_1, y_1)

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

$-3, 4$

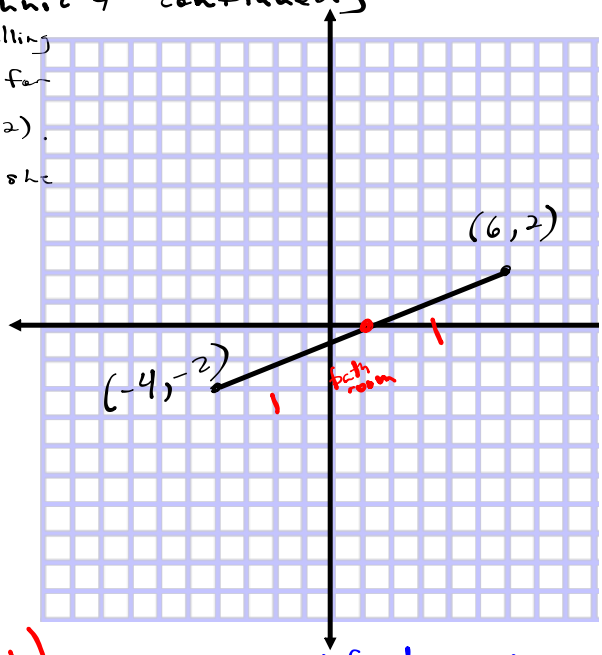
$-3 = \frac{2x_1 + 1(-1)}{2+1}$



Special Case of Point of Division

The Midpoint { unit 4 continued }

Shamon is in the staff room (6, 2) filling her water bottle. She realizes she's late for class and so heads her room (−4, −2). After covering 1/2 of the total distance she stops to use the bathroom. Determine the coordinates of the bathroom.



Division Ratio $\frac{1}{1}$ $\frac{a}{b}$

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

$$= P\left(\frac{1(x_1) + 1(x_2)}{1+1}, \frac{1(y_1) + 1(y_2)}{1+1}\right)$$

$$= P\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

a simplified version of the point of division formula for midpoints

Special Lines!

Horizontal Lines

$y = b$ ← no x variable indicates to you it's a horizontal line with y-int $(0, b)$

↳ the number on the right side when y is completely isolated

$y = mx + b$

ex.
- $y = 2$ $(0, 2)$
- $y = -1$ $(0, -1)$

$y + 2 = 0$

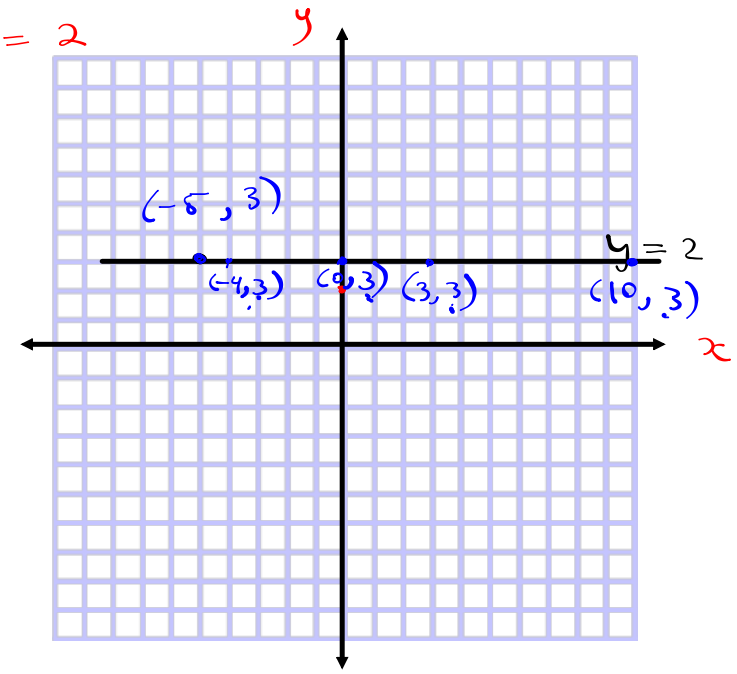
$y = -2$

$(0, -2)$

ex. Graph $y = 2$

$y = 2$

$(0, 2)$



Vertical Lines

$x = a$ ← no y variable indicates it's a vertical line with x-int $(a, 0)$

a the number on the right side of the equation when x is completely isolated.

