

# Graphing Linear Relations (Pages 250–255)

An equation whose graph is a straight line is called a **linear equation**. A linear equation may contain one or two variables with no variable having an exponent other than 1. A linear equation can be written in the form  $Ax + By = C$ , where  $A$ ,  $B$ , and  $C$  are any real numbers, and  $A$  and  $B$  are not both zero. To graph a linear equation, make a table of ordered pairs that are solutions. Then graph the ordered pairs and draw a straight line through them.

## EXAMPLES

- A** Determine whether the equation  $y = 2x - 1$  is a linear equation. If it is, identify  $A$ ,  $B$ , and  $C$ .

*This is a linear equation, since the equation contains only two variables and the power of each variable is 1. First, rewrite the equation so that both variables are on the same side of the equation.*

$$y = 2x - 1$$

$$-2x + y = -1 \quad \text{Subtract } 2x \text{ from each side.}$$

*The equation is now in the form  $Ax + By = C$ , where  $A = -2$ ,  $B = 1$ , and  $C = -1$ .*

- B** Graph the equation  $y = 2$ .

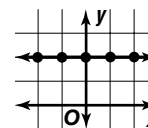
*Select five values for the domain and make a table.*

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

*Note that because the equation does not contain the variable  $x$ ,  $x$  can be any value and the  $y$ -value will still be 2.*

*Then graph the ordered pairs and connect them to draw the line.*

*Note that the graph of  $y = 2$  is a horizontal line through  $(0, 2)$ .*



## Try These Together

1. If the equation  $x = 3$  is a linear equation, identify  $A$ ,  $B$ , and  $C$ .

*HINT: Since there is no variable  $y$  in this equation, use the placeholder  $0y$ .*

2. Graph the equation  $3x - y = 5$ .

*HINT: To find values for  $y$  more easily, solve the equation for  $y$ . Subtract  $3x$  from each side and then divide each side by  $-1$ .*

## PRACTICE

**Determine whether each equation is a linear equation. Explain. If an equation is linear, identify  $A$ ,  $B$ , and  $C$ .**

3.  $y = 2x^2 - 3$

4.  $x = 2y + 8$

5.  $y = -1$

6.  $y = -4x + 1$

7.  $3x = 5y + 7$

8.  $8 - y = x$

**Graph each equation.**

9.  $y = x + 4$

10.  $y = 3x - 1$

11.  $y = 3 - 2x$

12.  $y - 3 = 0$

13.  $y + 5 = 0$

14.  $x - 2 = 0$

15.  $x - y = 6$

16.  $x + y = 15$

17.  $2x + y = 4$

- 18. Standardized Test Practice** Write the equation  $y = 2x - 8$  in the standard form  $Ax + By = C$ .

**A**  $y + 2x = -8$

**B**  $y - 2x = -8$

**C**  $-2x + y = -8$

**D**  $2x + y = -8$

**Answers:** 1.  $A = 1, B = 0, C = 3$  2. See Answer Key. 3. no 4. yes;  $A = 1, B = -2, C = 8$  5. yes;  $A = 0, B = 1, C = -1$  6. yes;  $A = 4, B = 1, C = 1$  7. yes;  $A = 3, B = -5, C = 7$  8. yes;  $A = 1, B = 1, C = 8$  9-17. See Answer Key. 18. C