

# 1.4 Intercepts and Graphing

The general form of a line is:

where  $A$ ,  $B$ , and  $C$  are integers and  $A$  is nonnegative.

To find an intercept, make the “other” variable zero and solve.

When interpreting an intercept, be sure to interpret both parts of the coordinate.

A horizontal line has an equation  
in the form:

A vertical line has an equation  
in the form:

The slope of a horizontal line is:

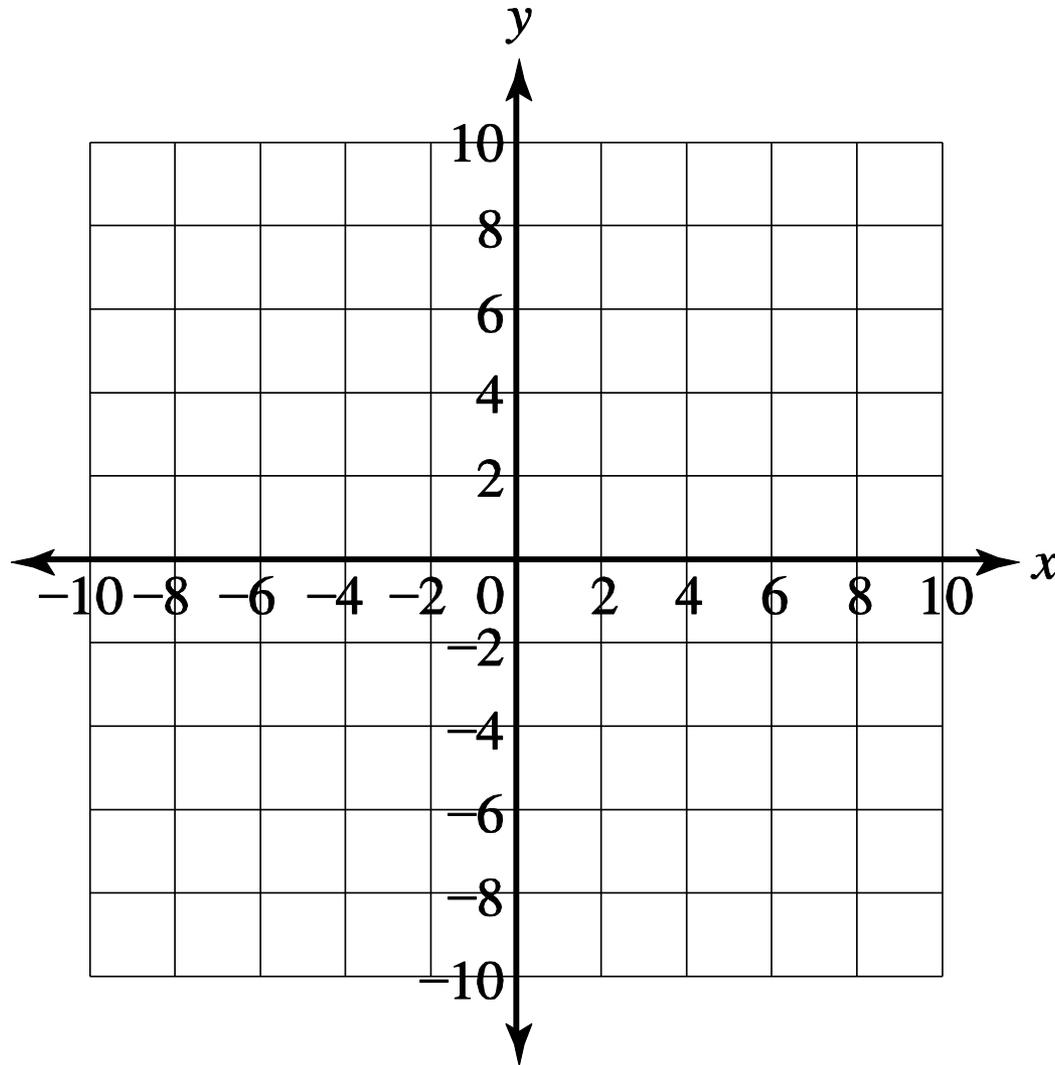
The slope of a vertical line is:

Find the vertical and horizontal intercepts, and explain their meaning in the given situation.

