

4.2 Explain – Writing Equations in Point-Slope Form - Notes

Essential Question: How can you write an equation of a line when you are given the slope and a point on the line?

Main Ideas/ Questions	Notes/Examples
What You Will Learn	<ul style="list-style-type: none"> To write an equation of a line given its slope and a point on the line. To write an equation of a line given two points on the line. To use linear equations to solve real-life problems

LINEAR EQUATIONS

Slope-intercept Form	Point-slope Form	Standard Form
$y = mx + b$	$y - y_1 = m(x - x_1)$	$Ax + By = C$
Linear Equations can be written in 3 different forms, but all are <u>EQUIVALENT</u> (same line)		

Point-Slope Form	<p>Point-slope form: $y - y_1 = m(x - x_1)$</p> <p>Where: $(x_1, y_1) \rightarrow$ represents one point on the line $m \rightarrow$ represents the slope of the line $(x, y) \rightarrow$ represents all the points on the line</p> <p>***Use the point-slope form when you are given a..... <i>point and a slope</i></p> <p>Practice: Identify the slope of the line and a point that the line passes through.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>1. $y + 2 = -3(x - 2)$</p> <p>$y - (-2) \quad m = -3 \quad x - 2$</p> <p>Point: $(2, -2)$</p> </div> <div style="text-align: center;"> <p>2. $y - \frac{1}{2} = -2(x + \frac{1}{2})$</p> <p>$y - (+\frac{1}{2}) \quad m = -2 \quad x - (-\frac{1}{2})$</p> <p>Point: $(-\frac{1}{2}, \frac{1}{2})$</p> </div> </div>
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Writing Equations Given a Point and a Slope	<p><u>If given a POINT and a SLOPE.....</u></p> <p>Step 1: Identify the slope, m.</p> <p>Step 2: Label the point x_1 and y_1</p> <p>Step 3: Substitute the slope, m, and point (x_1, y_1) into the formula.</p> <p>Practice: Write an equation in point-slope form of the line that passes through the point and has the given slope.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>3. $(3, -1); m = -2$</p> <p>$x_1 \quad y_1$</p> <p>$y - (-1) = -2(x - 3)$</p> <p>$y + 1 = -2(x - 3)$</p> </div> <div style="text-align: center;"> <p>4. $(4, 0); \text{slope} = -\frac{2}{3}$</p> <p>$x_1 \quad y_1$</p> <p>$y - 0 = -\frac{2}{3}(x - 4)$</p> <p>$y = -\frac{2}{3}(x - 4)$</p> </div> </div>
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Given TWO Points...

Step 1: Find the slope using: $\frac{y_2 - y_1}{x_2 - x_1}$

Step 2: Use the Point-Slope form: $y - y_1 = m(x - x_1)$

Practice: Write an equation in point-slope form of the points, graph or values below

5. $(-4, 6)$ and $(-2, 5)$

$$m = \frac{6 - 5}{-4 - (-2)} = -\frac{1}{2}$$

$$y - 6 = -\frac{1}{2}(x + 4)$$

Writing Equations Given Two Points

7. Write a linear function f with the values $f(4) = -2$ and $f(12) = 10$.

$$m = \frac{10 - (-2)}{12 - 4} = \frac{12}{8} = \frac{3}{2}$$

$$y + 2 = \frac{3}{2}(x + 4)$$

8. Write #5 in slope-intercept form.

$$y - 6 = -\frac{1}{2}(x + 4)$$

$$y - 6 = -\frac{1}{2}x + 2$$

$$y = -\frac{1}{2}x + 4$$

9. What conclusion can be drawn about the point-slope equation and slope-intercept equation for #5? **they are the same line!**

9. The student council is ordering customized foam hands to promote school spirit. The table shows the cost of ordering different numbers of foam hands.

Number of foam hands	Cost (dollars)
4	34
6	46
8	58
10	70
12	82

a. Can the situation be modeled by a linear equation? Explain.

yes. cost increases at constant rate

b. If possible, write a linear model that represents the cost as a function of the number of foam hands.

STAT calculc $y = 6x + 10$

4.2 Explain - Writing Equations in Point-Slope Form - Notes

10. Craig is driving at a constant speed of 60 miles per hour. After driving 3 hours, his odometer reads 265 miles.

a. What information is given? **Slope/Intercept or Point/Slope**

b. Identify the given information: **$m=7$ or Point: $(3, 265)$**

c. Write a linear function D that represents the miles driven after h hours in point-slope form.

$$D - 265 = 60(h - 3)$$

d. Write the above equation in slope-intercept form.

$$D - 265 = 60(h - 3)$$

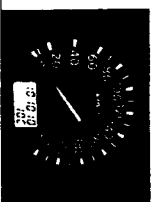
$$D - 265 = 60h - 180$$

$$D = 60h + 85$$

e. What does the odometer read after 7 hours of continuous driving?

$$D = 60(7) + 85 \quad 7 = h$$

$$D = 505 \text{ miles}$$



13. You pay a processing fee and a daily fee to rent a beach house. The table shows the total cost of renting the beach house for different numbers of days.

Days	2	4	6	8
Total cost (dollars)	246	450	654	858

- Can the situation be modeled by a linear equation? Explain.
- What is the processing fee?
- What is the daily fee?
- You can spend no more than \$1200 on the beach house rental. What is the maximum number of days you can rent the beach house?

14. You are designing a sticker to advertise your band. A company charges \$225 for the first 1000 stickers and \$80 for each additional 1000 stickers.

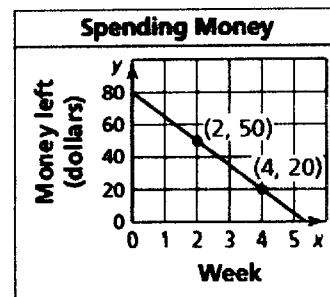
- Write an equation in point-slope form that represents the total cost (in dollars) of the stickers as a function of the number (in thousands) of stickers ordered.

15. The equation $y - 2 = \frac{5}{4}(x + 8)$ represents the cost (in dollars) of making your own juice (in fluid ounces).

- What is the slope of the line?
- Interpret the slope in the context of this situation.
- Write the equation in slope-intercept form.
- Determine the base cost of making your own juice.

16. Describe two ways to graph the equation $y - 1 = \frac{3}{2}(x - 4)$.

17. Three siblings each receive money for a holiday and then spend it at a constant weekly rate. The graph describes Sibling A's spending, the table describes Sibling B's spending, and the equation $y = -22.5x + 90$ describes Sibling C's spending. The variable y represents the amount of money left after x weeks.



Week, x	Money left, y
1	\$100
2	\$75
3	\$50
4	\$25

- Which sibling received the most money?
- Which sibling has the least money?
- Which sibling spends money at the fastest rate?
- Which sibling runs out of money first?
- The slowest rate?
- The last?