

4.1 Lesson

Key Vocabulary

linear equation,
p. 144
solution of a linear
equation, p. 144

Remember

An ordered pair (x, y) is
used to locate a point
in a coordinate plane.

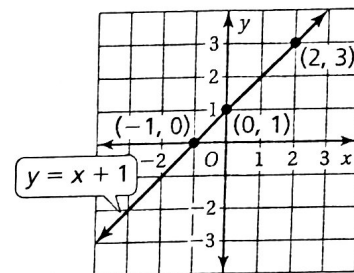
Key Idea

Linear Equations

A **linear equation** is an equation whose graph is a line. The points on the line are **solutions** of the equation.

You can use a graph to show the solutions of a linear equation. The graph below represents the equation $y = x + 1$.

x	y	(x, y)
-1	0	$(-1, 0)$
0	1	$(0, 1)$
2	3	$(2, 3)$



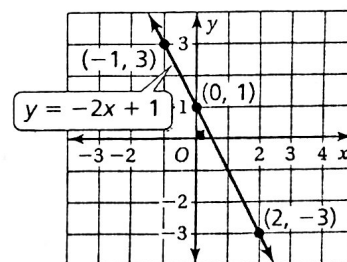
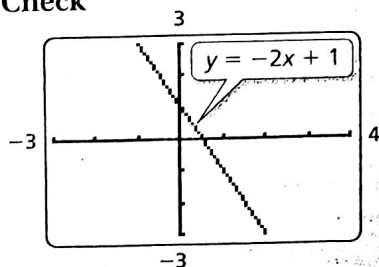
EXAMPLE 1 Graphing a Linear Equation

Graph $y = -2x + 1$.

Step 1: Make a table of values.

x	$y = -2x + 1$	y	(x, y)
-1	$y = -2(-1) + 1$	3	$(-1, 3)$
0	$y = -2(0) + 1$	1	$(0, 1)$
2	$y = -2(2) + 1$	-3	$(2, -3)$

Check



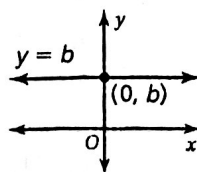
Step 2: Plot the ordered pairs.

Step 3: Draw a line through the points.

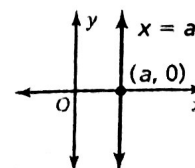
Key Idea

Graphing Horizontal and Vertical Lines

The graph of $y = b$ is a horizontal
line passing through $(0, b)$.



The graph of $x = a$ is a vertical
line passing through $(a, 0)$.



4.1 Exercises

Check It Out!
Help with Homework
BigIdeasMath



Vocabulary and Concept Check

- VOCABULARY** What type of graph represents the solutions of the equation $y = 2x + 4$?
- WHICH ONE DOESN'T BELONG?** Which equation does *not* belong with the other three? Explain your reasoning.

$$y = 0.5x - 0.2$$

$$4x + 3 = y$$

$$y = x^2 + 6$$

$$\frac{3}{4}x + \frac{1}{3} = y$$



Practice and Problem Solving

PRECISION Copy and complete the table. Plot the two solution points and draw a line *exactly* through the two points. Find a different solution point on the line.

3.

x		
$y = 3x - 1$		

4.

x		
$y = \frac{1}{3}x + 2$		

Graph the linear equation. Use a graphing calculator to check your graph, if possible.

1 2

5. $y = -5x$

6. $y = \frac{1}{4}x$

7. $y = 5$

8. $x = -6$

9. $y = x - 3$

10. $y = -7x - 1$

11. $y = -\frac{x}{3} + 4$

12. $y = \frac{3}{4}x - \frac{1}{2}$

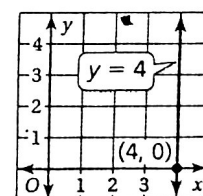
13. $y = -\frac{2}{3}$

14. $y = 6.75$

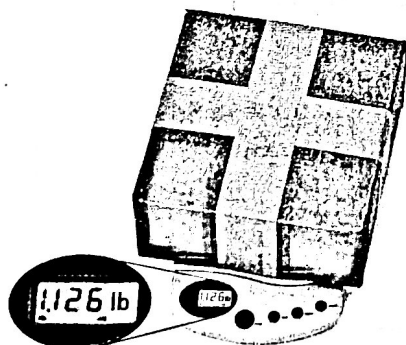
15. $x = -0.5$

16. $x = \frac{1}{4}$

17. **ERROR ANALYSIS** Describe and correct the error in graphing the equation.



18. **MESSAGING** You sign up for an unlimited text-messaging plan for your cell phone. The equation $y = 20$ represents the cost y (in dollars) for sending x text messages. Graph the equation. What does the graph tell you?



19. **MAIL** The equation $y = 2x + 3$ represents the cost y (in dollars) of mailing a package that weighs x pounds.
- Graph the equation.
 - Use the graph to estimate how much it costs to mail the package.
 - Use the equation to find exactly how much it costs to mail the package.

Solve for y . Then graph the equation. Use a graphing calculator to check your graph.

20. $y - 3x = 1$

21. $5x + 2y = 4$

22. $-\frac{1}{3}y + 4x = 3$

23. $x + 0.5y = 1.5$

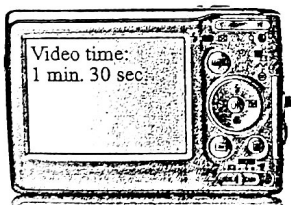
24. **SAVINGS** You have \$100 in your savings account and plan to deposit \$12.50 each month.

- Graph a linear equation that represents the balance in your account.
- How many months will it take you to save enough money to buy 10 acres of land on Mars?

25. **GEOMETRY** The sum S of the interior angle measures of a polygon with n sides is $S = (n - 2) \cdot 180^\circ$.

- Plot four points (n, S) that satisfy the equation. Is the equation a linear equation? Explain your reasoning.
- Does the value $n = 3.5$ make sense in the context of the problem? Explain your reasoning.

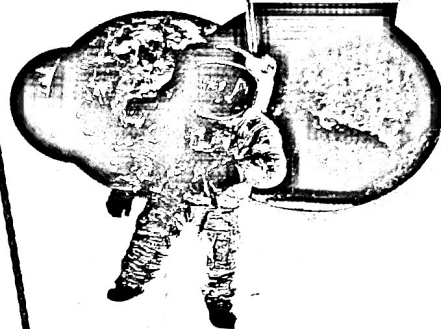
26. **SEA LEVEL** Along the U.S. Atlantic coast, the sea level is rising about 2 millimeters per year. How many millimeters has sea level risen since you were born? How do you know? Use a linear equation and a graph to justify your answer.



27. **Problem Solving** One second of video on your digital camera uses the same amount of memory as two pictures. Your camera can store 250 pictures.
- Write and graph a linear equation that represents the number y of pictures your camera can store when you take x seconds of video.
 - How many pictures can your camera store in addition to the video shown?

ACRES OF LAND
ON MARS

Acres of Land
FOR
SALE



10 acres for \$175



Fair Game Review

what you learned in previous grades & lessons

Write the ordered pair corresponding to the point.

(Skills Review Handbook)

28. point A

29. point B

30. point C

31. point D

32. **MULTIPLE CHOICE** A debate team has 15 female members. The ratio of females to males is 3 : 2. How many males are on the debate team? (Skills Review Handbook)

(A) 6

(B) 10

(C) 22

(D) 25

