

**Got It?**

4. a. The table shows the number of gallons of water y in a tank after x hours. The relationship is linear. What is an equation in point-slope form that models the data? What does the slope represent?
- b. **Reasoning** Write the equation from part (a) in slope-intercept form. What does the y -intercept represent?

Volume of Water in Tank

Time, x (h)	Water, y (gal)
2	3320
3	4570
5	7070
8	10,820

**Lesson Check****Do you know HOW?**

- What are the slope and one point on the graph of $y - 12 = \frac{4}{9}(x + 7)$?
- What is an equation of the line that passes through the point $(3, -8)$ and has slope -2 ?
- What is the graph of the equation $y - 4 = 3(x + 2)$?
- What is an equation of the line that passes through the points $(-1, -2)$ and $(2, 4)$?

Do you UNDERSTAND?**MATHEMATICAL PRACTICES**

- Vocabulary** What features of the graph of the equation $y - y_1 = m(x - x_1)$ can you identify?
- Reasoning** Is $y - 4 = 3(x + 1)$ an equation of a line through $(-2, 1)$? Explain.
- Reasoning** Can any equation in point-slope form also be written in slope-intercept form? Give an example to explain.

**Practice and Problem-Solving Exercises****MATHEMATICAL PRACTICES****A Practice**

Write an equation in point-slope form of the line that passes through the given point and with the given slope m .

- $(3, -4); m = 6$
- $(-2, -7); m = \frac{4}{5}$
- $(4, 2); m = -\frac{5}{3}$
- $(4, 0); m = -1$

← See Problem 1.

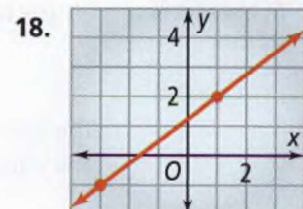
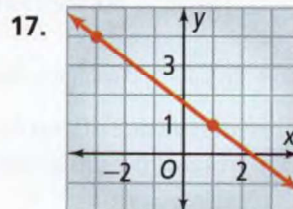
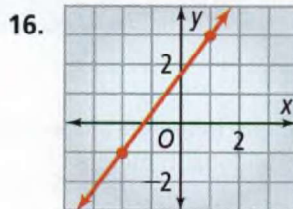
Graph each equation.

- $y + 3 = 2(x - 1)$
- $y - 1 = -3(x + 2)$
- $y + 5 = -(x + 2)$
- $y - 2 = \frac{4}{9}(x - 3)$

← See Problem 2.

Write an equation in point-slope form for each line.

← See Problem 3.



Write an equation in point-slope form of the line that passes through the given points. Then write the equation in slope-intercept form.

◀ See Problem 4.

19. $(1, 4), (-1, 1)$

20. $(2, 4), (-3, -6)$

21. $(-6, 6), (3, 3)$

Model the data in each table with a linear equation in slope-intercept form. Then tell what the slope and y -intercept represent.

22.

Time Painting, x (days)	Volume of Paint, y (gal)
2	56
3	44
5	20

23.

Time Worked, x (h)	Wages Earned, y (\$)
1	8.50
3	25.50
6	51.00

B Apply

Graph the line that passes through the given point and has the given slope m .

24. $(-3, -2); m = 2$

25. $(6, -1); m = -\frac{5}{3}$

26. $(-3, 1); m = \frac{1}{3}$

27. **Think About a Plan** The relationship of degrees Fahrenheit ($^{\circ}\text{F}$) and degrees Celsius ($^{\circ}\text{C}$) is linear. When the temperature is 50°F , it is 10°C . When the temperature is 77°F , it is 25°C . Write an equation giving the Celsius temperature C in terms of the Fahrenheit temperature F . What is the Celsius temperature when it is 59°F ?

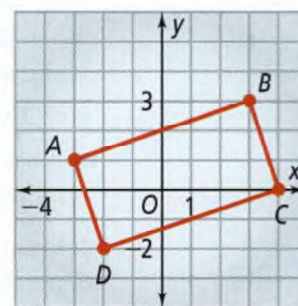
- How can point-slope form help you write the equation?
- What are two points you can use to find the slope?

28. a. **Geometry** Figure $ABCD$ is a rectangle. Write equations in point-slope form of the lines containing the sides of $ABCD$.

b. **Reasoning** Make a conjecture about the slopes of parallel lines.

c. Use your conjecture to write an equation of the line that passes through $(0, -4)$ and is parallel to $y - 9 = -7(x + 3)$.

29. **STEM** **Boiling Point** The relationship between altitude and the boiling point of water is linear. At an altitude of 8000 ft, water boils at 197.6°F . At an altitude of 4500 ft, water boils at 203.9°F . Write an equation giving the boiling point b of water, in degrees Fahrenheit, in terms of the altitude a , in feet. What is the boiling point of water at 2500 ft?



30. Using a graphing calculator, graph $f(x) = 3x + 2$.

- If $f(x) = 3x + 2$ and $g(x) = 4f(x)$, write the equation for $g(x)$. Graph $g(x)$ and compare it to the graph of $f(x)$.
- If $f(x) = 3x + 2$ and $h(x) = f(4x)$, write the equation for $h(x)$. Graph $h(x)$ and compare it to the graph of $f(x)$.
- Compare how multiplying a function by a number and multiplying the x value of a function by a number change the graphs of the functions.

31. Using a graphing calculator, graph $f(x) = 2x - 5$.

- If $f(x) = 2x - 5$ and $j(x) = f(x) + 3$, write the equation for $j(x)$. Graph $j(x)$ and compare it to the graph of $f(x)$.
- If $f(x) = 2x - 5$ and $k(x) = f(x + 3)$, write the equation for $k(x)$. Graph $k(x)$ and compare it to the graph of $f(x)$.
- Compare how adding a number to a function and adding a number to the x value of a function change the graphs of the functions.