

LESSON

Reteach

5-7 Point-Slope Form

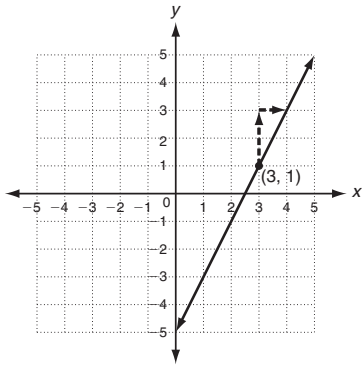
You can graph a line if you know the slope and any point on the line.

Graph the line with slope 2 that contains the point (3, 1).

Step 1: Plot (3, 1).

Step 2: The slope is 2 or $\frac{2}{1}$. Count 2 **up** and 1 **right** and plot another point.

Step 3: Draw a line connecting the points.



Write an equation in point-slope form for the line with slope $-\frac{1}{3}$ that contains the point (5, 2).

The **point-slope form** of a linear equation is

$$y - y_1 = m(x - x_1).$$

m is the given slope.
(x₁, y₁) is the given point.

$$y - y_1 = m(x - x_1).$$

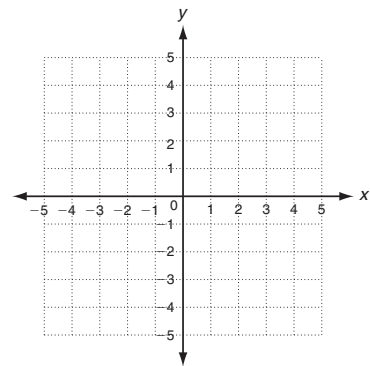
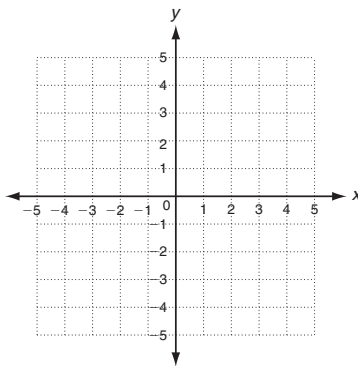
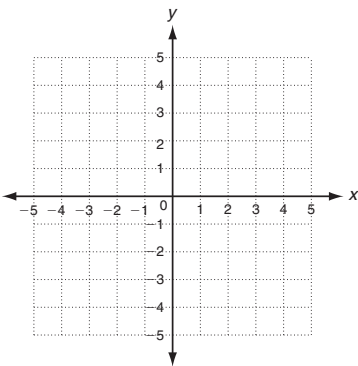
$$y - 2 = -\frac{1}{3}(x - 5) \text{ Substitute } -\frac{1}{3} \text{ for } m, \text{ 5 for } x_1 \text{ and 2 for } y_1.$$

Graph the line with the given slope that contains the given point.

1. slope = $\frac{2}{3}$; (-3, -3)

2. slope = $-\frac{1}{2}$; (-2, 4)

3. slope = 3; (-2, -2)



Write an equation in point-slope form for the line with the given slope that contains the given point.

4. slope = $-\frac{2}{5}$; (5, 1)

5. slope = 5; (-2, 6)

6. slope = $\frac{1}{6}$; (-4, 0)

LESSON

Reteach**5-7 Point-Slope Form (continued)**

You can write a linear equation in slope-intercept form if you are given any two points on the line.

Write an equation in slope-intercept form for the line through the points (4, 2) and (6, -4).

Step 1: Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - 2}{6 - 4} = \frac{-6}{2} = -3$$

Step 2: Write the line in point-slope form.

$$y - y_1 = m(x - x_1)$$

$$y - 2 = -3(x - 4) \quad \text{Substitute } -3 \text{ for } m \text{ and either one of the ordered pairs } x_1 \text{ and } y_1.$$

Step 3: Change point-slope form to slope-intercept form.

$$y - 2 = -3(x - 4)$$

$$y - 2 = -3x + 12 \quad \text{Distribute.}$$

$$\begin{array}{r} +2 \quad \quad +2 \\ \hline y = -3x + 14 \end{array} \quad \text{Add 2 to both sides.}$$

Write an equation in slope-intercept form for the line with the given slope that contains the given point.

7. $m = -3$; (1, 2)

8. $m = \frac{1}{4}$; (8, 3)

9. $m = 4$; (2, 8)

Write an equation in slope-intercept form for the line through the two points.