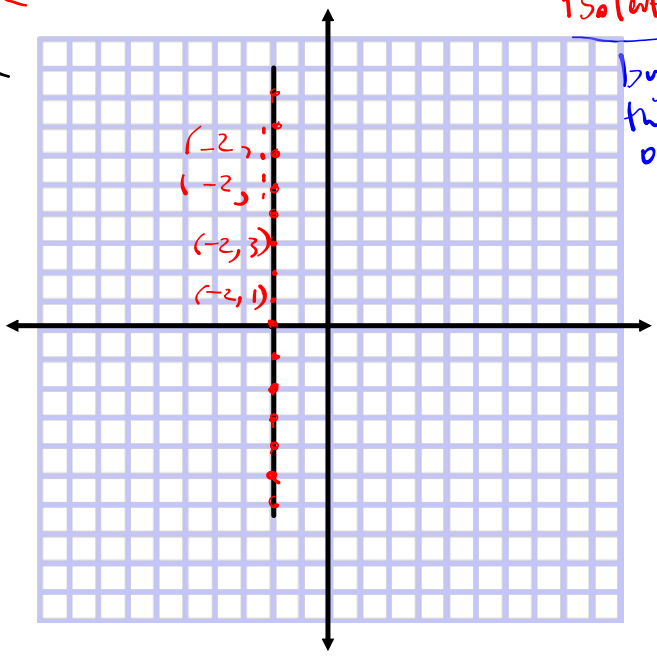
graph:

$-2x - 4 = 0$ $+4$ $+4$

$\frac{-2x}{-2} = \frac{4}{-2}$ by performing the opposite operation to both sides.

$x = -2$

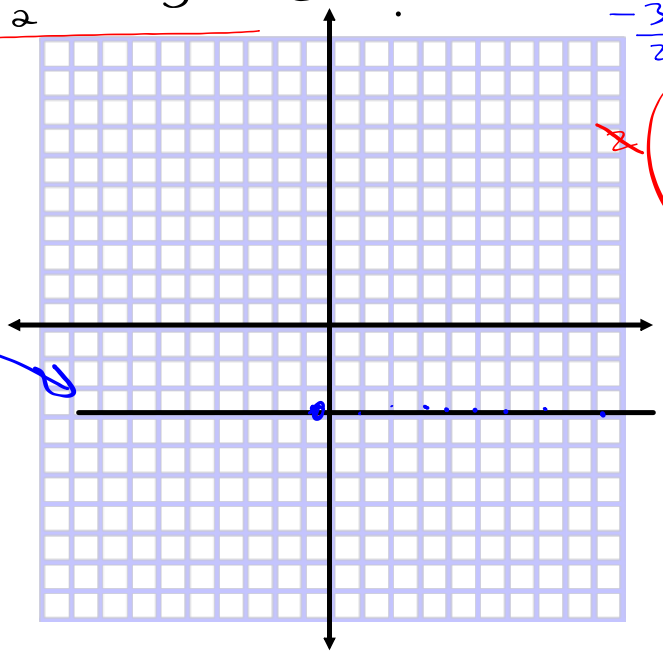
$(-2, 0)$



Exam Question

Determine the equation of the line that passes through point $(-\frac{1}{2}, -3)$ and is parallel to the line whose equation is $-\frac{3y}{2} - 3 = 0$.

horizontal line



$-\frac{3}{2}y - 3 = 0 + 3$

$2\left(\frac{-3y}{2}\right) = 3 \times 2$

$-3y = 6$

$\frac{-3y}{-3} = \frac{6}{-3}$

$y = -2$

answer

$y = -3$

Determine the equation of the line that passes through point $(\frac{3}{2}, -\frac{1}{4})$ and is perpendicular to the line whose equation is $\frac{-x}{3} + 1 = 0$.

