

LESSON

Practice B**12-4*****Point-Slope Form***

Use the point-slope form of each equation to identify a point the line passes through and the slope of the line.

1. $y - 2 = 4(x - 1)$

2. $y + 1 = 2(x - 3)$

3. $y - 4 = -3(x + 1)$

4. $y + 5 = -2(x + 6)$

5. $y + 4 = -9(x + 3)$

6. $y - 7 = -7(x - 7)$

7. $y - 10 = 6(x - 8)$

8. $y + 12 = 2.5(x + 4)$

9. $y + 8 = \frac{1}{2}(x - 3)$

Write the point-slope form of the equation with the given slope that passes through the indicated point.

10. the line with slope
- -1
- passing through
- $(2, 5)$

11. the line with slope
- 2
- passing through
- $(-1, 4)$

12. the line with slope
- 4
- passing through
- $(-3, -2)$

13. the line with slope
- 3
- passing through
- $(7, -6)$

14. the line with slope
- -3
- passing through
- $(-6, 4)$

15. the line with slope
- -2
- passing through
- $(5, 1)$

16. Michael was driving at a constant speed of 60 mph when he crossed the Sandy River. After 1 hour, he passed a highway marker for mile 84. Write an equation in point-slope form, and find which highway marker he will pass 90 minutes after crossing the Sandy River.

LESSON Practice B
12-4 Point-Slope Form

Use the point-slope form of each equation to identify a point the line passes through and the slope of the line.

1. $y - 2 = 4(x - 1)$ $m = 4;$ $(x_1, y_1) = (1, 2)$	2. $y + 1 = 2(x - 3)$ $m = 2;$ $(x_1, y_1) = (3, -1)$	3. $y - 4 = -3(x + 1)$ $m = -3;$ $(x_1, y_1) = (-1, 4)$
4. $y + 5 = -2(x + 6)$ $m = -2;$ $(x_1, y_1) = (-6, -5)$	5. $y + 4 = -9(x + 3)$ $m = -9;$ $(x_1, y_1) = (-3, -4)$	6. $y - 7 = -7(x - 7)$ $m = -7;$ $(x_1, y_1) = (7, 7)$
7. $y - 10 = 6(x - 8)$ $m = 6;$ $(x_1, y_1) = (8, 10)$	8. $y + 12 = 2.5(x + 4)$ $m = 2.5;$ $(x_1, y_1) = (-4, -12)$	9. $y + 8 = \frac{1}{2}(x - 3)$ $m = \frac{1}{2};$ $(x_1, y_1) = (3, -8)$

Write the point-slope form of the equation with the given slope that passes through the indicated point.

10. the line with slope -1 passing through $(2, 5)$ $y - 5 = -1(x - 2)$	11. the line with slope 2 passing through $(-1, 4)$ $y - 4 = 2(x + 1)$
12. the line with slope 4 passing through $(-3, -2)$ $y + 2 = 4(x + 3)$	13. the line with slope 3 passing through $(7, -6)$ $y + 6 = 3(x - 7)$
14. the line with slope -3 passing through $(-6, 4)$ $y - 4 = -3(x + 6)$	15. the line with slope -2 passing through $(5, 1)$ $y - 1 = -2(x - 5)$

16. Michael was driving at a constant speed of 60 mph when he crossed the Sandy River. After 1 hour, he passed a highway marker for mile 84. Write an equation in point-slope form, and find which highway marker he will pass 90 minutes after crossing the Sandy River.
 $y - 84 = 60(x - 1)$; highway marker for 114 miles

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LESSON Practice C
12-4 Point-Slope Form

Write the point-slope form of the equation with the given slope that passes through the indicated point.

1. the line with slope $\frac{1}{2}$ passing through $(-4, 8)$ $y - 8 = \frac{1}{2}(x + 4)$	2. the line with slope 7 passing through $(\frac{1}{3}, -6)$ $y + 6 = 7(x - \frac{1}{3})$
3. the line with slope 2.6 passing through $(7.8, 4.5)$ $y - 4.5 = 2.6(x - 7.8)$	4. the line with slope $\frac{5}{3}$ passing through $(2, 5)$ $y - 5 = \frac{5}{3}(x - 2)$
5. the line with slope $-\frac{3}{4}$ passing through $(\frac{1}{4}, \frac{1}{5})$ $y - \frac{1}{5} = -\frac{3}{4}(x - \frac{1}{4})$	6. the line with slope -9 passing through $(-\frac{2}{3}, -9)$ $y + 9 = -9(x + \frac{2}{3})$

The slopes of parallel lines are equal. The slopes of perpendicular lines are negative reciprocals. (If line A has a slope of 2 and line A is perpendicular to line B , then the slope of line B is $-\frac{1}{2}$.)

Write the point-slope form of each line described below.