10. (1, 2) and (3, 12)

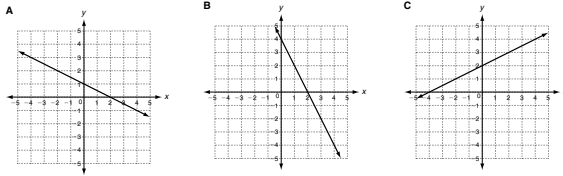
11. (6, 2) and (-2, -2)

12. (4, 1) and (1, 4)

LESSON **Practice A**
5-7 **Point-Slope Form**

Match each graph with the correct slope and point.

1. slope = $\frac{1}{2}$; (0, 2) **C** 2. slope = $-\frac{1}{2}$; (2, 0) **A** 3. slope = -2 ; (2, 0) **B**



Write an equation in point-slope form for the line with the given slope that contains the given point.

4. slope = 4; (3, 8) 5. slope = $-\frac{1}{2}$; (5, -3)
- $y - 8 = 4(x - 3)$ $y + 3 = -\frac{1}{2}(x - 5)$

Write an equation in slope-intercept form for the line with the given slope that contains the given point.

6. slope = 5; (1, 7) 7. slope = -3; (4, 0)
- $y = 5x + 2$ $y = -3x + 12$

Find the slope of the line that contains the given points. Then write an equation in slope-intercept form for the line.

8. (0, 2); (2, 6) 9. (8, -2); (4, -4)
- $2; y = 2x + 2$ $\frac{1}{2}; y = \frac{1}{2}x - 6$

10. The cost to have T-shirts made with the school logo is a function of the number of T-shirts ordered. The costs for 20, 50, and 100 shirts are shown. Write an equation in slope-intercept form that represents the function. Then find the cost of ordering 130 T-shirts.

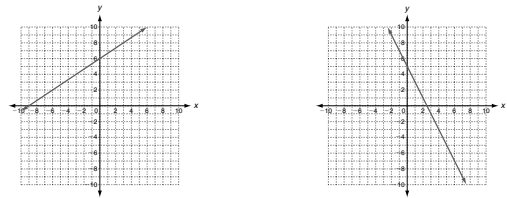
$y = 8x + 30; \$1070$

T-shirts	20	50	100
Cost (\$)	190	430	830

LESSON **Practice B**
5-7 **Point-Slope Form**

Graph the line with the given slope that contains the given point.

1. slope = $\frac{2}{3}$; (-3, 4) 2. slope = -2; (0, 5)



Write an equation in point-slope form for the line with the given slope that contains the given point.

3. slope = 3; (-4, 2) 4. slope = -1; (6, -1)
- $y - 2 = 3(x + 4)$ $y + 1 = -(x - 6)$

Write an equation in slope-intercept form for the line with the given slope that contains the given point.

5. slope = -4; (1, -3) 6. slope = $\frac{1}{2}$; (-8, -5)
- $y = -4x + 1$ $y = \frac{1}{2}x - 1$

Write an equation in slope-intercept form for the line through the two points.

7. (2, 1); (0, -7) 8. (-6, -6); (2, -2)
- $y = 4x - 7$ $y = \frac{1}{2}x - 3$

9. The cost of internet access at a cafe is a function of time. The costs for 8, 25, and 40 minutes are shown. Write an equation in slope-intercept form that represents the function. Then find the cost of surfing the web at the cafe for one hour.

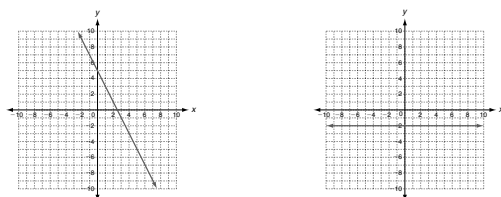
$y = 0.17x + 3; \$13.20$

Time (min)	8	25	40
Cost (\$)	4.36	7.25	9.80

LESSON **Practice C**
5-7 **Point-Slope Form**

Graph the line with the given slope that contains the given point.

1. slope = -2; (1, 3) 2. slope = 0; (-4, -2)



Write an equation in point-slope form for the line with the given slope that contains the given point.

3. slope = $\frac{4}{3}$; (-5, -3) 4. slope = -3; (0, 8)
- $y + 3 = \frac{4}{3}(x + 5)$ $y - 8 = -3(x - 0)$

Write an equation in slope-intercept form for the line with the given slope that contains the given point.

