Unit 2 Question: $y = mx + b$

Determine the equation of l_1 that passes through point $(1, 2)$ and is perpendicular to line l_2: $x - \frac{y}{2} + \frac{3}{4} = 0$

(negative reciprocal slopes!) → Find m_2, flip it, change the sign.

to find m_2, put equation in $y = mx + b$ form (isolate y)

$x - \frac{1}{2}y + \frac{3}{4} = 0$ $-x$ $-\frac{3}{4}$

$-\frac{1}{2}y = -x - \frac{3}{4}$

* perform opposite operation to both sides

BEDMAS

$\frac{-\frac{1}{2}y}{-1} = \frac{-x - \frac{3}{4}}{-1}$

$y = 2x + \frac{6}{4}$

$y = m_2x + b$

$m_2 = 2$

$\therefore m_1 = -\frac{1}{2}$

$l_1 \perp l_2$

To find $y = mx + b$ w/ the slope and y-int (use modified slope form slope/point form)

$m = \frac{y - y_1}{x - x_1}$ $m = \frac{-1}{2}$ $(1, 2)$ x_1, y_1

$\frac{-1}{2} = \frac{y - 2}{x - 1}$

cross multiply

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

$-x + 1 = 2y - 4$ $+4$ $+4$

isolate y

$\frac{2y}{2} = \frac{-x + 5}{2}$

$y = -\frac{1}{2}x + \frac{5}{2}$

BEDMAS

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

Another true equation could be the eq of the line

x

A (2, -6)

B (x, -2)

$d_{AB} = 5$

Steps to solve for an unknown

i. Sketch

1. Write a true equation that has what you know and has you need (only one unknown in the equation)

2. Sub in values into the equation, and isolate for the unknown by performing the opposite operation to both sides.

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

Ex #7 $A(2, -6)$ (x_1, y_1)

$B(x, -2)$ (x_2, y_2)

$d_{AB} = 5$ units

find x!

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

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

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

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

$$25 = (x-2)^2+16 \quad (-16)$$

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

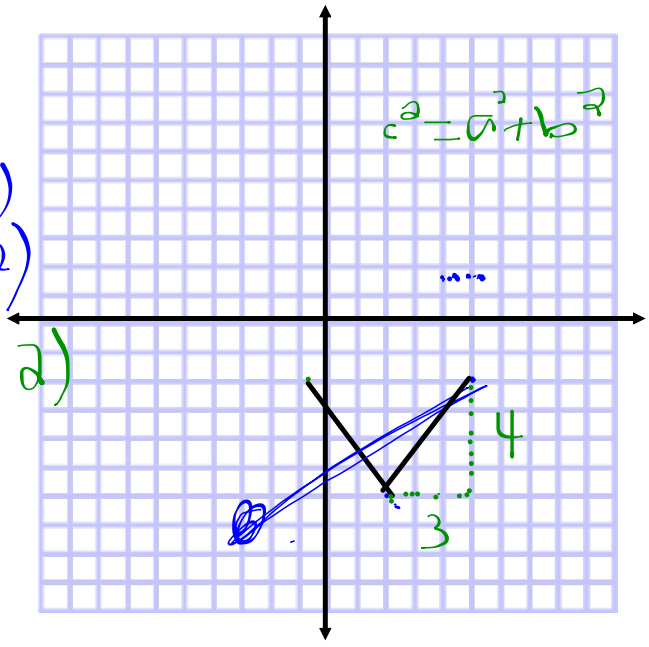
$$3 = (x-2)$$

$$3 = x-2 \quad (+2)$$

$$x = 5$$

true

an equation w/ just one unknown, we can solve for it. (Isolate x)



#3 $A(\overset{x_1}{5}, \overset{y_1}{2})$

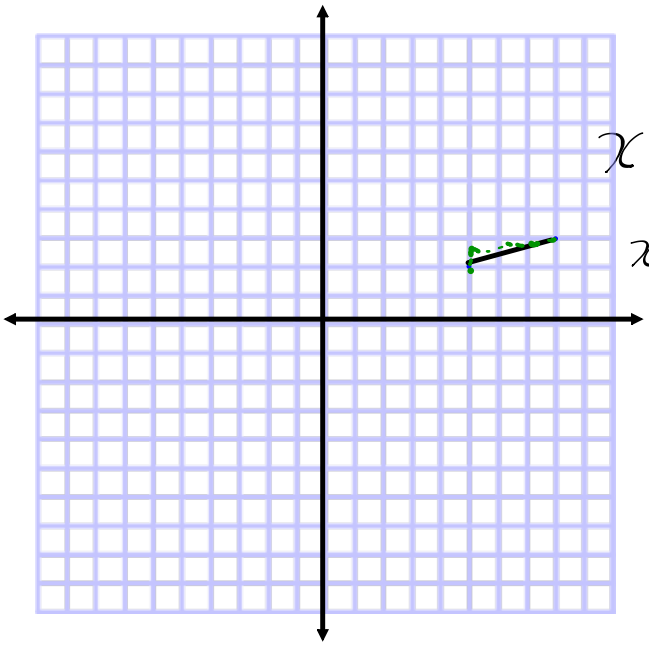
$B(\overset{x_2}{x}, \overset{y_2}{3})$

LABEL

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

$m = \frac{1}{3} = \frac{\text{rise}}{\text{run}}$

find x!



