

## 1.1 Solving Linear Equations

**Revenue** – The amount of money brought into a business through sales. Revenue is often calculated as

$$\text{Revenue} = \text{price} \cdot \text{quantity sold}$$

**Cost** – The amount of money spent by a business to create and/or sell a product. Cost usually includes both fixed costs and variable costs. Fixed costs are the same each month or year, and variable costs change depending on the number of items produced and/or sold.

$$\text{Cost} = \text{fixed cost} + \text{variable cost}$$

or

$$\text{Cost} = \text{fixed cost} + \text{cost per item} \cdot \text{quantity sold}$$

**Profit** – The amount of money left after all costs.

$$\text{Profit} = \text{Revenue} - \text{Cost}$$

**Break-even point** – A company breaks even when their revenue equals their cost or when their profit is zero.

$$\text{Revenue} = \text{Cost}$$

$$\text{Profit} = 0$$

Golf Carts To Go sells refurbished golf carts in south Florida. The company has fixed costs of \$26,000 per month for rent, salary and utilities. They can buy used carts and refurbish them for an average of \$1400 each. They sell the carts for an average price of \$2500 each. Golf Carts To Go can only refurbish 55 carts a month.

- Write an equation for the monthly cost of refurbishing  $n$  carts.
- Write an equation for the monthly revenue from selling golf carts.

3

[Back to Table of Contents](#) 1.1-2

You plan to purchase custom printed lunch coolers for your school staff. If you order 50 or more lunch coolers, there will be a \$45 setup fee and each lunch cooler will cost \$3.

- Write an equation for the total cost,  $C$ , in dollars for purchasing  $L$  lunch coolers.
- How much would 75 lunch coolers cost?
- How many lunch coolers can you purchase with a budget of \$400?

2

[Back to Table of Contents](#) 1.1-1

Golf Carts To Go sells refurbished golf carts in south Florida. The company has fixed costs of \$26,000 per month for rent, salary and utilities. They can buy used carts and refurbish them for an average of \$1400 each. They sell the carts for an average price of \$2500 each. Golf Carts To Go can only refurbish 55 carts a month.

- Write an equation for the monthly profit the company makes if they refurbish and sell  $n$  carts.
- What is the profit of refurbishing and selling 25 golf carts?

4

[Back to Table of Contents](#) 1.1-2

$$C = 26,000 + 1400n \quad R = 2500n \quad P = 1100n - 26,000$$

- e. How many golf carts does the company have to refurbish and sell to earn \$20,000 profit?

$$C = 26,000 + 1400n \quad R = 2500n \quad P = 1100n - 26,000$$

Golf Carts To Go can only refurbish 55 carts a month.

- f. How many golf carts does the company have to refurbish and sell to earn \$40,000 profit?

5

[Back to Table of Contents](#) 1.1-2

Solve

$$\frac{1}{4}x + \frac{3}{8} = 2$$

$$\frac{2}{5}(x+4) = \frac{7}{10}x - 5$$

6

[Back to Table of Contents](#) 1.1-2

Solve

$$6p - 3(4.1p + 2) = 3p + 13.2$$

7

[Back to Table of Contents](#) 1.1-3

8

[Back to Table of Contents](#) 1.1-3

## 1.2 Using Data to Create Scatterplots

**Independent variable**

input variable, input, domain value, usually  $x$

**Dependent variable**

output variable, output, range value, usually  $y$

**Scatterplot** – graph of many ordered pairs (created using Statplot in calculator)

**Linear relation** – pattern follows a straight line

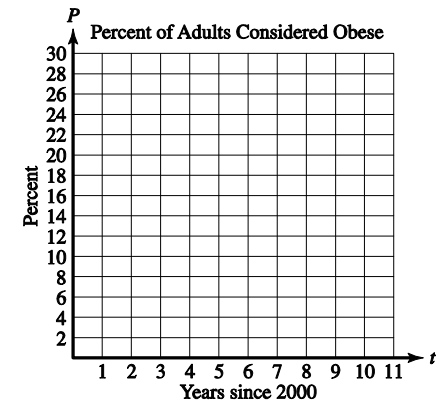
**Vertical intercept** – The point where the graph crosses the vertical axis. This will always occur when the input value is \_\_\_\_\_. Vertical intercepts are written as an ordered pair (0, number)

**Horizontal intercept** – The point where the graph crosses the horizontal axis. This will always occur when the output variable is \_\_\_\_\_. Horizontal intercepts are written as an ordered pair (number, 0).

Create a scatterplot of the data given in the table.  
The percent of adults aged 20 years and over in the United States who are considered obese are given in the table.

Year	Percent
2004	24.5
2005	25.4
2006	26.4
2007	26.7
2008	26.8

Source: CDC 2008 National Health Interview Survey.