7. the line parallel to $y = 5x - 1$ that passes through $(-2, 7)$ $y - 7 = 5(x + 2)$	8. the line perpendicular to $y = 3x + 6$ that passes through $(-1, 0)$ $y = -\frac{1}{3}(x + 1)$
9. the line perpendicular to $y = -\frac{2}{3}x$ that passes through $(-5, -5)$ $y + 5 = \frac{3}{2}(x + 5)$	10. the line parallel to $y = \frac{3}{4}x + 8$ that passes through $(-1, -9)$ $y + 9 = \frac{3}{4}(x + 1)$

11. A school librarian is packing up books for the summer. The boxes will hold either 6 English books and 18 math books, or 11 English books and 14 math books. Let x equal the number of English books and y equal the number of math books. Write two different equations in point-slope form using this information.
 $y - 18 = -\frac{4}{5}(x - 6)$ or $y - 14 = -\frac{4}{5}(x - 11)$

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LESSON Reteach
12-4 Point-Slope Form

$y - y_1 = m(x - x_1)$
 slope (x_1, y_1) are the coordinates of a known point on the line.

If a minus sign precedes a coordinate value, use that value.
 $y - 3 = 7(x - 1)$
 $(1, 3)$ is on the line; slope $m = 7$

If a plus sign, precedes a coordinate value, use the opposite of that value.
 $y + 3 = 7(x + 1)$
 $(-1, -3)$ is on the line; slope $m = 7$

Identify the slope of each line and a point it passes through.

1. $y + 2 = 5(x - 3)$ $m = 5$	2. $y - 4 = -3(x + 5)$ $m = -3$
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Which sign for each coordinate? (same or opposite) opposite; same same; opposite

Coordinates of a point on the line: $(3, -2)$ $(-5, 4)$

To write an equation for the line with slope -4 that passes through $(6, -2)$, substitute $m = -4$, $x_1 = 6$, $y_1 = -2$ into the point-slope form.
 $y - y_1 = m(x - x_1)$
 $y - (-2) = -4(x - 6)$
 $y + 2 = -4(x - 6)$

Write the point-slope form of the equation with the given slope that passes through the given point.

3. $m = 3$; $(x_1, y_1) = (7, 2)$ $y - y_1 = m(x - x_1)$ $y - 2 = 3(x - 7)$	4. $m = -5$; $(x_1, y_1) = (2, 6)$ $y - y_1 = m(x - x_1)$ $y - 6 = -5(x - 2)$
5. $m = \frac{1}{2}$; $(x_1, y_1) = (-8, 1)$ $y - y_1 = m(x - x_1)$ $y - 1 = \frac{1}{2}(x + 8)$	6. $m = -\frac{3}{4}$; $(x_1, y_1) = (0, -1)$ $y - y_1 = m(x - x_1)$ $y + 1 = -\frac{3}{4}(x - 0)$

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LESSON Challenge
12-4 So Everyone Gets the Same Answer

The standard form of a line is $Ax + By = C$ where A , B , and C are real numbers.

To write an equation of a line, you need to know two pieces of information.

When the slope and the y -intercept are known, use $y = mx + b$.

When the slope and a point on the line are known, use $y - y_1 = m(x - x_1)$.

You can use either the slope-intercept form or the point-slope form to write an equation in standard form.

Write an equation in standard form for the line that contains side \overline{AB} of triangle ABC .

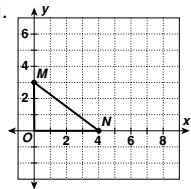
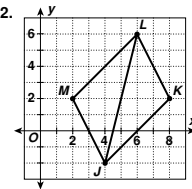
Use $A(1, 0)$ and $B(4, 5)$ to find the slope of \overline{AB} . $m = \frac{5 - 0}{4 - 1} = \frac{5}{3}$

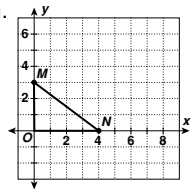
Substitute $m = \frac{5}{3}$ and $(x_1, y_1) = (1, 0)$ into point-slope form. $y - 0 = \frac{5}{3}(x - 1)$

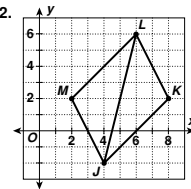
Write the equation in standard form.

clear fractions $3y = 5(x - 1)$
 distribute $3y = 5x - 5$
 add and subtract $5x - 3y = 5$

Write the standard form of the equation for each indicated line.

1.  \overline{MN} of right triangle MNO $3x + 4y = 12$	2.  \overline{JL} of parallelogram $JKLM$ $4x - y = 18$
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1. 
 \overline{MN} of right triangle MNO
 $3x + 4y = 12$

2. 
 \overline{JL} of parallelogram $JKLM$
 $4x - y = 18$

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