Let  $D = 0.28t + 5.95$  be the percentage of adults aged 18 years old and over in the United States that have been diagnosed with diabetes,  $t$  years since 2000. Source: CDC.

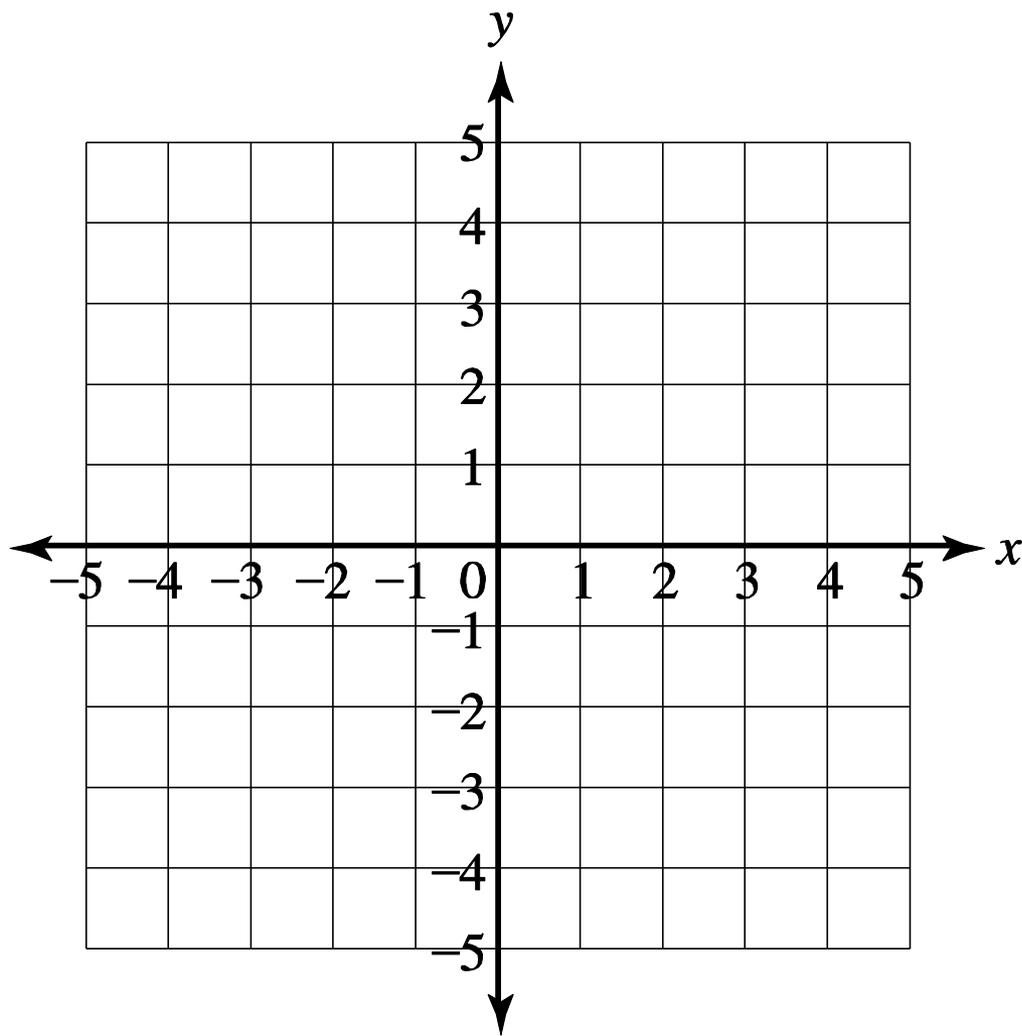
Find the horizontal and vertical intercepts of  $6x - 5y = 42$

