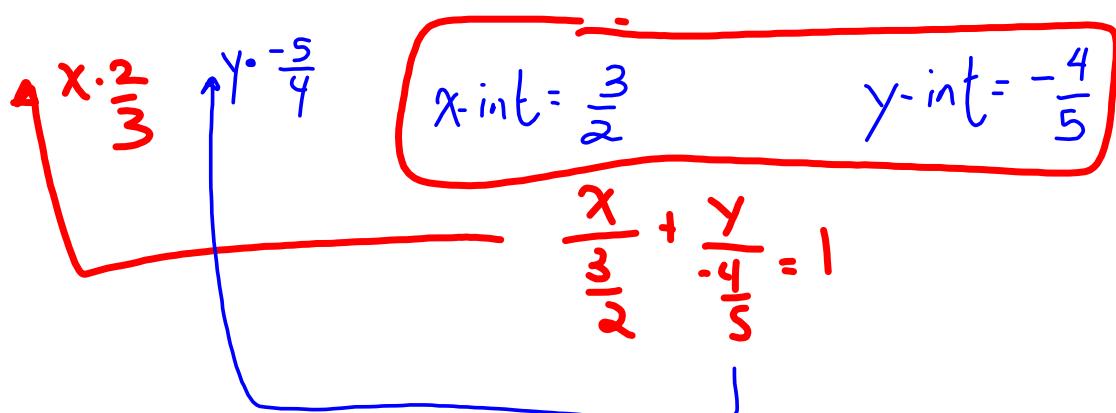


What are the intercepts of the line whose equation is

$$\frac{2x}{3} - \frac{5y}{4} = 1 ?$$

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



Example: A line's  $x$ -intercept is  $-10$  and its  $y$ -intercept is  $8$ . Determine the equation of the line three ways.  $(-10, 0)$   $(0, 8)$

1) Symmetric  $\frac{x}{-10} + \frac{y}{8} = 1$

2) Standard  $\left\{ \begin{array}{l} \frac{x}{-10} + \frac{y}{8} = 1 \\ (10, 0) \\ (0, 8) \end{array} \right.$

$$y = mx + b$$

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

$$m = -\frac{8}{-10} = \frac{4}{5} = 0.8$$

$$y = \frac{4}{5}x + 8$$

3) General  $Ax + By + C = 0$

$$\frac{x}{-10} + \frac{y}{8} - 1 = 0 \quad LC M = 40$$

$$40 \cdot \left( \frac{x}{-10} + \frac{y}{8} - 1 \right) = 0 \cdot 40$$

$$\boxed{-4x + 5y - 40 = 0}$$

$$\text{OR } -40 \left( \frac{x}{-10} + \frac{y}{8} - 1 \right) = 0 \cdot (-40)$$

$$\boxed{4x - 5y + 40 = 0}$$

Example: Write the equation  $\frac{A}{2}x - \frac{B}{4}y - \frac{C}{5} = 0$  in symmetric form.

$$x\text{-int} = -\frac{C}{A} = \frac{5}{2}$$

$$y\text{-int} = -\frac{C}{B} = -\frac{5}{4}$$

OR

$$\frac{x}{\frac{5}{2}} + \frac{y}{-\frac{5}{4}} = 1$$

$$\frac{2x}{5} - \frac{4y}{5} = 1$$

②  $x\text{-int} : y=0$   
 $2x - 5 = 0$   
 $2x = 5$   
 $x = \frac{5}{2}$

$y\text{-int} : x=0$   
 $-4y - 5 = 0$   
 $-4y = 5$   
 $y = -\frac{5}{4}$

③  $2x - 4y - 5 = 0$   
 $\frac{2x - 4y}{5} = \frac{5}{5}$   $\Rightarrow \frac{2x}{5} - \frac{4y}{5} = 1$

Example: Find the equation of a line that passes through the point (4, 9) and is

a) parallel to the line  $\frac{x}{2} + \frac{y}{3} = 1$ .

$$m = -\frac{b}{a} = -\frac{3}{2}$$

$$\therefore m = -\frac{3}{2}$$

$$b \rightarrow 9 = -\frac{3}{2}(4) + b$$
$$9 = -6 + b$$
$$15 = b$$

$$y = -\frac{3}{2}x + 15$$

**Example:** Find the equation of a line that passes through the point  $(4, 9)$  and is

b) perpendicular to the line  $\frac{x}{5} + \frac{y}{-4} = 1$ .

$$y = mx + b$$

$$\therefore m = -\frac{5}{4}$$

$$m = ? = -\frac{b}{a} = \frac{4}{5}$$

$$9 = -\frac{5}{4}(4) + b$$

$$9 = -5 + b$$

$$14 = b$$

$$y = -\frac{5}{4}x + 14$$

Example: Determine the equation of the perpendicular bisector of the line segment that joins points  $(5, 8)$  &  $(15, 13)$ .

$$\textcircled{1} \text{ slope of green line : } m = \frac{13-8}{15-5} = \frac{5}{10} = \frac{1}{2}$$

$\therefore$  slope of p.b  $\Rightarrow m = -2$

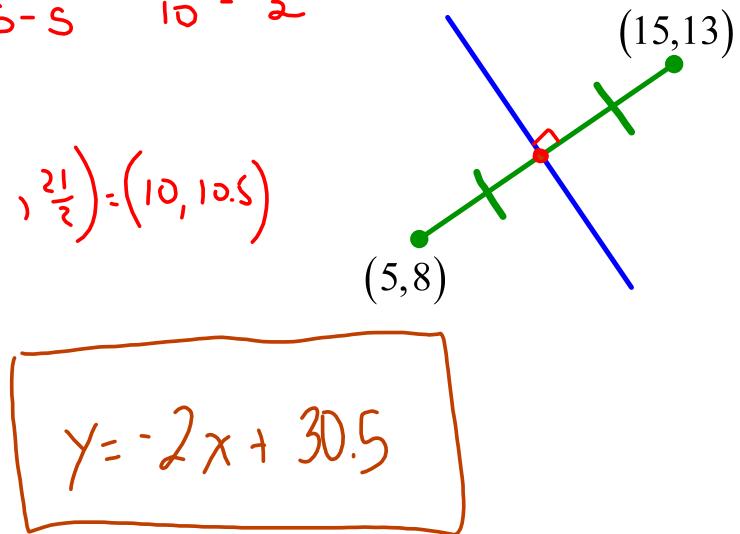
$$\textcircled{2} M\left(\frac{5+15}{2}, \frac{8+13}{2}\right) = \left(\frac{20}{2}, \frac{21}{2}\right) = (10, 10.5)$$

$$\textcircled{3} \quad y = mx + b$$

$$10.5 = (-2)10 + b$$

$$10.5 = -20 + b$$

$$30.5 = b$$



$$y = -2x + 30.5$$