

LESSON
13-4 **Problem Solving**
Linear Functions

Write the correct answer.

1. The greatest amount of snow that has ever fallen in a 24-hour period in North America was on April 14–15, 1921 in Silver Lake, Colorado. In 24 hours, 76 inches of snow fell, at an average rate of 3.2 inches per hour. Find a rule for the linear function that describes the amount of snow after x hours at the average rate.

2. At the average rate of snowfall from Exercise 1, how much snow had fallen in 15 hours?

3. The altitude of clouds in feet can be found by multiplying the difference between the temperature and the dew point by 228. If the temperature is 75° , find a rule for the linear function that describes the height of the clouds with dew point x .

4. If the temperature is 75° and the dew point is 40° , what is the height of the clouds?

For exercises 5–7, refer to the table below, which shows the relationship between the number of times a cricket chirps in a minute and temperature.

5. Find a rule for the linear function that describes the temperature based on x , the number of cricket chirps in a minute based on temperature.

A $f(x) = x + 5$

B $f(x) = \frac{x}{4} + 40$

C $f(x) = x - 20$

D $f(x) = \frac{x}{2} + 20$

6. What is the temperature if a cricket chirps 150 times in a minute?

F 77.5°F

H 130°F

G 95°F

J 155°F

Cricket Chirps/min	Temperature ($^\circ\text{F}$)
80	60
100	65
120	70
140	75

7. If the temperature is 85°F , how many times will a cricket chirp in a minute?

A 61

C 180

B 105

D 200

Problem Solving

13-4 Linear Functions

Write the correct answer.

- The greatest amount of snow that has ever fallen in a 24-hour period in North America was on April 14–15, 1921 in Silver Lake, Colorado. In 24 hours, 76 inches of snow fell, at an average rate of 3.2 inches per hour. Find a rule for the linear function that describes the amount of snow after x hours at the average rate.

$$f(x) = 3.2x$$

- At the average rate of snowfall from Exercise 1, how much snow had fallen in 15 hours?

48 inches

- The altitude of clouds in feet can be found by multiplying the difference between the temperature and the dew point by 228. If the temperature is 75° , find a rule for the linear function that describes the height of the clouds with dew point x .

$$f(x) = 228(75 - x)$$

7980 feet

For exercises 5–7, refer to the table below, which shows the relationship between the number of times a cricket chirps in a minute and temperature.

Cricket Chirps/min	Temperature ($^\circ\text{F}$)
80	60
100	65
120	70
140	75

- Find a rule for the linear function that describes the temperature based on x , the number of cricket chirps in a minute based on temperature.

A $f(x) = x + 5$

B $f(x) = \frac{x}{4} + 40$

C $f(x) = x - 20$

D $f(x) = \frac{x}{2} + 20$

- What is the temperature if a cricket chirps 150 times in a minute?

F 77.5°F

H 130°F

G 95°F

J 155°F

- If the temperature is 85°F , how many times will a cricket chirp in a minute?

A 61

C 180

B 105

D 200

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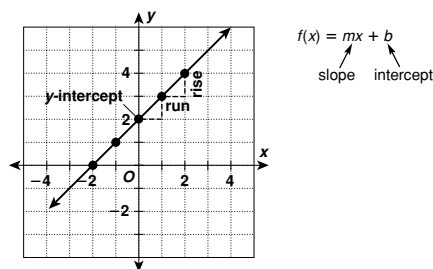
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Reading Strategies

13-4 Use a Graphic Aid

The graph of a **linear function** is a straight line, so you can write a rule for a linear function in slope-intercept form.



Use the graph to answer each question.

- What type of function is pictured in the graph?

linear function

- What is the name for the y -coordinate of the point where the line crosses the y -axis?

the y -intercept

- What is the y -intercept for this graph?

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You can use the graph to find the slope of the line. Find the “rise over run,” or the change in y to the change in x .

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x}$$

Answer each question.

- How can you find the slope of a linear function?

Sample answer: Write the ratio of the change in y to the change in x of any two points on the graph of the function.

- Find the slope of the graph above.

$$\frac{1}{1}, \text{ or } 1$$

- Complete to write a rule for the function. $f(x) = \underline{1}x + \underline{2}$

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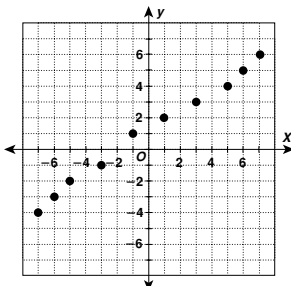
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Puzzles, Twisters and Teasers

13-4 Bee-lieve It or Not!

Fill in the missing coordinate for each point on the graph. Use the corresponding letter to solve the riddle. (Hint: There is one letter that you will not need.)

- $(-7, \underline{-4})$ E $(1, \underline{2})$ X
 $(-6, \underline{-3})$ S $(3, \underline{3})$ G
 $(-5, \underline{-2})$ B $(5, \underline{4})$ L
 $(-3, \underline{-1})$ P $(6, \underline{5})$ N
 $(-1, \underline{1})$ A $(7, \underline{6})$ I



What is more amazing than a talking dog?

A
1

S P E L L I N G
-3 -1 -4 4 6 5 3

B E E
-2 -4



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Practice A

13-5 Exponential Functions

Complete the table for each exponential function.

1. $f(x) = 2^x$

x	y
-2	$y = 2^{-2} = \frac{1}{4}$
-1	$y = 2^{-1} = \frac{1}{2}$
0	$y = 2^0 = 1$
1	$y = 2^1 = 2$
2	$y = 2^2 = 4$

2. $f(x) = (0.2)^4x$

x	y
-2	$y = (0.2)^4(-2) = 0.0125$
-1	$y = (0.2)^4(-1) = 0.05$
0	$y = (0.2)^4(0) = 0.2$
1	$y = (0.2)^4(1) = 0.8$
2	$y = (0.2)^4(2) = 3.2$

Create a table for each exponential function, and use it to graph the function.

3. $f(x) = 5^x$

x	y
-2	$y = 5^{-2} = \frac{1}{25}$
-1	$y = 5^{-1} = \frac{1}{5}$
0	$y = 5^0 = 1$
1	$y = 5^1 = 5$

4. $f(x) = 4 \cdot 2^x$

x	y
-2	$y = 4 \cdot 2^{-2} = 1$
-1	$y = 4 \cdot 2^{-1} = 2$
0	$y = 4 \cdot 2^0 = 4$
1	$y = 4 \cdot 2^1 = 8$

- The exponential function $f(x) = 1000 \cdot 1.03^x$ describes the increase in a bank deposit of \$1000 with a 3% annual interest rate for x years. Find the value of the deposit after 2 years.

\$1060.90

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