Find the intercepts and graph the line  $2x + 3y = 18$



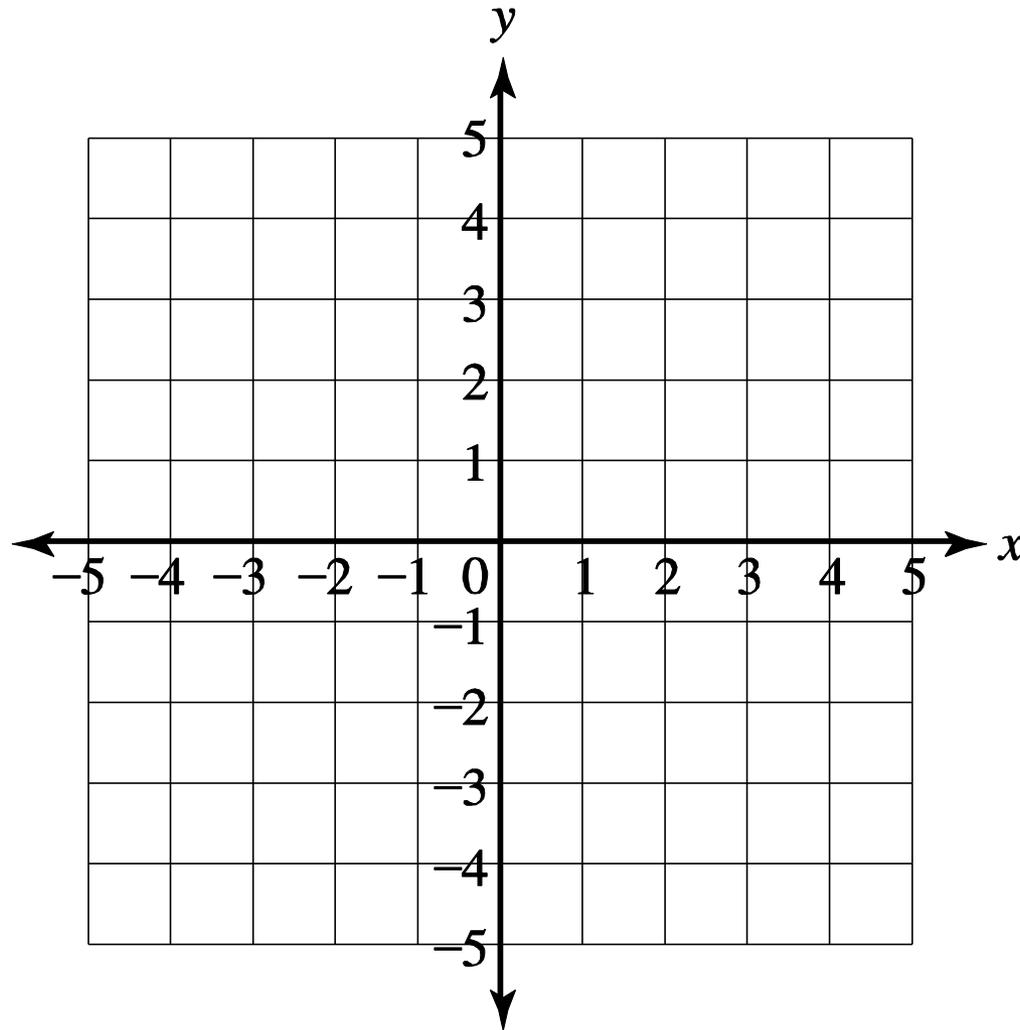
Sketch the graph of the following lines

a.  $x = -4$



Sketch the graph of the following lines

b.  $y = -1.5$



# 1.5 Finding Equations of Lines

Besides general form, an equation of a line can also be written using either slope-intercept form:  $y=mx + b$  or point-slope form:

When asked to write 'the equation' you will typically be writing your final answer in slope-intercept form.

**To find the equation of a line using the point-slope formula:**

1. Use any two points to calculate the \_\_\_\_\_.
2. Substitute the slope and a point into the \_\_\_\_\_.
3. Write the equation in slope-intercept form.
4. Check the equation by plugging in the points to be sure they are solutions.