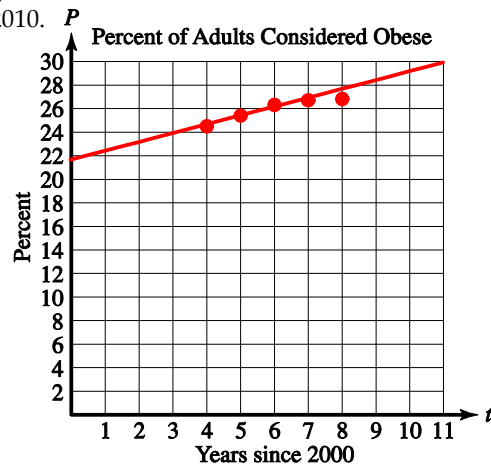


10

[Back to Table of Contents](#)

1.2-1

b. Using your eyeball best-fit line, make a prediction for the percentage of adults in the United States who were considered obese in 2010.



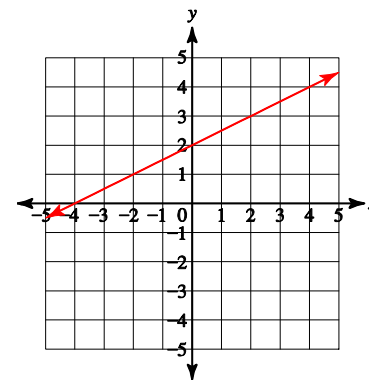
11

[Back to Table of Contents](#)

1.2-1

Use the graph to answer the following questions

a. Estimate the vertical intercept.



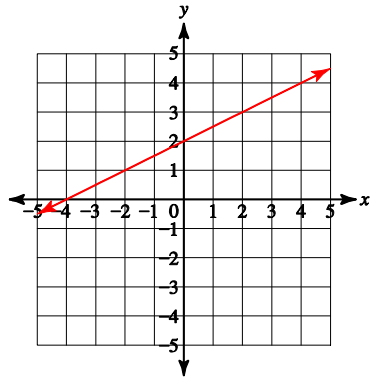
b. Estimate the horizontal intercept.

12

[Back to Table of Contents](#)

1.2-3

Use the graph to answer the following questions



c. Estimate the input value that makes the output of this graph equal 3.

d. Estimate the output value of this graph when the input value is  $-2$ .

## 1.2 continued

**Domain** – The set of values for the independent variable that results in reasonable output values with no model breakdown. A domain will typically be written in interval notation or using inequality symbols.

**Range** – The set of values for the dependent variable resulting from the given domain values. The outputs that come from the given domain's input values. A range will typically be written in interval notation or using inequality symbols.

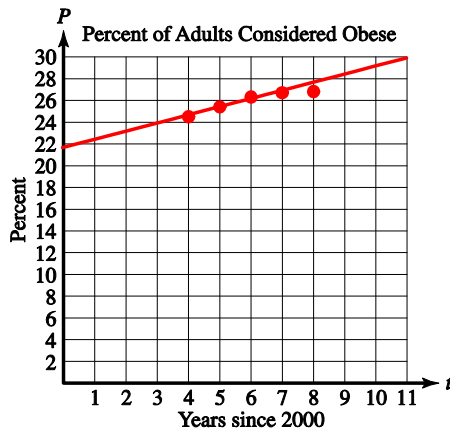
**Model breakdown** – When input values give you outputs that do not make sense in the situation described in the problem.

Note: Choose a reasonable domain, and then choose the corresponding range.

13

[Back to Table of Contents](#) 1.2-3

Determine a reasonable domain and range for the graphical model found for the obesity data.



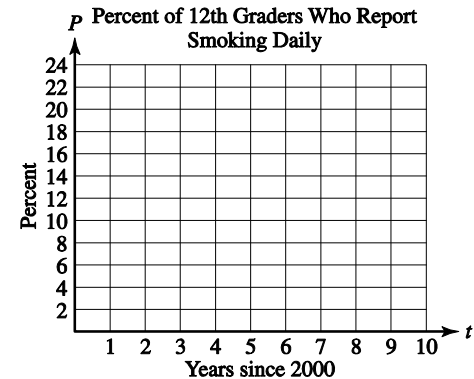
15

[Back to Table of Contents](#) 1.2-4

The percentage of students in twelfth grade who report smoking daily is given in the table. Source: [www.monitoringthefuture.org](http://www.monitoringthefuture.org)

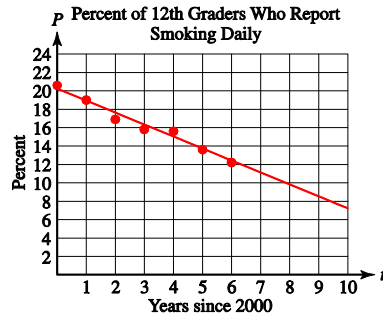
Year	Percent
2000	20.6
2001	19.0
2002	16.9
2003	15.8
2004	15.6
2005	13.6
2006	12.2

a. Create a scatterplot for these data and draw an "eyeball best fit" line through the data.



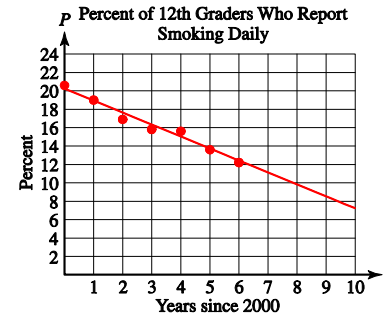
16

[Back to Table of Contents](#) 1.2-5



b. Determine the vertical intercept for this model. Explain its meaning in this situation.

c. Find a reasonable domain and range for this model.



d. According to your graphical model, what percentage of twelfth grade students reported smoking daily in 2007?

