The Equation of a Line

Ex/ Solve.

a) $2x + 5 = 25$ (−5 −5)

$2x = 25 - 5$

$\frac{2x}{2} = \frac{20}{2}$

$x = 10$

b) $10 + 3m = -20$ (−10 −10)

$3m = -20 - 10$

$\frac{3m}{3} = \frac{-30}{3}$

$m = -10$

c) $4 = 3(-2) + b$ (multiply)

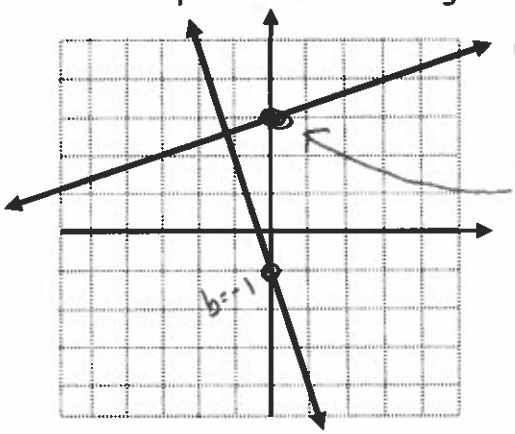
$4 = -6 + b$

$4 + 6 = b$

$10 = b$

- Always start by filling in the parts you know into Slope Intercept Form $(y = mx + b)$.

Ex/ Find the equation of the lines given below.



$m = \frac{\text{rise } 1}{\text{run } 3} = \frac{1}{3}$

$b = 3$

$y = \frac{1}{3}x + 3$

$m = \frac{\text{rise down } 3}{\text{run } 1} = \frac{-3}{1}$

$= -3$

$b = -1$

$y = -3x - 1$

Slope and a Point

1) Fill-in the part of the equation that we know (the slope - m)
2) Substitute a known point (x,y)
3) Solve for the unknown value (the y-intercept - b)
4) Re-write the equation

Ex/ Find the equation of a line, given:

a) Slope of -2, passing through (-3,5) (x y)

① $y = -2x + b$ fill in m

② $5 = -2(-3) + b$ fill in x and y

③ $5 = 6 + b$ (multiply) solve for b

$5 - 6 = b$

$-1 = b$

④ $y = -2x - 1$ (m, b) write the equation

b) Slope of 3, through (4,0) (x y)

① $y = 3x + b$

② $0 = 3(4) + b$

③ $0 = 12 + b$ (−12 −12)

$0 - 12 = b$

$-12 = b$

④ $y = 3x - 12$

c) Slope of 5, passing through (-5,-2)

$y = 5x + b$

$-2 = 5(-5) + b$

$-2 = -25 + b$

$+25 \quad +25$

$-2 + 25 = b$

$23 = b$

$y = 5x + 23$

d) Slope of -2, passing through (4,-3)

$y = -2x + b$

$-3 = -2(4) + b$

$-3 = -8 + b$

$+8 \quad +8$

$-3 + 8 = b$

$5 = b$

$y = -2x + 5$

e) Slope of $-\frac{2}{5}$, through (7,1)

↳ divide to change to decimal

$y = -0.4x + b$

$1 = -0.4(7) + b$

$1 = -2.8 + b$

$+2.8 \quad +2.8$

$1 + 2.8 = b$

$3.8 = b$

$y = -0.4x + 3.8$

Homework: Handout - The Equation of a Line