**To find the equation of a line using slope-intercept form:**

1. Use any two points to calculate the \_\_\_\_\_.
2. Use the slope and a point to find the value of  $b$ .
3. Write the equation in slope-intercept form.
4. Check the equation by plugging in the points to be sure they are a solutions.

# 1.5 Finding Equations of Lines

Parallel lines have the \_\_\_\_\_ slopes and never intersect.

Perpendicular lines have \_\_\_\_\_ slopes and intersect at a right angle.

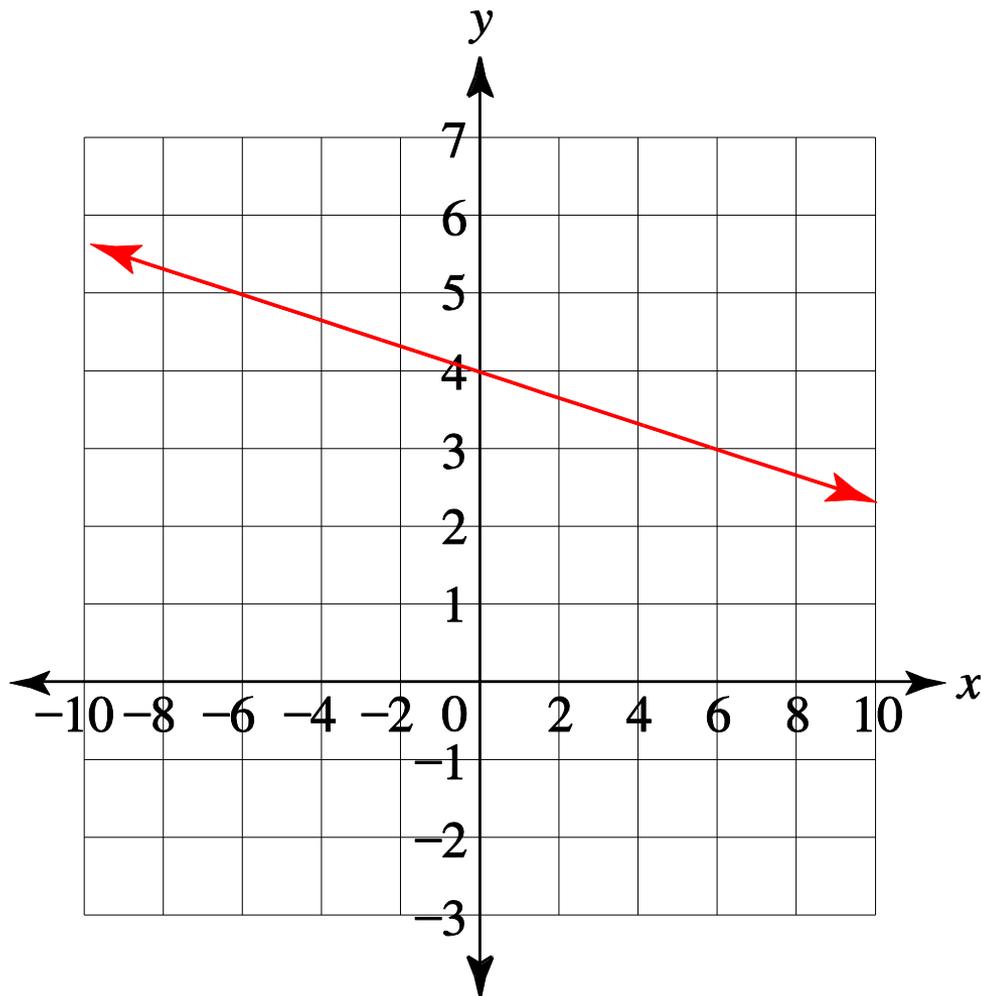
Use the point slope formula to write the equation of the line that passes through the points  $(6, -13)$  and  $(18, -31)$ .

