Warm-up) Given $A(3, -7)$ $B(6, -11)$, find the standard form of the line.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-11 + 7}{6 - 3} = \frac{-4}{3}$$

$$y - y_1 = m(x - x_1)$$

$$(y + 7) = \frac{-4}{3}(x - 3)$$

$$3y + 21 = -4x + 12$$

$$4x + 3y + 9 = 0$$

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56. - Draw the line of best fit.
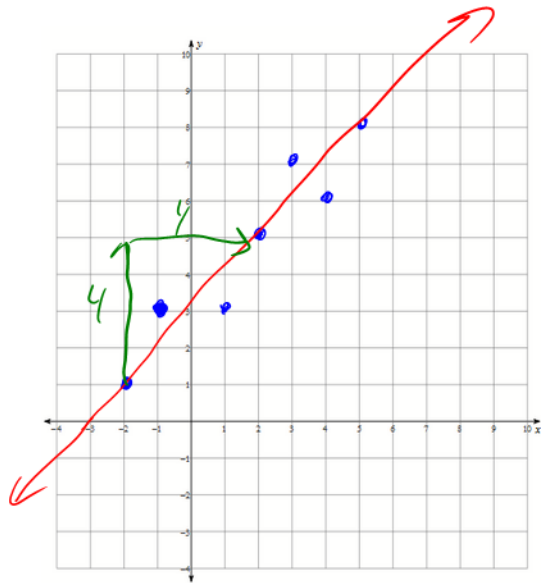
- Determine the equation of the line

$$m = \frac{4}{4} = 1 \qquad (5, 8)$$

$$y - y_1 = m(x - x_1)$$

$$y - 8 = 1(x - 5)$$

$$\boxed{y - 8} = x - 5$$

$$0 = x - y + 3$$

65. The Mariana Trench The Mariana Trench in the Pacific Ocean is the deepest spot on Earth. The bottom of the trench is 11 000 m below the surface of the ocean. A winged submersible, called *Deep Flight*, allows scientists to explore the trench for the first time. Conventional submersibles rely on ballast to sink. *Deep Flight* is powered by thrusters to move it through the water. The ordered pairs (15, 1830) and (55, 6710) give the time, in minutes, that *Deep Flight* has been diving and its depth, in metres.
a) Calculate the slope of the line.
b) What rate of change does the slope represent?
c) Find an equation of the line.
d) Use the equation to determine how long it will take *Deep Flight* to reach the bottom of the Mariana Trench.

min   depth   min   depth
$(15, 1830)$ $(55, 6710)$

a) $m = \dfrac{6710 - 1830}{55 - 15} = \dfrac{4880}{40}$

$= 122$

Going Down
b) 122 metres per min.

c) $y - y_1 = m(x - x_1)$

$y - 1830 = 122(x - 15)$

$\boxed{y - 1830} = 122x - 1830$

$0 = 122x - y + \cancel{0}$

d) $x =$ time $y =$ metres
$x = ?$ $y = 11000$ m

+11000
$0 = 122x - 11000$

$\dfrac{11000}{122} = \dfrac{122x}{122}$

$90 = x$

∴ 90 minutes to reach the bottom of the ocean.
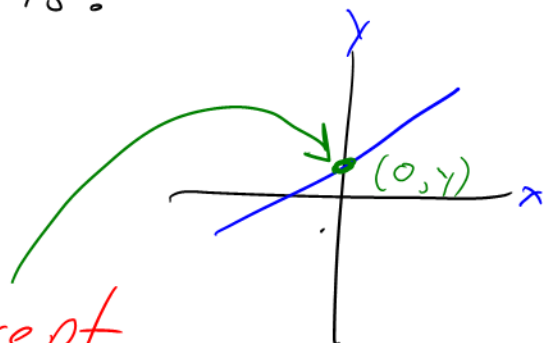

8.4 | Slope and y-intercept Form   pg 428.

The slope and y-intercept form is:

$$y = mx + b$$

M is slope

b is the y-intercept

→ y must be positive and alone.

(0, y)

Find slope and y-intercept:

1. $y = 3x + 1$

$m = 3$ y-int $= 1$
$(0, 1)$

3. $y = -4x + 3$

$m = -4$ y-int $= 3$
$(0, 3)$

6. $y + \overset{-4}{4} = 5x$

$y = 5x - 4$

$m = 5$ y-int $= -4$
$(0, -4)$

7. $y - 2x = 0$

$y = 2x$

$m = 2$, y-int $= 0$

9. $4x^{-4x} + 2y = 3^{-4x}$

$\dfrac{2y}{2} = \dfrac{-4x}{2} + \dfrac{3}{2}$

$y = -2x + \dfrac{3}{2}$

$m = -2$, y-int $= \dfrac{3}{2}$

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Find the $y = mx + b$ of the given points.

19. $(1, 3)$ $(3, 5)$

① $m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{5 - 3}{3 - 1} = \dfrac{2}{2} = 1$

② $y - y_1 = m(x - x_1)$

$y - 3 = 1(x - 1)$

$y - 3 = x - 1$
$\quad +3 \qquad +3$

③ Create $y = mx + b$

$y = x + 2$

22. $(-1, -2)$ $(-5, -10)$

$m = \dfrac{-10 + 2}{-5 + 1} = \dfrac{-8}{-4} = 2$

$y - y_1 = m(x - x_1)$

$y + 2 = 2(x + 1)$

$y + 2 = 2x + 2 \quad {}^{-2}$

$y = 2x + 0$

23. $(2,1)$ $(6,4)$

$m = \dfrac{4-1}{6-2} = \dfrac{3}{4}$

$y - y_1 = m(x - x_1)$

$4(y-1) = \dfrac{3}{4}(x-2) \longrightarrow$

$4y - 4 = 3x - 6$

$\dfrac{4y}{4} = \dfrac{3x}{4} - \dfrac{2}{4}$

$y = \dfrac{3}{4}x - \dfrac{1}{2}$

$y - 1 = \dfrac{3}{4}x - \dfrac{6}{4} + \dfrac{4}{4}$

$y = \dfrac{3}{4}x - \dfrac{2}{4}$

$y = \dfrac{3}{4}x - \dfrac{1}{2}$

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