$\frac{-x}{3} + 1 = 0$

$3\left(\frac{-x}{3}\right) = -1 3$

$-x = -3$

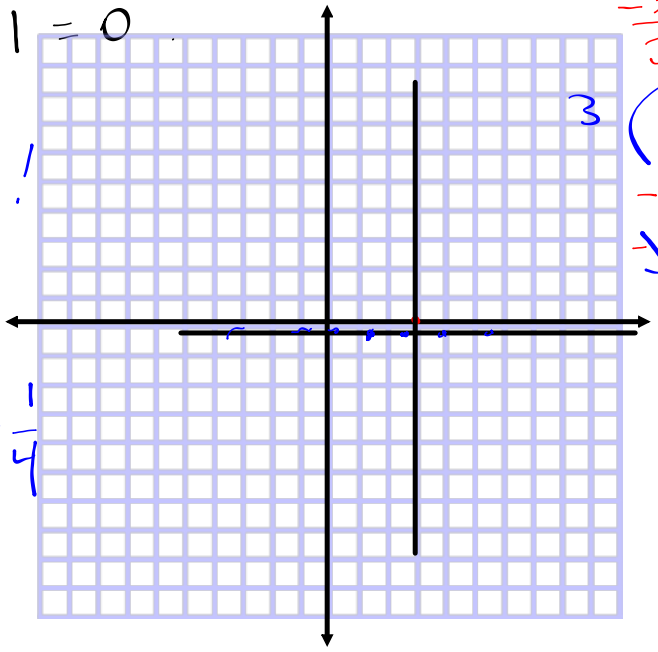
$-1 \cdot x = -3$

$\frac{-1}{-1} \quad \frac{-3}{-1}$

$x = 3$

vertical line!

$y = -\frac{1}{4}$



Unit 5: Using Properties of Shapes and Formulas to solve for an Unknown

Steps to solve for an unknown

step ①: Draw a sketch

Step ①: Write a true equation that has what you know (written in the question or in diagram) and has what you need. (unknown, x)

Step ②: To solve for the unknown (x), isolate it by performing the opposite operation to both sides

$x + 2 - 2 = 4 - 2$

$x = 2$

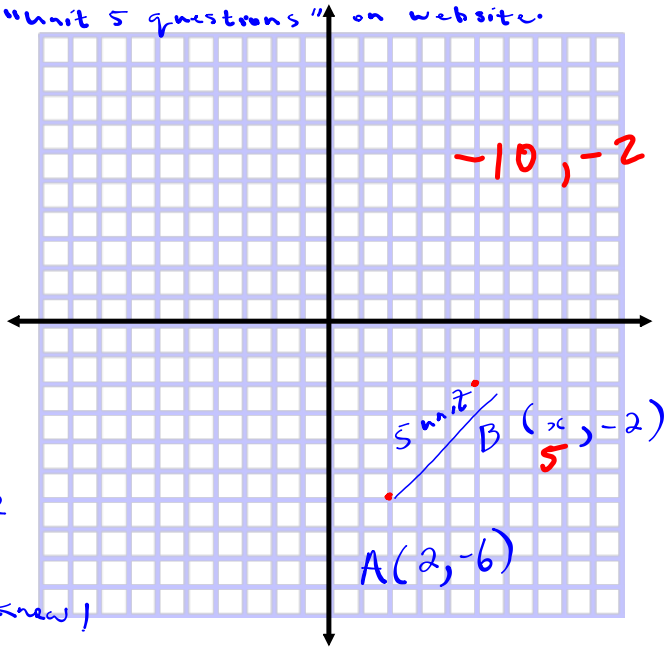
For questions, see "unit 5 questions" on website.

Q #1.

P_1 $A(\overset{x_1}{2}, \overset{y_1}{-6})$

P_2 $B(\overset{x_2}{x}, \overset{y_2}{-2})$

$d_{AB} = 5$ unit



step ①

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

sub in the values you know!

$5 = \sqrt{(x_2 - 2)^2 + (-2 - (-6))^2}$

$(-2 + 6)$

step ② isolate x by performing opposite operation to both sides.

simplify!