A business purchased a production machine in 2005 for \$185,000. For tax purposes, the value of the machine in 2011 was \$129,500. If the business is using straight line depreciation, write the equation of the line that gives the value of the machine based on the age of the machine in years.

- a. Write the equation of the line that passes through the points in the table.

$x$	$y$
5	13
7	15.8
15	27
18	31.2

b. Write the equation of the line shown in the graph.



- a. Write the equation of the line that goes through the point  $(-12, 8)$  and is perpendicular to the line  $y = 4x - 23$

- b. Write the equation of the line that goes through the point  $(8,11)$  and is parallel to the line  $5x - 2y = 30$ .



Using the value of the production machine equation we found earlier, answer the following:  $v = -9250a + 185,000$

- c. What is the horizontal intercept of the equation? What does it represent in this situation?

# 1.6 Finding Linear Models

## **Modeling steps:**

1. Find the variables and adjust the data if needed.
2. Create a scatter plot.  
2<sup>nd</sup> stat (to enter data), turn Stat Plot on, may need to adjust Window or do a Zoom stat
3. Is the model linear? If yes, select two points (that best fit the line) and calculate the slope.
4. Find the equation of the line.

The total revenue for GE is given in the table.

Year	Revenue (billions \$)
2004	124
2005	136
2006	152
2007	172
2008	183

Source: GE 2008 annual report

- a. Find an equation for a model of these data.

The total revenue for GE is given in the table.

$$R = 14.75t + 65$$

- b. Using your model estimate GE's revenue in 2010.

Year	Revenue (billions \$)
2004	124
2005	136
2006	152
2007	172
2008	183

- c. What is the slope of your model? What does it mean in regards to GE's revenue?

- d. Determine a reasonable domain and range for the model.

# 1.7 Functions

- For every input value, there is only one unique output value. For each input value in the domain, you must have one and only output value in the range.
- If a vertical line intersects the graph at no more than one point, the graph is a function.
- Most linear functions (with the exception of horizontal lines or application problems) have a Domain and Range of all real numbers.

Determine whether the following descriptions of relations are functions or not.

a. The set  $A = \{(2, 5), (4, 8), (10, 8), (20, 15)\}$

b.

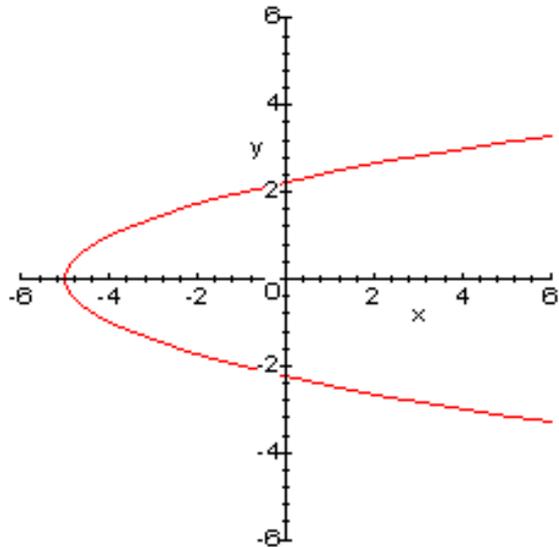
Day of week	Monday	Wednesday	Saturday	Monday
Temperature degrees Fahrenheit	90	88	91	93

c. Weekly salaries during the  $m$ th month of the year.

a. Is the equation a function or not?

$$y = 7x - 20$$

b. Is the graph a function or not?



$H(t)$  = The height of a toy rocket in feet  $t$  second after launch.

Interpret the mathematical statement  $H(3) = 12$  .

The population of Wisconsin, in millions, is given in the table.

Year	Population (in millions)
2003	5.47
2004	5.51
2005	5.54
2006	5.57
2007	5.60
2008	5.63

Source: [www.census.gov](http://www.census.gov)

Let  $P(t)$  be the population of Wisconsin, in millions,  $t$  years since 2000.

a. Find an equation for a model of these data. Write your model in function notation.

b. Determine a reasonable domain and range for your model.

The population of Wisconsin, in millions, is given in the table.

