

Appendix N:

Writing the Equation of a Line

READING AND SELF-DISCOVERY QUESTION

APPENDIX N

1. Explain how to write the equation of a line in slope-intercept form if you are given the slope of the line and one point on the line.

Substitute the coordinates for the given point for x and y and the slope for m . Solve the resulting equation for b . Write the equation in slope-intercept form, $(y = mx + b)$ now that you know the value of m and b .

CRITICAL THINKING QUESTIONS

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1. What are three real-life situations where an understanding of graphing lines and/or reading the slope of a line are important skills?

Student answers will vary. Examples include:

Finding the slope of the line that represents

1) the growth of a stock over time.

2) the growth of population over time.

3) the rate at which the distance versus time is changing, i.e. miles per hour.

2. How many points do you need to identify on a graph of a line in order to write an equation for that line? How can knowing an additional point on that line be useful?

Two points are needed. A third point is useful in checking your result.

3. The coefficient for x in a linear equation written in **slope-intercept form** is the slope. Does the coefficient for x in a linear equation written in **standard form** mean the same thing? Explain your answer.

No, it does not. The slope in the standard form is the negative of the coefficient of x divided by the coefficient of y .

DEMONSTRATE YOUR UNDERSTANDING

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1. Given the formula $C = \frac{5}{9}(F - 32)$ for converting Fahrenheit to Celsius

a) Rewrite this formula in slope-intercept form.

$$C = \frac{5}{9} \cdot (F - 32)$$

$$C = \frac{5}{9}F - \frac{160}{9}$$

- b) What is the slope? $\frac{5}{9}$
- c) What is the y-intercept? $-\frac{160}{9}$
2. What is the process for finding the equation of a line, if you know the coordinates for two points on the line?

If you know the coordinates for two points, you can find the slope of the line with these two points. Then use the slope-intercept form with one of the points to determine the value of b by solving this new equation for b . Finally, present the equation in $y = mx + b$ (slope-intercept) form.

3. What is the y-intercept of a line with an undefined slope?

There is no y-intercept for a line with an undefined slope. The exception is the line $x = 0$, which has an infinite number of y-intercepts.

IDENTIFY AND CORRECT THE ERRORS

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Identify the error(s) you find in each of the following worked solutions. Describe the error made and solve the problem correctly in the appropriate spaces provided.

Problem	Describe Error	Correct Process
1. Write an equation for a line, in <i>slope-intercept form</i> , given the slope and a point on the line: slope: 3 point: (3, 4)	<p>The student apparently used the second coordinate of a point that is not on the y-axis as the y-intercept.</p>	$y = 3x + b$ $4 = 3 \cdot 3 + b$ $4 = 9 + b$ $b = -5$ $y = 3x - 5$
Worked Solution (What is wrong here?)		
$y = 3x + 4$		
Problem	Describe Error	Correct Process
2. Write an equation for a line, in <i>slope-intercept form</i> , that passes through the following points: (2, 0) and (1, 3)	<p>Student used the wrong numbers in the $y = mx + b$ of a linear equation, incorrectly using one number from the first ordered pair, and one from the second.</p>	$y = -3x + b$ $(2, 0)$ $0 = -3 \cdot 2 + b$ $0 = -6 + b$ $b = 6$ $y = -3x + 6$
Worked Solution (What is wrong here?)		
$m = \frac{3-0}{1-2} = \frac{3}{-1} = -3$ $0 = (-3)1 + b$ $0 = -3 + b$ $3 = b$ $y = -3x + 3$		