

UNDERSTANDING GRAPHS OF LINEAR EQUATIONS

* Recall that the slope-intercept form of a linear equation is $y = mx + b$ where m is the slope and b is the y -coordinate of the y -intercept

* Recall that the point-slope of a linear equation is $y - y_0 = m(x - x_0)$ where m is the slope and (x_0, y_0) is a given point on the line

* Don't forget that the slope measures the change in the y -coordinate relative to the change in the x -coordinate, or, more precisely, slope = $\frac{\text{change in } y}{\text{change in } x} = \frac{\Delta y}{\Delta x}$

Model Problems:

1. What are the slope and the y -intercept of the following linear equation?

$$6x + 2 = 2y - 7$$

$$y = 3x + 4.5$$

Solve the original equation for y and read off m and b

Answer: $m = 3$ and y -int = $(0, 4.5)$

2. Find the slope of the line which passes through the points $(5, 100)$ and $(8, 67)$.

Answer: $\text{slope} = \frac{100 - 67}{5 - 8} = \frac{33}{-3} = -11$

3. Find the equation of the line which passes through the points $(5, 100)$ and $(8, 67)$.

Using the above result, we know that $m = -11$

$$y - 100 = -11(x - 5)$$

Here we're using the point-slope form

$$y - 100 = -11x + 55$$

Distribute -11

$$y = -11x + 155$$

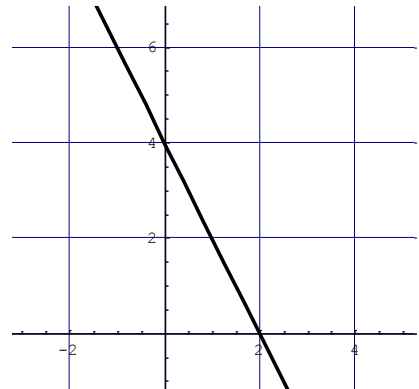
Solve for y

4. Find an equation of the line graphed on the right:

$m = -2$ Choose any two clear points, like $(2, 0)$ and $(0, 4)$, and use the slope formula

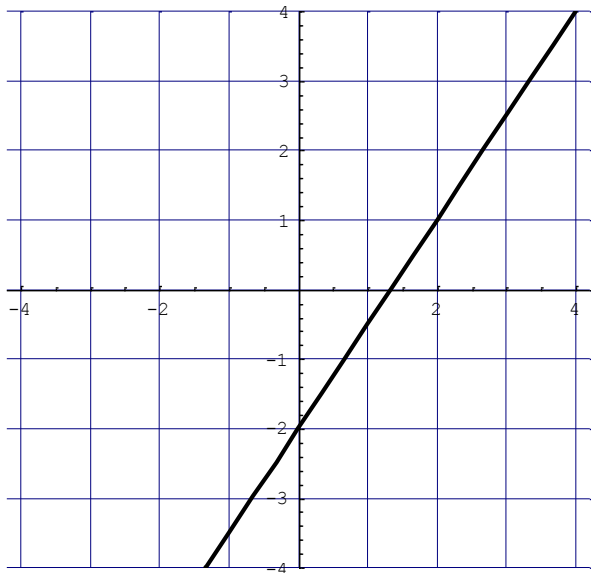
y -int = $(0, 4)$ Simply read off the graph

Answer: $y = -2x + 4$



Practice Exercises:

1. Which of the following equations is most likely represented by the given graph?



(a) $y = 2x + 1$

(b) $y = -\frac{3}{2}x - 2$

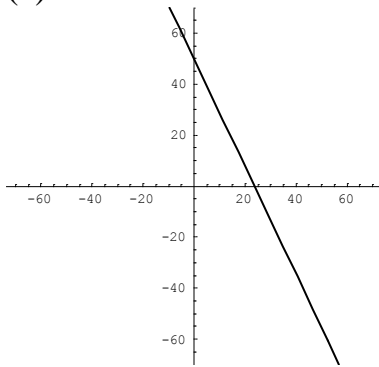
(c) $y = \frac{3}{2}x - 2$

(d) $y = \frac{3}{2}x + 2$

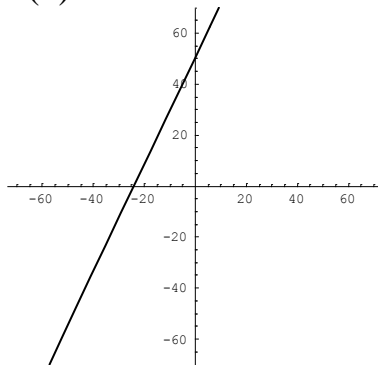
(e) $y = \frac{3}{2}x^2 - 2$

2. Which of the following graphs most likely represents the equation $y = -2.1x + 50$?

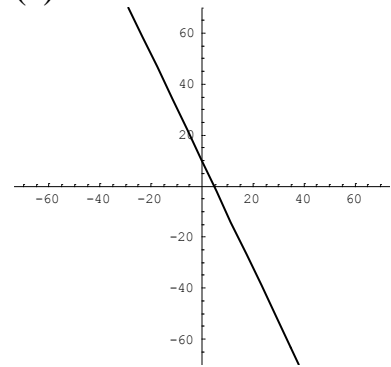
(a)



(b)

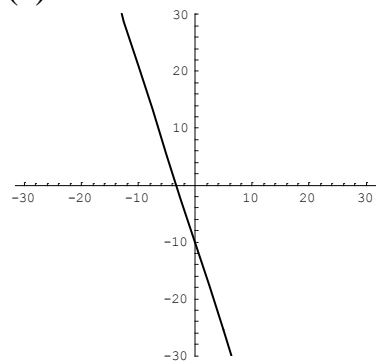


(c)

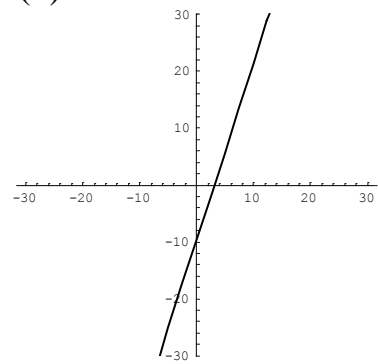


3. Which of the following graphs most likely represents the equation $y = 3.11x - 10$?

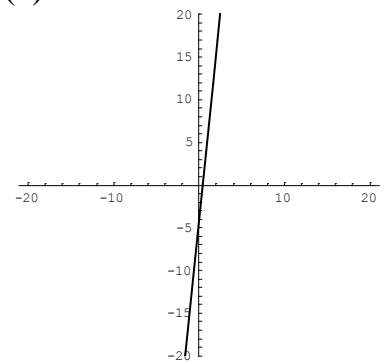
(a)



(b)



(c)



Given a pair of points below, find the slope of the line which passes through them.

4. (5, 2) and (-1, 1) 5. (12, -4) and (10, 10) 6. (1, 4) and (-10, 4)

Find the equation of the line which passes through the given points.

7. (3, -5) and (8, 5) 8. (10, 3) and (15, -17) 9. (1.2, 4) and (2.2, 5)

Find the slope and the y-intercept of the lines whose equations are given below.

10. $2y - 2 = 6x$ 11. $10y + 3 = -20x - 20$ 12. $110x + 1 = 100y - 1$

Answers:

1. (c) 2. (a) 3. (b) 4. $\frac{1}{6}$ 5. -7 6. 0

7. $y = 2x - 11$ 8. $y = -4x + 43$ 9. $y = x + 2.8$

10. $slope = 3, y_{int} = (0,1)$ 11. $slope = -2, y_{int} = (0,-2.3)$

12. $slope = 1.1, y_{int} = (0,0.02)$