$\frac{1}{3} = \frac{3-2}{x-5}$

solve for x

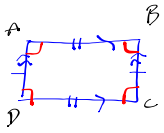
• cross multiple

$x - 5 = 3(1)$

$x - 5 \overset{+5}{=} 3 \overset{+5}{}$

$x = 8$

5



$\overline{AD} \perp \overline{DC}$

m_{AB} & m_{BC} negative reciprocal

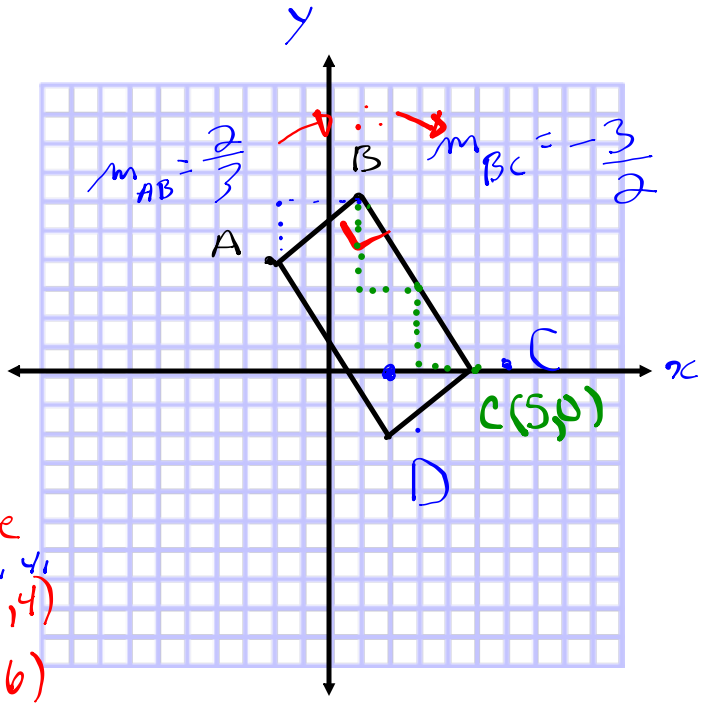
$d_{BC} = ?$

$A(-2,4)$

$B(1,6)$

$C(x,0)$

we know the y-coordinate is zero since C is on the x-axis



since this is $\perp$ calculate

$A(-2,4)$ x_1, y_1

$B(1,6)$ x_2, y_2

$$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_{AB} = \frac{6-4}{1-(-2)}$$

$$m_{AB} = \frac{2}{3} \quad \therefore m_{BC} = \frac{-3}{2}$$

$AB \perp BC$

$B(1,6)$ x_1, y_1

$C(x,0)$ x_2, y_2

$$m_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$$

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

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

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

$$-3x = -15$$

$$x = 5$$

$\therefore C(5,0)$

Finally calculate

$B(1,6)$ x_1, y_1

$C(5,0)$ x_2, y_2

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

$$d_{BC} = \sqrt{(5-1)^2 + (0-6)^2}$$

$d_{BC} = 7.21$ units.

☆ Note: For the pretest, don't do questions that ask you to determine the distance between a point and a line.

ex. Version A Q7

Special Case of Point of Division
(AKA The Midpoint Formula)

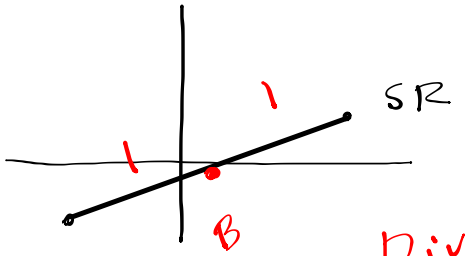
SR(6,2)

C(-4,-2)

$\frac{1}{2}$

Half way there

B(x,y)



midpoint! Division Ratio $\frac{1}{1}$ $\frac{1}{b}$

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

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

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

$$M\left(\frac{6+(-4)}{2}, \frac{2+(-2)}{2}\right)$$

(6,2)

(-4,-2)

M(1,0) Bathroom