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2003	5.47
2004	5.51
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Source: [www.census.gov](http://www.census.gov)

$$P(t) = 0.03t + 5.39$$

- c. Find  $P(14)$  and interpret its meaning in regard to the population of Wisconsin.

- d. Find when  $P(t) = 5.75$  and interpret its meaning in regard to the population of Wisconsin.

Let  $f(x) = 7x + 2$        $g(x) = -1.25x + 14$        $h(x) = 2x^2 - 10$

Find the following.

a.  $f(3)$

Let  $f(x) = 7x + 2$        $g(x) = -1.25x + 14$        $h(x) = 2x^2 - 10$

Find the following.

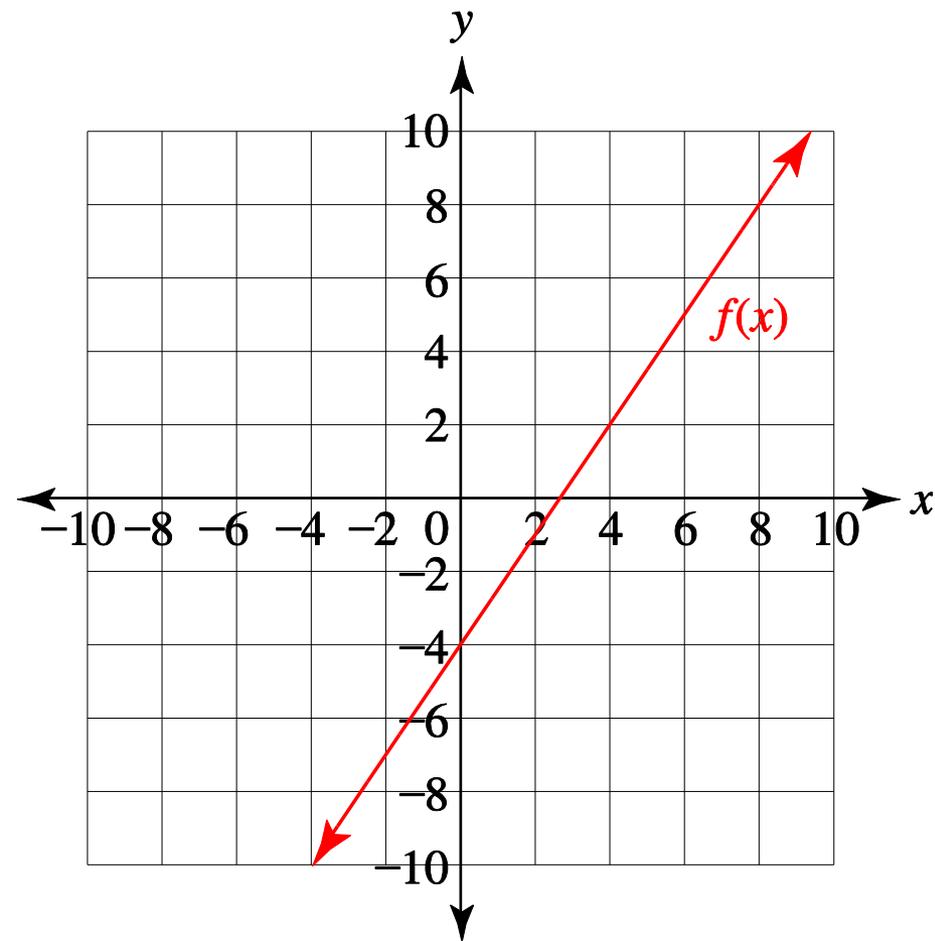
b.  $h(5)$

Let  $f(x) = 7x + 2$        $g(x) = -1.25x + 14$        $h(x) = 2x^2 - 10$

Find the following.

c.  $x$  such that  $g(x) = 15$

Use the graph to estimate the following.



a.  $f(2)$

b.  $x$  such that  $f(x) = 5$

Determine the domain and range of the following functions

a.  $f(x) = -3x + 7$

b.  $g(x) = 8$