

## Linear Equations (Exercises)

Use the following information to answer the next three exercises. A vacation resort rents SCUBA equipment to certified divers. The resort charges an up-front fee of \$25 and another fee of \$12.50 an hour.

### ? Exercise 12.2.5

What are the dependent and independent variables?

**Answer**

dependent variable: fee amount; independent variable: time

### ? Exercise 12.2.6

Find the equation that expresses the total fee in terms of the number of hours the equipment is rented.

### ? Exercise 12.2.7

Graph the equation from Exercise.

**Answer**


 This is a graph of the equation  $y = 25 + 12.50x$ . The x-axis is labeled in intervals of 1 from 0 - 7; the y-axis is labeled in intervals of 25 from 0 - 100. The equation's graph is a line that crosses the y-axis at 25 and is sloped up and to the right, rising 12.50 units for every one unit of run.

Figure 4.

Use the following information to answer the next two exercises. A credit card company charges \$10 when a payment is late, and \$5 a day each day the payment remains unpaid.

### ? Exercise 12.2.8

Find the equation that expresses the total fee in terms of the number of days the payment is late.

### ? Exercise 12.2.9

Graph the equation from Exercise.

**Answer**


 This is a graph of the equation  $y = 10 + 5x$ . The x-axis is labeled in intervals of 1 from 0 - 7; the y-axis is labeled in intervals of 10 from 0 - 50. The equation's graph is a line that crosses the y-axis at 10 and is sloped up and to the right, rising 5 units for every one unit of run.

Figure 5.

### ? Exercise 12.2.10

Is the equation  $y = 10 + 5x - 3x^2$  linear? Why or why not?

### ? Exercise 12.2.11

Which of the following equations are linear?

- a.  $y = 6x + 8$
- b.  $y + 7 = 3x$
- c.  $y - x = 8x^2$
- d.  $4y = 8$

**Answer**

$y = 6x + 8$ ,  $4y = 8$ , and  $y + 7 = 3x$  are all linear equations.

### ? Exercise 12.2.12

Does the graph show a linear equation? Why or why not?

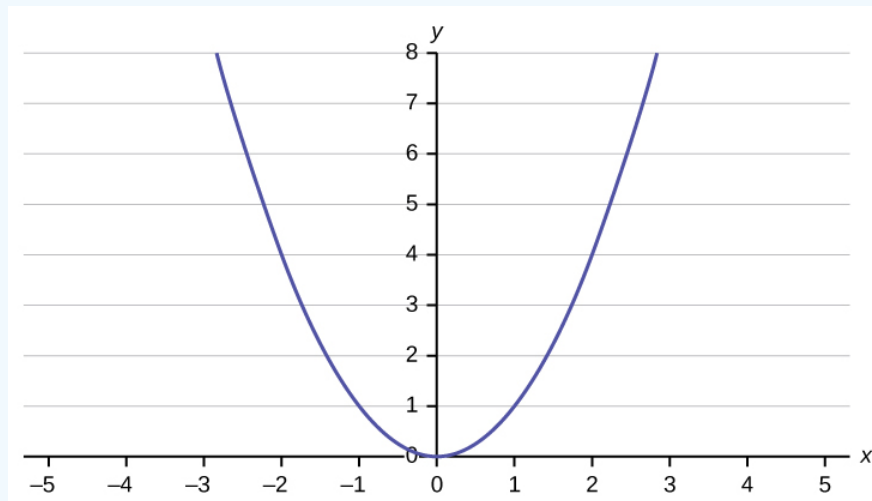


Figure 6.

Table contains real data for the first two decades of AIDS reporting.

Adults and Adolescents only, United States

Year	# AIDS cases diagnosed	# AIDS deaths
Pre-1981	91	29
1981	319	121
1982	1,170	453
1983	3,076	1,482
1984	6,240	3,466
1985	11,776	6,878
1986	19,032	11,987
1987	28,564	16,162
1988	35,447	20,868
1989	42,674	27,591
1990	48,634	31,335
1991	59,660	36,560
1992	78,530	41,055
1993	78,834	44,730
1994	71,874	49,095
1995	68,505	49,456
1996	59,347	38,510
1997	47,149	20,736

Year	# AIDS cases diagnosed	# AIDS deaths
1998	38,393	19,005
1999	25,174	18,454
2000	25,522	17,347
2001	25,643	17,402
2002	26,464	16,371
<b>Total</b>	<b>802,118</b>	<b>489,093</b>

### ? Exercise 12.2.13

Use the columns "year" and "# AIDS cases diagnosed." Why is "year" the independent variable and "# AIDS cases diagnosed." the dependent variable (instead of the reverse)?

#### Answer

The number of AIDS cases depends on the year. Therefore, year becomes the independent variable and the number of AIDS cases is the dependent variable.

Use the following information to answer the next two exercises. A specialty cleaning company charges an equipment fee and an hourly labor fee. A linear equation that expresses the total amount of the fee the company charges for each session is  $y = 50 + 100x$ .

### ? Exercise 12.2.14

What are the independent and dependent variables?

### ? Exercise 12.2.15

What is the y-intercept and what is the slope? Interpret them using complete sentences.

#### Answer

The y-intercept is 50 ( $a = 50$ ). At the start of the cleaning, the company charges a one-time fee of \$50 (this is when  $x = 0$ ). The slope is 100 ( $b = 100$ ). For each session, the company charges \$100 for each hour they clean.

Use the following information to answer the next three questions. Due to erosion, a river shoreline is losing several thousand pounds of soil each year. A linear equation that expresses the total amount of soil lost per year is  $y = 12,000x$ .

### ? Exercise 12.2.16

What are the independent and dependent variables?

### ? Exercise 12.2.17

How many pounds of soil does the shoreline lose in a year?

#### Answer

12,000 pounds of soil

### ? Exercise 12.2.18

What is the  $y$ -intercept? Interpret its meaning.

Use the following information to answer the next two exercises. The price of a single issue of stock can fluctuate throughout the day. A linear equation that represents the price of stock for Shipment Express is  $y = 15 - 1.5x$  where  $x$  is the number of hours passed in an eight-hour day of trading.

### ? Exercise 12.2.19

What are the slope and  $y$ -intercept? Interpret their meaning.

#### **Answer**

The slope is  $-1.5$  ( $b = -1.5$ ). This means the stock is losing value at a rate of \$1.50 per hour. The  $y$ -intercept is \$15 ( $a = 15$ ). This means the price of stock before the trading day was \$15.

### ? Exercise 12.2.19

If you owned this stock, would you want a positive or negative slope? Why?

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