

# Finding Slope Given Two Points

Activity

Name Key  
 Date \_\_\_\_\_ Period \_\_\_\_\_

How can you find the slope of a line if all you know are two points on the line?

Horatio recently signed up with an Internet provider. He knows that there is a basic monthly charge and an hourly rate depending on how many hours he is connected during the month. The first month he was connected for 5 hours and his bill was \$25.00. The second month he was connected for 8 hours and his bill was \$31.00. He has forgotten what the hourly rate is.

Time (hr)	Total fee (\$)
time <sub>1</sub> 5	\$25.00 cost <sub>1</sub>
time <sub>2</sub> 8	\$31.00 cost <sub>2</sub>

1. What is the difference between the number of hours he was connected for the two months?

$8 - 5 = 3 \text{ hours}$   
 $\text{time}_2 - \text{time}_1$

2. What is the difference between the costs of the monthly bills?

$\text{cost}_2 - \text{cost}_1$   
 $31 - 25 = 6 \text{ dollars}$

3. What is the hourly rate?

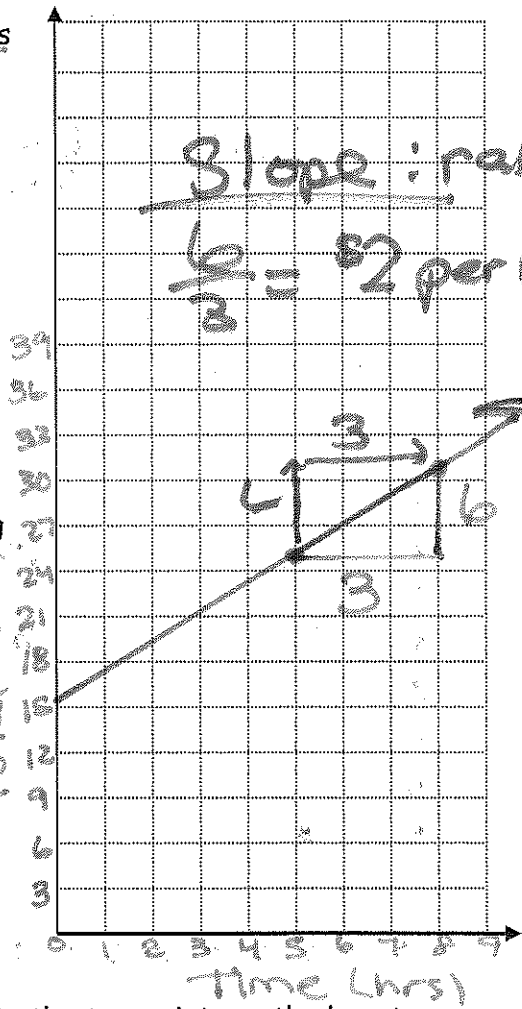
$6 \div 3 \text{ hours} = \$2 \text{ per hour}$

4. Think about what you did in questions 1 - 3 and write an expression for calculating this cost per hour using the variables time<sub>1</sub>, cost<sub>1</sub>, time<sub>2</sub>, cost<sub>2</sub>.

$$\frac{\text{cost}_2 - \text{cost}_1}{\text{time}_2 - \text{time}_1}$$

5. On graph paper mark the vertical axis from 0 to 35 and the horizontal axis from 0 to 9. Then plot the points (5, 25) and (8, 31). Describe the real-world meaning of these points.

They describe the total fee for a specific amount of hours connected



6. Draw a right triangle using the segment that connects the two points as the hypotenuse. How long is the vertical segment? 6

How long is the horizontal segment? 3

7. What can you do with the answers to question 6 to get the same hourly rate you got in question 3? What are the units for this slope?

Divide;  $\frac{\text{dollars}}{\text{hours}} \rightarrow \$ \text{ per hour}$

8. Write a single numerical expression using the coordinates of both points to show how you can calculate the slope.

$$\frac{31-25}{8-5} = \frac{6}{3} = 2$$

9. Write a symbolic algebraic rule for finding the slope between any two points  $(x_1, y_1)$  and  $(x_2, y_2)$ . To do this think about what you did in question 8 with the numbers in the table and write an expression that shows the same operations done on the variables.

$$\frac{y_2 - y_1}{x_2 - x_1}$$

Time (hr)	Total fee (\$)
5	\$25.00
8	\$31.00
$x_1$	$y_1$
$x_2$	$y_2$

Try This

1. Find the slope of the line containing the points  $(2, 2)$  and  $(8, 6)$ .

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{6-2}{8-2} = \frac{4}{6} = \frac{2}{3}$$

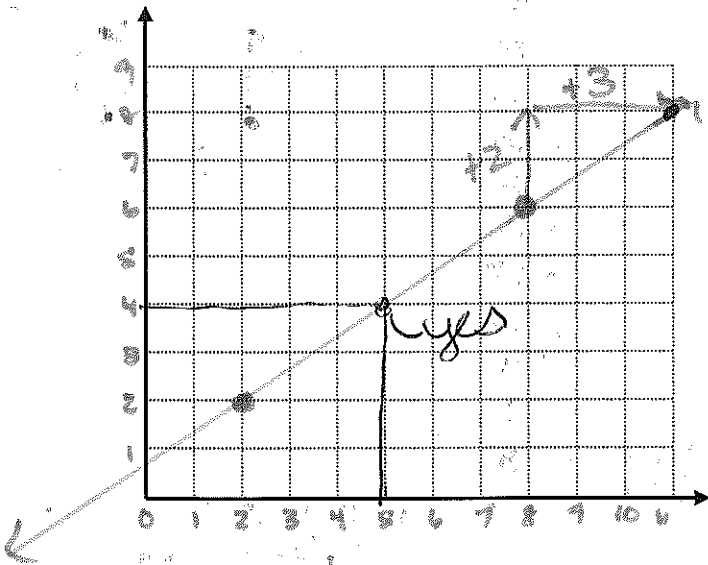
2. Graph the points, draw the line through the points, and verify that the point  $(5, 4)$  is on that line.

Yes

3. Use the slope you found in number 1 to find the coordinates of two other points on the line.

y: add 2 or subtract 2  
x: add 3 or subtract 3

$(11, 8)$   $(-1, 0)$   
 $(14, 10)$



4. Find the slope of the line through each pair of points. Name another point that lies on the same line.

a.  $(2, 4), (4, 7)$

$$\frac{7-4}{4-2} = \frac{3}{2}$$

$(6, 10)$

b.  $(6, -1), (2, 5)$

$$\frac{5-(-1)}{2-6} = \frac{6}{-4} = -\frac{3}{2}$$

$(4, 2)$

$x: 6-2=4$   
 $y: -1+3=2$

c.  $(-3, 5), (-2, 8)$

$$\frac{8-5}{-2-(-3)} = \frac{3}{1} = 3$$

$(-1, 11)$

$x: -2+1=-1$   
 $y: 8+3=11$

d.  $(2, -3), (8, 6)$

$$\frac{6-(-3)}{8-2} = \frac{9}{6} = \frac{3}{2}$$

$(10, 9)$

$x: 6+3=9$   
 $y: -3+2=-1$