

Unit 2: Solving Equations and Inequalities

Lesson 2: Graphing Linear Equations

A **linear equation** has no operations other than addition, subtraction, and multiplication of a variable or a constant.

Linear Equations	Not Linear Equations
$y = -3x + 2$	$y = \sqrt{x} - 3$
$2x - 4y = 9$	$y = x^2 + 4$
$f(x) = -\frac{1}{2}x - 6$	$y = \frac{1}{x} - 2$

Any **linear function** can be written in the form $y = mx + b$ where m and b are real numbers.

State whether each function is a linear function. Explain.

- $f(x) = 10 - 5x$ **Yes**
- $g(x) = x^4 - 5$ **No because there is an exponent on x .**
- $h(x, y) = 2xy$ **No because x is multiplied by y .**

Example 1. The linear function $P(d) = 62.5d + 2117$ can be used to find the pressure (lb/ft²) d feet below the surface of the water. Find the pressure at a depth of 350 feet. Remember your units.

$$\begin{aligned}
 P(350) &= 62.5(350) + 2117 \\
 &= 21875 + 2117 \\
 &= \boxed{23992 \text{ lb/ft}^2}
 \end{aligned}$$

$P(d)$ = pressure
 d = depth

SLOPE-INTERCEPT FORM:

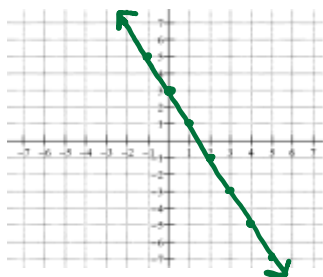
$$y = mx + b$$

where m is the slope and b is the y-intercept.

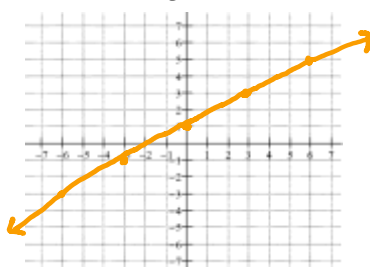
slope = $\frac{\text{rise}}{\text{run}}$
 y-int: $(0, b)$

Graph each equation.

a. $y = -2x + 3$
 y-int: $(0, 3)$
 slope: $-2 = \frac{-2}{1}$



b. $y = \frac{2}{3}x + 1$
 y-int: $(0, 1)$
 slope: $\frac{2}{3}$



c. $\frac{1}{2}y = \frac{3x+6}{2}$
 $y = \frac{3x+6}{1}$
 $y = \frac{3}{1}x + \frac{6}{1}$
 $y = \frac{3}{1}x + 6$
 y-int: $(0, 6)$
 slope: $\frac{3}{1}$



STANDARD FORM:

$$Ax + By = C$$

where A , B , and C are integers whose greatest common factor is 1, $A \geq 0$, and A and B are not both zero.

Write each equation in standard form. Identify A , B , and C .

a. $y = -2x + 3$
 $+2x \quad +2x$
 $2x + y = 3$

Equation: $2x + y = 3$
 A: 2
 B: 1
 C: 3

b. $\frac{-3}{5}x = 3y - 2$
 $-5(\frac{-3}{5}x - 3y = -2)$
 $3x + 15y = 10$

Equation: $3x + 15y = 10$
 A: 3
 B: 15
 C: 10

c. $\frac{1}{3}x = \frac{1}{3}y - 2$
 $\cdot \frac{1}{3}y \quad \cdot \frac{1}{3}y \quad 3(\frac{1}{3}x - \frac{1}{3}y = -2)$
 $x - y = -6$

Equation: $x - y = -6$
 A: 1
 B: -1
 C: -6

Find the x-intercept and the y-intercept of the graph of each equation. Then graph the equation.

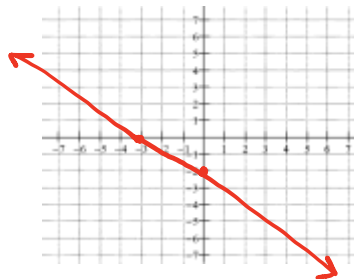
a. $3x - 4y = -12$
 $\frac{3x}{3} = \frac{-12}{3} \quad x = -4$

x-intercept: $(-4, 0)$
 $\frac{-4y}{-4} = \frac{-12}{-4} \quad y = 3$
 y-intercept: $(0, 3)$



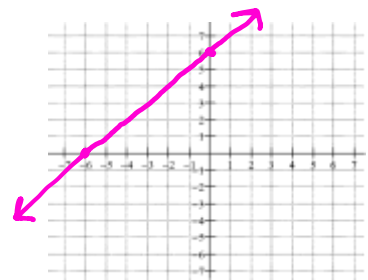
b. ~~$\frac{-3}{5}x = 3y - 2$~~
 $\frac{3x}{2} = \frac{-6}{2} \quad x = -3$

x-intercept: $(-3, 0)$
 $\frac{3y}{3} = \frac{-6}{3} \quad y = -2$
 y-intercept: $(0, -2)$



c. $\frac{1}{3}x = \frac{1}{3}y - 2$
 $x - y = -6$
 $x = -6$

x-intercept: $(-6, 0)$
 $\frac{-y}{-1} = \frac{-6}{-1} \quad y = 6$
 y-intercept: $(0, 6)$



Journal prompt: One way to remember something is to explain it to another person. Suppose that you are studying this lesson with a friend who thinks that she should let $x = 0$ to find the x-intercept and let $y = 0$ to find the y-intercept. How would you explain to her how to remember the correct way to find intercepts of a line?

HW: pg. 69: 10-18 even, 22-33 all
 BONUS # 34