GRAPHING LINEAR EQUATIONS



FINDING THE EQUATION OF THE LINE

Example 1: (Slope-intercept form) Graph.

a) Graph y = x + 1





у



Example 2: (Standard form) Graph.



b) Graph $y = \frac{5}{3}x - 2$









c) Graph y = $-\frac{1}{2}x + 1$











SLOPE-INTERCEPT FORM **POINT-SLOPE FORM** y = mx + b $y - y_1 = m(x - x_1)$ **Example 1**: Find an equation of the line with slope $\frac{1}{5}$ and point (0, 7). The coordinate (o, 7) is a y-intercept, so b = 7. y = mx + b $y = \frac{1}{5}x + 7$ **Example 2**: Find an equation of the line with slope $\frac{3}{2}$ and point (6, o). Method 1: Use the slope-intercept form. Method 2: Use the point-slope form. $y - y_1 = m(x - x_1)$ y = mx + b $y - 0 = \frac{3}{2}(x - 6)$ $y = \frac{3}{2}x - 9$ $y = \frac{3}{2}x + b(*)$ $o = \frac{3}{2}(6) + b$ o = 9 + b -9 = b Update (*). y = $\frac{3}{2}x - 9$ **Example 3**: Find an equation of the line with slope 4 and point (2, 5). <u>Method 1</u>: *Use the slope-intercept form.* Method 2: Use the point-slope form. y = mx + b $y - y_1 = m(x - x_1)$ y = 4x + b(**)y - 5 = 4(x - 2)y - 5 = 4x - 85 = 4(2) + b5 = 8 + by = 4x - 3-3 = b Update (**). y = 4x - 3**Example 4**: Find an equation of the line containing the points (3, 2) and (9, -6). First, find the slope using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{-6-2}{9-3} = \frac{-8}{6} = \frac{-4}{3}$ <u>Method 1</u>: *Use the slope-intercept form.* Method 2: Use the point-slope form. $y - y_1 = m(x - x_1)$ $y - 2 = \frac{-4}{3}(x - 3)$ $y - 2 = \frac{-4}{3}x + 4$ $y = \frac{-4}{3}x - 6$ y = mx + by = $\frac{-4}{3}x + b$ (***) 2 = $\frac{-4}{3}(3) + b$ 2 = -4 + b 6 = b Update (***). y = $\frac{-4}{3}$ x + 6

Example 1: Find an equation of the line given the slope and point.

a) slope $\frac{2}{3}$ and point (0, 1)

b) slope $\frac{-7}{2}$ and point (0, -4)

Equation: _____

Equation: _____

INTERPRET THE SLOPE AND Y-INTERPRET

c)	slope $\frac{5}{4}$ and point (–8, o)	d) slope —3 and point (2, 0)
	Equation:	Equation:
e)	slope $-\frac{1}{5}$ and point (5, 7)	f) slope 1 and point (3, 6)
	Equation:	Equation:

Example 2: Find an equation of the line containing the two points.

a) (1, 2) and (3, -8)

b) (2, –3) and (4, –2)

Equation: _____

Equation: _____

Interpret the slope and y-interpret			
	Example 1 : When you have a physical exam, your doctor draws blood for your cholesterol test. Your cholesterol count is measured in milligrams per deciliter (mg/dL). A woman's total cholesterol y is related to her age x by the following linear equation:		
	y = 1.1x + 157		
	a) Determine and interpret the slope of the equation.		
	The slope is $\frac{1.1mg/dL}{1 year}$		
	Interpretation: The total cholesterol of a female increases by 1.1 mg/dL as age increases by 1 year.		
	b) Determine and interpret the y-intercept of the equation.		
	The y-intercept is (0, 157).		
	The total cholesterol of a newborn girl is 157 mg/dL.		
	c) Estimate the total cholesterol of a female at age 30. Interpret this in a complete sentence.		
	y = 1.1(30) + 157 = 190		
	The total cholesterol of a 30 year old woman is 190 mg/dL.		
	Example 2 : The temperature dropped rapidly overnight. Starting at 80°F at midnight, the temperature dropped 3°F per minute. The temperature T is related to the number of minutes x can be represented by the following linear equation: T = -3x + 80		
	a) Determine and intercept the slope of the equation.		
	The slope is –3.		
	Interpretation: The temperature decreases by 3°F as time increases by 1 minute.		
	b) Determine and interpret the y-intercept of the equation.		
	The y-intercept is (o, 8o).		
	The temperature is 80°F at midnight.		
	c) Estimate the temperature when it is 12:10am. Interpret this in a complete sentence.		
	T = -3(10) + 80 = 50		
	The temperature is 50°F at 12:10am.		
ļ			

Example 1: Some costs involved in owning a car are affected by the number of miles driven (gas and maintenance) Suppose the annual cost y of operating a Toyota Camry is related to the number of miles driven x. The annual cost of operating a Toyota Camry is \$0.25 per mile plus \$2000 by the following linear equation:

y = 0.25x + 2000

a) Determine and interpret the slope of the equation. The slope is $\frac{\$0.25}{1 \text{ mile}}$

Interpretation: The annual cost of owning a Camry increases by \$0.25/mile as the mileage increases by 1 mile.

 b) Determine and interpret the y-intercept of the equation. The y-intercept is (0, 2000). Interpretation: The annual cost of a Toyota Camry is \$2000 when o miles are driven.

c) Estimate the annual cost of a Toyota Camry when 500 miles are driven. Interpret this in a complete sentence. y = 0.25(500) + 2000 = 2125

Interpretation: The annual cost of a Toyota Camry is \$2125 when 500 miles are driven.

Example 2: The cost per minute of talk time for cell phone users has gone down over the years. In 1995, cell phone users paid, on the average, \$0.56 per minute. In 2011, they paid \$0.05 per minute. Assuming that the rate of decline of the cost per minute was constant, the cost per minute can be calculated by the equation

y = -0.031875x + 0.56, where x represents the number of years after 1995 and y represents the cost per minute of cell phone usage in dollars.

- a) Determine and interpret the slope of the equation. The slope is -0.031875. Interpretation: The cost per minute of cell phone usage decreases by \$0.03 per year.
- b) Determine and interpret the y-intercept of the equation. The y-intercept is (o, o.56).
 Interpretation: The cost per minute of cell phone usage is to 56 in year does

Interpretation: The cost per minute of cell phone usage is \$0.56 in year 1995.

c) Estimate the cost per minute of cell phone usage in year 2003. Interpret this in a complete sentence.
y = -0.031875(8) + 0.56 = 0.305
Interpretation: The cost per minute of cell phone usage is \$0.31 in year 2003.

Example 3: A teen magazine began with a circulation of 500,000 prints in its first year. Since then, the circulation has increased an average of 33,388 per year. The equation y = 33,388x + 500,000 represents the number of prints y and the number of years since its initial production y.

a) Determine and interpret the slope of the equation.

b) Determine and interpret the y-intercept of the equation.

c) Estimate the number of prints after the teen magazine's seventh year. Interpret this in a complete sentence.