a) Convert $y = 0.05x + 2.003$ to general form

$0 = 0.05x - y + 2.003$

$\times 100$ $\times 1000$

$1000 \cdot 0 = (0.05x - y + 2.003) \cdot 1000$

$0 = 50x - 1000y + 2003$

$Ax + By + C = 0$

Integers

b) Convert $y = \frac{5}{6}x - \frac{1}{4}$ to general form

$0 = \frac{5}{6}x - y - \frac{1}{4}$

L.C.M = 12

$12 \cdot 0 = \left(\frac{5}{6}x - y - \frac{1}{4}\right) \cdot 12$

$0 = 10x - 12y - 3$

$y = 3x + 8$

$0 = 3x - y + 8$

2. From General form to Function form.

Example: Convert $3x+2y-10=0$ to function form. $y = mx+b$

We need to isolate y. →

$$3x+2y-2y-10=0-2y$$

$$3x-10=-2y$$

$$\frac{3x-10}{-2}=\frac{-2y}{-2}$$

$$y=-1.5x+5$$

Example: Convert $6x-5y+15=0$ to function form.

$$6x-5y+5y+15=0+5y$$

$$6x+15=5y$$

$$\frac{6x+15}{5}=\frac{5y}{5}$$

$$\frac{6}{5}x+3=y$$

$$y=1.2x+3$$

Example: Convert $Ax + By + C = 0$ to function form.

$-By \quad -By$

$\frac{Ax}{-B} + \frac{C}{-B} = \frac{-By}{-B}$

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

Slope y-int

zero

$y = 0$

$Ax + C = 0$

$Ax = -C$

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

$\text{Slope} = \frac{-A}{B}$ $\quad y\text{-intercept} = \frac{-C}{B}$ $\quad \text{Zero} = \frac{-C}{A}$

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

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

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

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

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

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

slopes are negative reciprocals

slope?

- convert $4x-6=5y$

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

- $m=-\frac{A}{B}=\frac{-4}{-5}=\frac{4}{5}$

$y=mx+b$

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

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

$6=-10+b$

$16=b$

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

gen: $0=-\frac{5}{4}x-y+16$

$\times 4$ or $\times -4$

$-4\cdot 0=\left(-\frac{5}{4}x-y+16\right)\cdot -4$

$0=5x+4y-64$

$4\cdot 0=\left(-\frac{5}{4}x-y+16\right)\cdot 4$

$0=-5x-4y+64$

$y = mx + b$

Determine the equation of the line that passes through the point $(9, 14)$ and is...

a) parallel (same slope) to the line $4x + 3y - 15 = 0$

$m = -\frac{A}{B} = -\frac{4}{3}$

$y = -\frac{4}{3}x + b$

$14 = -\frac{4}{3}(9) + b$

$14 = -12 + b$

$26 = b$

$y = -\frac{4}{3}x + 26$

b) perpendicular to the line $6x - 5y - 5 = 0$

$m = -\frac{A}{B} = -\frac{6}{-5} = \frac{6}{5}$

$y = -\frac{5}{6}x + b$

$14 = -\frac{5}{6}(9) + b$

$14 = -7.5 + b$

$21.5 = b$

$y = -\frac{5}{6}x + 21.5$

Symmetric Form

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

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

x-int: $(a, 0)$
y-int: $(0, b)$
slope: $m = \frac{0-b}{a-0} = \boxed{\frac{-b}{a}}$

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 $(0, -4)$?

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

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

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

We could do $y = mx + b$

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

$$-0.5 + \frac{10.5}{b} = 1 \quad (+0.5 \text{ to both sides})$$

$$\frac{10.5}{b} = 1.5 \quad (10.5 \div 1.5 = b)$$

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

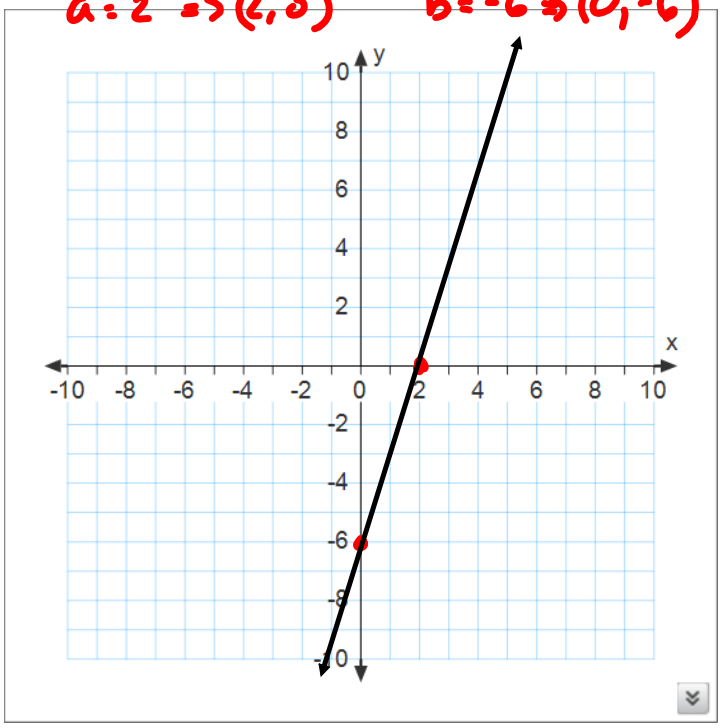
$$7 = b$$

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

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

① $x \neq y$ ② $y=mx+b$ slope y-int

$a=2 \Rightarrow (2,0)$ $b=-6 \Rightarrow (0,-6)$



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

$3 = -16 + b$

$19 = b$

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

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

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

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

$0 = 8x + 3y - 57$

3) Symmetric $\frac{x}{a} + \frac{y}{b} = 1$ the intercepts

a) from standard

$y = -\frac{8}{3}x + 19 \;:b \Rightarrow \frac{x}{a} + \frac{y}{19} = 1$

a: $y = 0$

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

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

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

$x = 7.125$

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

$= \frac{57}{8}$

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

$\Rightarrow \frac{x}{\frac{57}{8}} + \frac{y}{19} = 1$

$\frac{8x}{57} + \frac{y}{19} = 1$

b) from General form $0 = 8x + 3y - 57$

① y-int $= -\frac{C}{B} = \frac{57}{3} = 19$

② x-int $= -\frac{C}{A} = \frac{57}{8}$

x-int: let $y = 0$

$0 = 8x - 57$

$57 = 8x$

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

y-int: let $x = 0$

$0 = 3y - 57$

$57 = 3y$

$19 = y$

$$\frac{x}{\frac{57}{8}} + \frac{y}{19} = 1$$