

WarmUp

Form a conjecture explaining what "a" and "b" represent in the symmetric form of a line:

$$\frac{x}{a} + \frac{y}{b} = 1$$

where
 $a \neq \{0, 1\}$
 $b \neq \{0, 1\}$

Use at least 3 examples. Hint: put them into function form and/or graph the line.

Ex: $\frac{1x}{5} + \frac{y}{-2} = 1$ $y = ax + b$

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

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

Ex 2: $\frac{x}{-3} + \frac{y}{6} = 1$ $\frac{x}{-3} - \frac{x}{3} = -\frac{1}{3}x$

$$6 \left(\frac{y}{6} = \frac{x}{3} + 1 \right)$$

$$y = 2x + 6$$

Ex 3: $\frac{x}{12} + \frac{y}{9} = 1$ $y = -\frac{9}{12}x + 9$ $x\text{-int: } 12$

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	a	b	Slope	$y\text{-int}$	$x\text{-int}$	
①	5	-2	$\frac{2}{5}$	-2	5	
②	-3	6	2	6	-3	
③	12	9	$-\frac{9}{12}$	9	12	

In symmetric form: $\frac{x}{a} + \frac{y}{b} = 1$

$a = x\text{-intercept}$

$b = y\text{-intercept}$

Slope = $-\frac{b}{a}$

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DISTANCE between a POINT (x,y) and a LINE $(Ax+By+C=0)$:

Shortest Distance (forming a 90° angle with line)

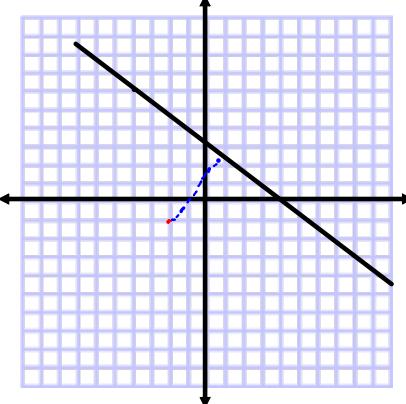
$$d(P,l) = \frac{|Ax + By + C|}{\sqrt{A^2 + B^2}}$$

No
negatives
(always
positive)

Example:

The distance from point $P(2, -1)$ to the line $l: 3x + 4y - 12 = 0$ is:

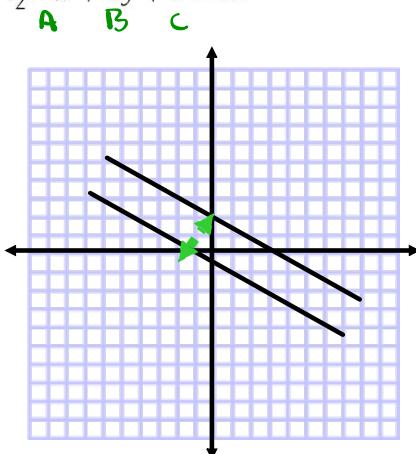
$$\begin{aligned} d(P,l) &= \frac{|3(2) + 4(-1) - 12|}{\sqrt{3^2 + 4^2}} \\ &= \frac{|6 - 4 - 12|}{\sqrt{9 + 16}} = \frac{|-10|}{\sqrt{25}} = \frac{10}{5} = 2 \end{aligned}$$



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4. Calculate the distance between the parallel lines l_1 and l_2 if $l_1: 2x + 3y - 6 = 0$ and $l_2: 4x + 6y + 3 = 0$.



$$\begin{aligned} l_1: y - \text{int} &\rightarrow 2(0) + 3y - 6 = 0 \\ 3y &= 6 \\ y &= 2 \quad (0, 2) \end{aligned}$$

$$\begin{aligned} d(l_1, l_2) &= \frac{|4(0) + 6(2) + 3|}{\sqrt{4^2 + 6^2}} \\ &= \frac{15}{\sqrt{52}} = 2.08 \end{aligned}$$

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Homework

P. 156 #1

P. 157 #3-7

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