5. slope = -4; (2, -1) 6. slope = $\frac{1}{4}$; (-2, 3)
- $y = -4x + 7$ $y = \frac{1}{4}x + \frac{7}{2}$

Write an equation in slope-intercept form for the line through the two points.

7. (-3, 6); (2, 1) 8. (0, -5); (6, -3)
- $y = -x + 3$ $y = \frac{1}{3}x - 5$

9. A pool is being drained at a constant rate. The amount of water is a function of the number of minutes the pool has been draining, as shown in the table. Write an equation in slope-intercept form that represents the function. Then find the amount of water in the pool after two and a half hours.

$y = -26x + 5274; 1374 \text{ gal}$

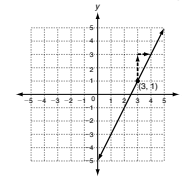
Time (min)	12	20	50
Volume (gal)	4962	4754	3974

LESSON **Reteach**
5-7 **Point-Slope Form**

You can graph a line if you know the slope and any point on the line.

Graph the line with slope 2 that contains the point (3, 1).

- Step 1: Plot (3, 1).
Step 2: The slope is 2 or $\frac{2}{1}$. Count 2 up and 1 right and plot another point.
Step 3: Draw a line connecting the points.



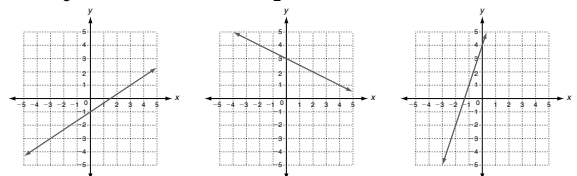
Write an equation in point-slope form for the line with slope $-\frac{1}{3}$ that contains the point (5, 2).

- The point-slope form of a linear equation is
- $y - y_1 = m(x - x_1)$
- $y - y_1 = m(x - x_1)$
- $y - 2 = -\frac{1}{3}(x - 5)$ Substitute $-\frac{1}{3}$ for m , 5 for x_1 , and 2 for y_1 .

m is the given slope.
 (x_1, y_1) is the given point.

Graph the line with the given slope that contains the given point.

1. slope = $\frac{2}{3}$; (-3, -3) 2. slope = $-\frac{1}{2}$; (-2, 4) 3. slope = 3; (-2, -2)



Write an equation in point-slope form for the line with the given slope that contains the given point.

4. slope = $-\frac{2}{5}$; (5, 1) 5. slope = 5; (-2, 6) 6. slope = $\frac{1}{6}$; (-4, 0)
- $y - 1 = -\frac{2}{5}(x - 5)$ $y - 6 = 5(x + 2)$ $y - 0 = \frac{1}{6}(x + 4)$

LESSON **Reteach**

5-7 Point-Slope Form (continued)

You can write a linear equation in slope-intercept form if you are given any two points on the line.

Write an equation in slope-intercept form for the line through the points (4, 2) and (6, -4).

Step 1: Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - 2}{6 - 4} = \frac{-6}{2} = -3$$

Step 2: Write the line in point-slope form.

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$$y - 2 = -3(x - 4) \quad \text{Substitute } -3 \text{ for } m \text{ and either one of the ordered pairs } x_1 \text{ and } y_1.$$

Step 3: Change point-slope form to slope-intercept form.

$$y - 2 = -3(x - 4)$$

$$y - 2 = -3x + 12 \quad \text{Distribute.}$$

$$\begin{array}{r} +2 \quad +2 \\ y - 2 = -3x + 12 \\ \hline y = -3x + 14 \end{array} \quad \text{Add 2 to both sides.}$$

Write an equation in slope-intercept form for the line with the given slope that contains the given point.

7. $m = -3$; (1, 2)

8. $m = \frac{1}{4}$; (8, 3)

9. $m = 4$; (2, 8)

$$y = -3x + 5$$

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

$$y = 4x$$

Write an equation in slope-intercept form for the line through the two points.

10. (1, 2) and (3, 12)

11. (6, 2) and (-2, -2)

12. (4, 1) and (1, 4)

$$y = 5x - 3$$

$$y = \frac{1}{2}x - 1$$

$$y = -x + 5$$

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55

Holt Algebra 1

LESSON **Challenge**

5-7 Connect the Dots

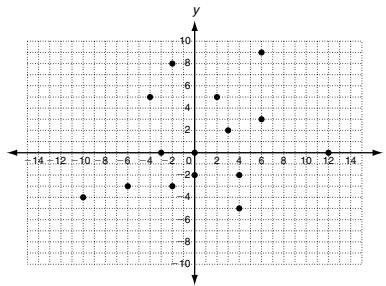
The objective of this game is to write and graph linear equations such that each line passes through as many points as possible. Each equation must be written in slope-intercept form, but you may use point-slope form as part of your work.

