

## Building Understanding for Using Slope

James recently signed up with a limited-usage Internet provider. There is a flat monthly charge and an hourly rate for the number of hours he is connected during the month. The table shows the amount of time he spent using the Internet for the first three months and the total fee he was charged.

Internet Use

Month	Time (h)	Total fee (\$)
September	40	16.55
October	50	19.45
November	80	28.15

Step 1: Is there a linear relationship between the time in hours that Hector uses the Internet and his total fee in dollars? If so, why do you think such a relationship exists?

Step 2: Use the numbers in the table to find the hourly rate in dollars per hour. Explain how you calculated this rate.

Step 3: Draw a pair of coordinate axes on graph paper. Use the x-axis for time in hours and the y-axis for total fee in dollars. Plot and label the three points the table of data represents. Draw a line through the three points. Does this line support your answer in Step 1?

Step 4: Choose two points on your graph. Use arrows to show how you could move from one point to the other using only one vertical move and one horizontal move. How long is each arrow? What are the units of these values?

Step 5 How do the arrow lengths relate to the hourly rate that you found in Step 2? Use the arrow lengths to find the hourly rate of change, or slope, for this situation. What units should you apply to the number?

Step 6: Choose a different pair of points on your graph. Create a slope triangle between them and use it to find the slope of the line. How does this slope compare to your answers in Step 2 and Step 5?

Step 7 : Think about what you have done with your slope triangles. How could you use the coordinates of any two points to find the vertical change and the horizontal change of each arrow? Write a single numerical expression using the coordinates of two points to show how you can calculate slope.

Step 8 Write a symbolic algebraic rule for finding the slope between any two points  $(x_1, y_1)$  and  $(x_2, y_2)$ . The subscripts mean that these are two distinct points of the form  $(x, y)$ .