17

[Back to Table of Contents](#) 1.2-5

### 1.3 Fundamentals of Graphing & Slope

The **slope** of a line is the steepness of the line. Slope can be remembered as:

$$m =$$

The slope of a line is a constant and represents the amount that the output variable changes per a unit change in the input variable.

The slope-intercept form of a line is:

An equation can be graphed by three different methods:

1. Creating a table of values and plotting points
2. Finding and plotting the slope and y-intercept
3. Finding and plotting the horizontal and vertical intercepts

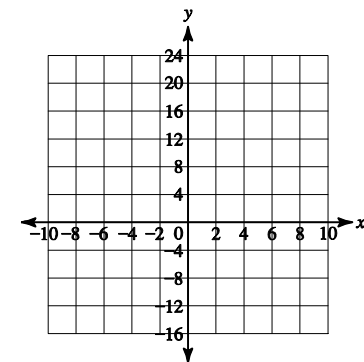
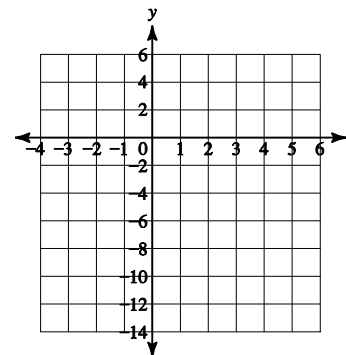
18

[Back to Table of Contents](#) 1.2-5

Graph the equations by creating a table of values and plotting the points.

a.  $y = 2x - 6$

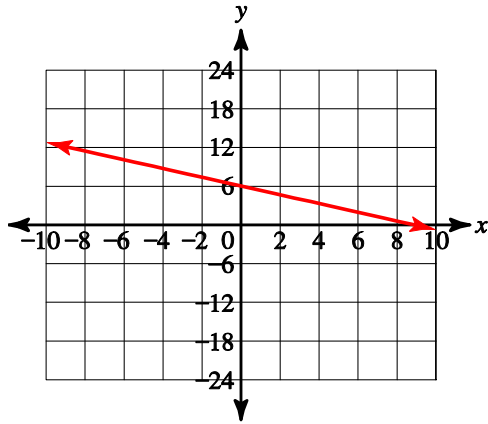
b.  $y = x^2 - 5$



20

[Back to Table of Contents](#) 1.3-1

Use the graph to estimate the slope of the line and determine if the line is increasing or decreasing.



21

[Back to Table of Contents](#) 1.3-3

Find the slope of the line passing through the points given in the table.

$x$	$y$
-4	-24
-1	-16.5
5	-1.5
8	6

22

[Back to Table of Contents](#) 1.3-4

Determine if the points given in the table all lie on a line.  
a.

$x$	$y$
6	11
10	16
12	18.5
22	31

23

[Back to Table of Contents](#) 1.3-5

Determine if the points given in the table all lie on a line.  
b.

$x$	$y$
-3	5.4
2	3.4
4	2.8
8	1

24

[Back to Table of Contents](#) 1.3-5

Find the slope and y-intercept of the following lines:

a.  $y = 6x - 4$

b.  $y = \frac{1}{5}x + \frac{3}{10}$

25

[Back to Table of Contents](#) 1.3-6

Find the slope and y-intercept of the following lines:

c.  $4x - 3y = 15$

26

[Back to Table of Contents](#) 1.3-6

Find the slope of the model and explain its meaning in the given situation.

- a. Let  $C = 4.5p + 1200$  be the total cost in dollars to produce  $p$  pizzas a day at a local pizzeria.

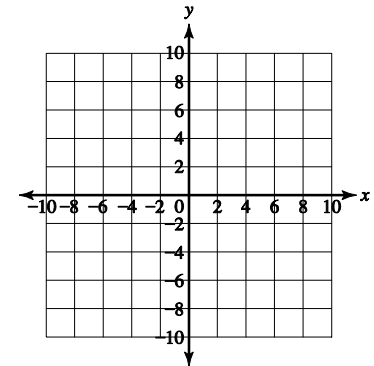
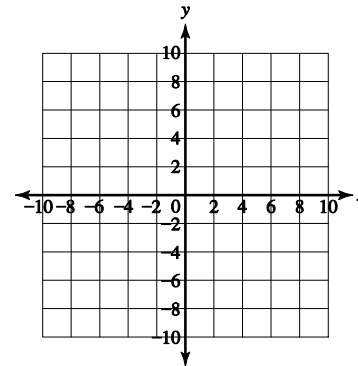
27

[Back to Table of Contents](#) 1.3-7

Sketch the graph of the following lines. Label the vertical intercept.

a.  $y = \frac{3}{4}x - 6$

b.  $y = -2x + 7$



28

[Back to Table of Contents](#) 1.3-8