Two-player version:

- o Each player takes a turn writing and graphing one linear equation that passes through points on the graph. Allow time for the player to make calculations. Check each other's work for accuracy—sometimes a line may come close to a point but not actually intersect it.
- o The player scores 5 points for each point on the graph that the line passes through. If the line passes through a point that was previously intersected by a line, the player does not get credit for it.
- o After all points have been used, tally your scores to see who wins.

Single-player version:

- o Try to write equations for the fewest number of lines that intersect all of the points.
- o If other students in your class are playing as single players, compare results to see who was able to use the fewest lines. Challenge yourselves to find ways to further reduce the number of lines that you used.



Tell how to make a game board that would result in a tie.

Plot an even number of points, and only pairs of points that are collinear.

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56

Holt Algebra 1

LESSON **Problem Solving**

5-7 Point-Slope Form

Write the correct answer.

1. The number of students in a school has been increasing at a constant rate. The table shows the number of students in the school for certain numbers of years since 1995.

Years Since 1995	Number of Students
0	118
5	124
10	130

Write an equation in point-slope form that represents this linear function.

Possible answer:

$$y - 130 = 1.2(x - 10)$$

Write the equation in slope-intercept form.

$$y = 1.2x + 118$$

Assuming the rate of change remains constant, how many students will be in the school in 2010?

136

The cost of a cell phone for one month is a linear function of the number of minutes used. The total cost for 20, 35, and 40 additional minutes are shown. Select the best answer.

4. What is the slope of the line represented in the table?

- A 0.1 C 2
 B 0.4 D 2.5

5. What would be the monthly cost if 60 additional minutes were used?

- F \$64 H \$84
 G \$72 J \$150

2. Toni is finishing a scarf at a constant rate. The table shows the number of hours Toni has spent knitting this week and the corresponding number of rows in the scarf.

Toni's Knitting	
Hours	Rows of Knitting
2	38
4	44
6	50

Write an equation in slope-intercept form that represents this linear function.

$$y = 3x + 32$$

3. A photo lab manager graphed the cost of having photos developed as a function of the number of photos in the order. The graph is a line with a slope of $\frac{1}{10}$ that passes through (10, 6). Write an equation in slope-intercept form that describes the cost to have photos developed. How much does it cost to have 25 photos developed?

$$y = \frac{1}{10}x + 5; \$7.50$$

Cell-Phone Costs			
Number of Additional Minutes	20	35	40
Total Cost	\$48	\$54	\$56

6. What does the y -intercept of the function represent?

- A total cost of the bill
 C cost per additional minute
 B number of additional minutes used
 D cost with no additional minutes used

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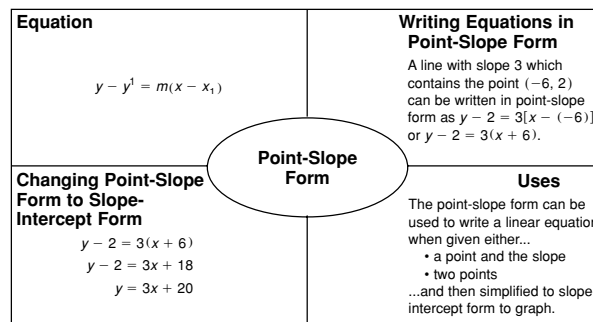
57

Holt Algebra 1

LESSON **Reading Strategies**

5-7 Use a Concept Map

The point-slope form of a line can be used when writing linear equations.



Complete the following.

1. What two pieces of information do you need to write an equation in point-slope form?
 the slope of the line and one point on the line

2. In the concept map above, it states that you can write an equation in point-slope form if given two points on the line. What piece of information do you still need and how can you get it?
 the slope; you can substitute the coordinates of the two given points into the slope formula.

3. Write an equation in point-slope form for the line with slope 4 that contains (3, -10).

$$y + 10 = 4(x - 3)$$

4. Write an equation in slope-intercept form for the line that contains points (2, -5) and (-4, 7).

$$y = -2x - 1$$

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58

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