Example: Convert $Ax \underbrace{+By} + C = 0$ to function form.

$Ax + C = -By$

$\frac{A}{-B}x + \frac{C}{-B} = y$

$y = mx + b$

Slope $= \frac{-A}{B}$

$y$-intercept $= \frac{-C}{B}$

Zero $= \frac{-C}{A}$

(x-int)

Convert $\overset{Ax + By + C = 0}{7x - 3y + 9 = 0}$ to standard form.

$y = \overset{\text{slope}}{m}x + \underset{\text{y-int} \nearrow}{b}$

$\text{slope} = -\frac{A}{B}$

$$m = \frac{-7}{-3} = \frac{7}{3}$$

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

$$b = \frac{-9}{-3} = 3$$

$$\therefore y = \frac{7}{3}x + 3$$

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

neg recip

$\therefore m = -\frac{5}{4}$ or $-1.25$

① convert to standard

② slope $= -\frac{A}{B}$

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

$= \frac{4}{5}$

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

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

$6 = -10 + b$

$16 = b$

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

# 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 $\underbrace{(5, 0)}_{\substack{x\text{- int}\\ \underline{\underline{a}}}}$ and $\underbrace{(0, -4)?}_{\substack{y\text{- int}\\ b}}$

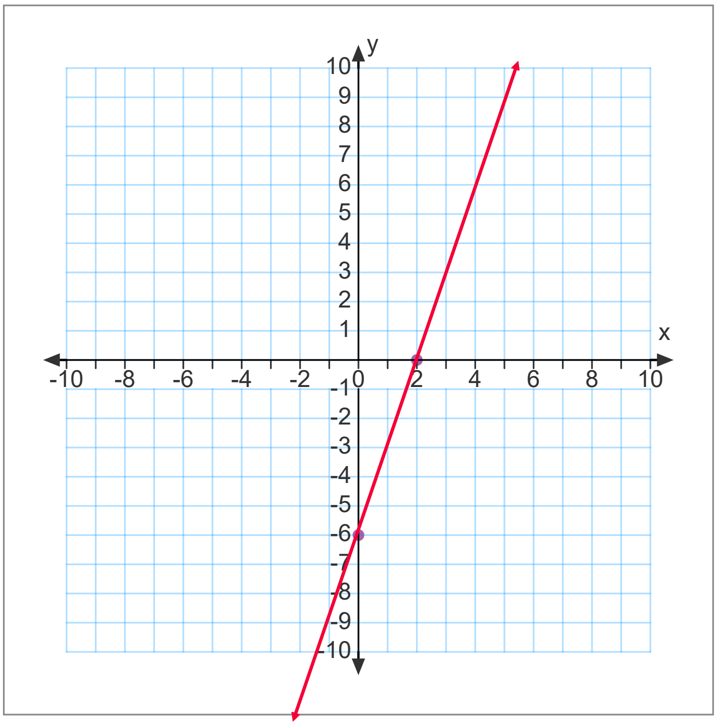
Answer: $$\frac{x}{5}+\frac{y}{-4}=1$$

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

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 $y = mx + b$

i) $m = \frac{3-11}{6-3} = -\frac{8}{3}$

ii) $11 = -\frac{8}{\cancel{3}}(\cancel{3}) + b$

$11 = -8 + b$

$19 = b$

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

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

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

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

$0=-8x-3y+57$ OR $0=8x+3y-57$

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

x-int
$y=0$

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

x-int $=\frac{-C}{A}=\frac{-57}{-8}=7.125$

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