$5 = \sqrt{(x_2 - 2)^2 + (4)^2}$

$(5)^2 = \left(\sqrt{(x_2 - 2)^2 + 16}\right)^2$

-16

$25 = (x_2 - 2)^2 + 16 - 16$

$\sqrt{9} = \sqrt{(x_2 - 2)^2}$

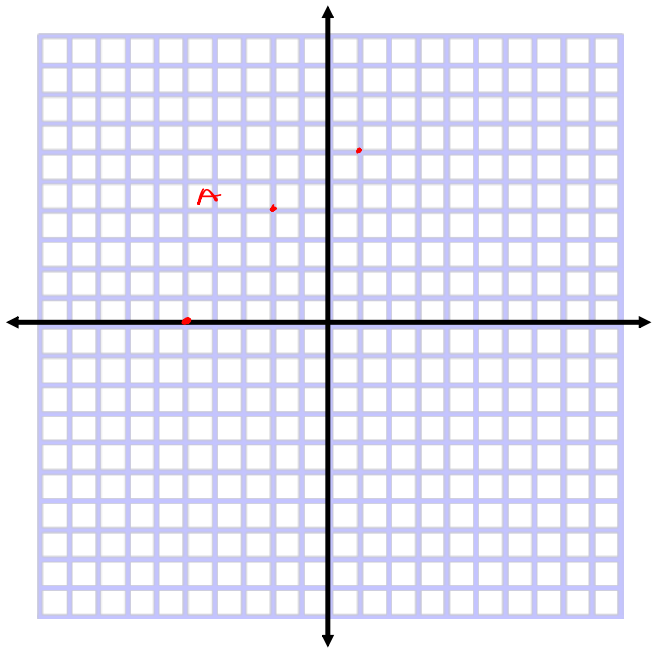
$3 = x_2 - 2 \overset{+2}{+2}$

$\boxed{x_2 = 5}$

BEDMAS

$P_1(1, 6)$ (x_1, y_1)

$P_2(x, 0)$ (x_2, y_2)



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

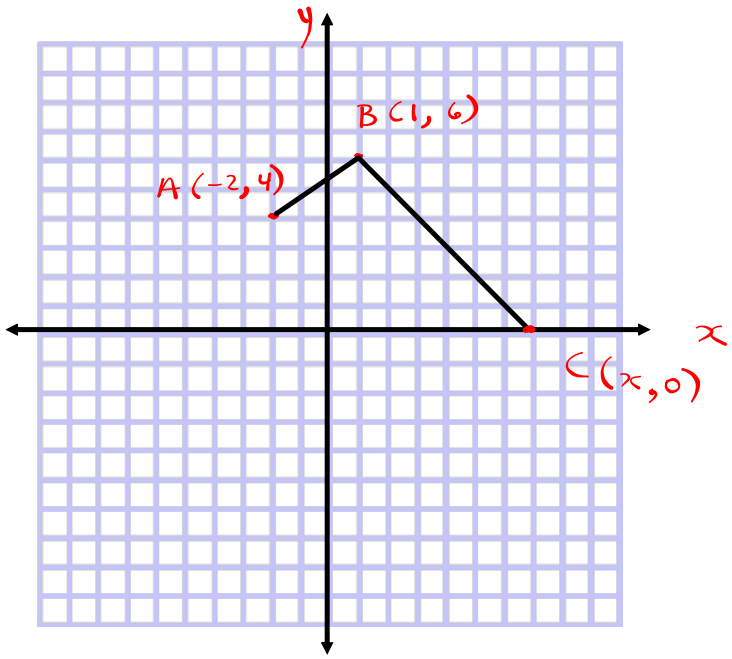
$$\frac{-3}{2} = \frac{0 - 6}{x - 1}$$

$$-3(x - 1) = 2(-6)$$

$$-3x + 3 = -12 - 3$$

$$\frac{-3x}{-3} = \frac{-15}{-3}$$

$$x = 5$$


y
B (1, 6)
A (−2, 4)
x
C (x, 0)