Example: Find the equation of the line that passes through the point $(8, 6)$ and is perpendicular to the equation $4x - 5y - 6 = 0$.

$+5y \quad +5y$

① convert

$4x - 6 = 5y$

$\frac{4}{5}x - \frac{6}{5} = y$

OR

slope: $-\frac{A}{B} = -\frac{4}{-5} = \frac{4}{5}$

$y = \frac{4}{5}x - \frac{6}{5}$

① ②

$y = mx + b$

② slope $= -\frac{5}{4}$ $x = 8$ $y = 6$

$6 = -\frac{5}{4}(8) + b$

$6 = -\frac{40}{4} + b$

$6 = -10 + b$

$16 = b$

$y = -\frac{5}{4}x + 16$

Symmetric Form

The equation of an oblique line that does not pass through the origin can be written as ...

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

where a is the x-intercept (zero) and b is the y-intercept, and the slope (rate of change) is $\frac{-b}{a}$.

Example: What is the equation of the line whose intercepts are $(5, 0)$ and $(0, -4)$?

x-int
$\therefore a = 5$

y-int
$b = -4$

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

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

Example: What is the equation of the line whose x-intercept is $(-12, 0)$ and passes through the point $(6, 10.5)$?

$$\frac{x}{a}+\frac{y}{b}=1 \longrightarrow \frac{6}{-12}+\frac{10.5}{b}=1$$

$$-0.5+\frac{10.5}{b}=1$$

$$\frac{10.5}{b}=1.5$$

switch

$$1.5b=10.5$$

$$\frac{1.5b}{1.5}=\frac{10.5}{1.5}$$

$$\frac{10.5}{1.5}=b$$

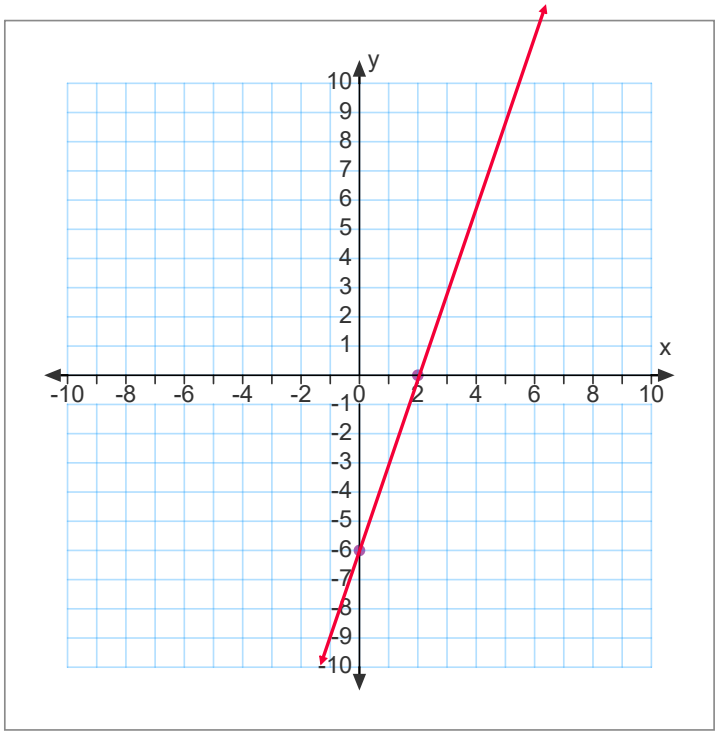
$$7=b$$

Answer: $\frac{x}{-12}+\frac{y}{7}=1$

Example: Draw the graph of $\frac{x}{2}+\frac{y}{-6}=1.$

x- int = 2

y- int : -6



Converting From One Form to Another

Example: Determine the equation of the line that passes through the points $(3, 11)$ & $(6, 3)$ in all three forms.

1) Standard $y = mx + b$

① $m = \frac{3 - 11}{6 - 3}$

$= -\frac{8}{3}$

② Using $(6, 3)$

$3 = -\frac{8}{3}(6) + b$

$3 = -16 + b$

$19 = b$

$y = -\frac{8}{3}x + 19$

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

$y = -\frac{8}{3}x + 19$

$3\left(0 = -\frac{8}{3}x - y + 19\right)$ or (-3)

$0 = -8x - 3y + 57$ $\quad 0 = 8x + 3y - 57$

3) Symmetric $\frac{x}{a} + \frac{y}{b} = 1$ $\quad \frac{x}{a} + \frac{y}{19} = 1$

x-int: $y = 0$

$0 = -\frac{8}{3}x + 19$

$-19 = -\frac{8}{3}x$

$-19 \div -\frac{8}{3} = x$

$\frac{57}{8} = x$

$\frac{x}{7.125} + \frac{y}{19} = 1$