

# What Am I Missing?

## Slope



Missy and Miguel found a way to use their calculators to solve the riddles below. How do you think they did this? Solve the riddles yourself to test your ideas.

1. I am a line with a slope of 5. One of my points has coordinates (13, 12). Another of my points has the  $x$ -coordinate 26. What is the  $y$ -coordinate of this point?
2. I am a line with a slope of  $\frac{2}{3}$ . One of my points has coordinates of (-11, 14). Another of my points has the  $x$ -coordinate 35. What is the  $y$ -coordinate of this point?
3. I am a line with a slope of  $\frac{6}{5}$ . (Assume that originally this slope was already in lowest terms.) One of my points has an  $x$ -coordinate of 54. Another of my points has a  $y$ -coordinate of -22. What are the coordinates of these two points?
4. I am a line with a slope of 2.5. (Assume that originally this slope was already in lowest terms.) One of my points has an  $x$ -coordinate of -36.8. Another of my point has a  $y$ -coordinate of 28.2. What are the coordinates of these two points?
5. I am a line with a slope of -0.9. One of my points has an  $x$ -coordinate of -18. Another of my points has an  $x$ -coordinate of 20. What are the  $y$ -coordinates of these two points?
6. I am a line with a slope of 0. Two of my points have the  $y$ -coordinate -106.5. What are the  $x$ -coordinates of these two points?



### Thinking Cap



Write several slope riddles of your own. Explain how you decided what to write.

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## Slope

**Topic:** Slope

**Objective:** To use the calculator to find the missing coordinate(s) of points on a line given the slope of the line.

**NCTM Standards:** Communication, Reasoning, Patterns and Functions

### Using the Activity

Students use the calculator in this activity to help them find the missing coordinate(s) of points on a line given the slope of the line.

- The **[+/-]** key can be used to enter integers.
- The **[ ( ]** and **[ ) ]** keys can be used to group expressions.

**Example** To find the missing y-coordinate in riddle 1, substitute the known values into the slope formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ . The equation now becomes  $5 = \frac{y - 12}{26 - 13}$ . To find the missing value, enter  $5$  **[x]** **[ ( ]**  $26$  **[ - ]**  $13$  **[ ) ]** **[ + ]**  $12$  **[ = ]**  $77$ . The y-coordinate is 77.

**Assessment** Students should be encouraged to check each missing value found by substituting the coordinates of the two points into the slope formula and simplifying. If their answer is correct, the result should be the same as the slope given in the riddle.

### Answers

Riddle 1: See example above.

Riddle 2:  $2$  **[b/c]**  $3$  **[x]** **[ ( ]**  $35$  **[ - ]**  $11$  **[ +/- ]** **[ ) ]** **[ + ]**  $14$  **[ = ]**  $44\frac{2}{3}$ .

Riddle 3: Substituting into the slope formula gives us  $\frac{-22 - y}{x - 54} = \frac{6}{5}$ . So,  $-22 - y = 6$  and  $x - 54 = 5$ . To find the missing y-coordinate, enter  $6$  **[ + ]**  $22$  **[ = ]**  $28$  **[ +/- ]**  $-28$ . To find the missing x-coordinate, enter  $5$  **[ + ]**  $54$  **[ = ]**  $59$ . Therefore, the coordinates of the two points are  $(54, -28)$  and  $(59, -22)$ .

Riddle 4: Substituting into the slope formula gives us  $\frac{28.2 - y}{x - 36.8} = \frac{5}{2}$ . So,  $28.2 - y = 5$  and  $x - 36.8 = 2$ . To find the missing y-coordinate, enter  $5$  **[ - ]**  $28.2$  **[ = ]**  $-23.2$  **[ +/- ]**  $23.2$ . To find the missing x-coordinate, enter  $2$  **[ - ]**  $36.8$  **[ = ]**  $-34.8$ . Therefore, the coordinates of the two points are  $(-36.8, 23.2)$  and  $(-34.8, 28.2)$ .

Riddle 5: Substituting into the slope formula gives us  $\frac{y_2 - y_1}{20 - 18} = -\frac{9}{10}$ . To find  $y_2 - y_1$ , enter **[ ( ]** **[ ( ]**  $20$  **[ - ]**  $18$  **[ +/- ]** **[ ) ]** **[ x ]**  $9$  **[ +/- ]** **[ ) ]** **[ ÷ ]**  $10$  **[ = ]**  $-34.2$ . So, the y-coordinates can be any two numbers whose difference is  $-34.2$ .

Riddle 6: Since  $y = -106.5$  in both cases, the x-coordinates can be any two unequal numbers. Students should use the calculator to check that the values they choose give them the desired slope.

### Thinking Cap Answers

Answers may vary. See students' work.