Dear Family,

Your child is learning to analyze linear functions.

You can analyze a linear function by finding the slope and *y*-intercept of its graph. The graph here shows the total cost, *y*, of a cell phone plan for a certain number of minutes used, *x*, in a given month.

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The *slope* is also known as the rate of change. In a linear function, you can use any two points to find the slope. For example, you can use (100, 40) and (0, 30):

$$\frac{\text{rise, or change in } y}{\text{run, or change in } x} = \frac{40 - 30}{100 - 0} = \frac{10}{100} = 0.1$$

The slope, 0.1, represents the cost for each minute, $0.10.

The *y-intercept* of a line is the *y*-value of the point where the line crosses the *y*-axis. Here, the *y*-intercept is 30. This means you pay a $30 monthly fee even if you do not use any minutes.

You can use the slope and the *y*-intercept to write an equation of the form $y = mx + b$, where *m* is the slope (or rate of change) and *b* is the *y*-intercept (or initial value). The equation of this line is $y = 0.1x + 30$.

Consider the following example:

The table shows the costs for a cell phone plan that charges a monthly fee plus a cost for the number of minutes used. Find the slope and *y*-intercept, and write an equation that relates the total cost, *y*, to the number of minutes, *x*.

Minutes, *x*	0	100	200	300	400	500
Total Cost ($), *y*	10	30	50	70	90	110

On the next page you will see two ways your child will learn to write an equation for this data.
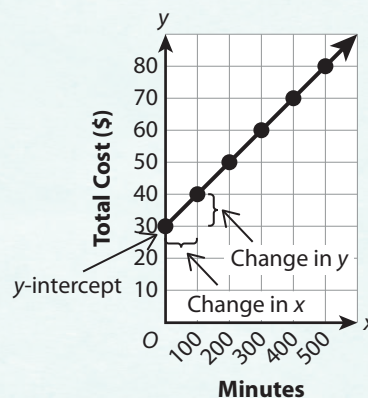
NEXT

Analyze Linear Functions: Sample Solution

The table shows the costs for a cell phone plan. Find the slope and y-intercept, and write an equation that relates the total cost, y, to the number of minutes, x.

Minutes, x	0	100	200	300	400	500
Total Cost ($), y	10	30	50	70	90	110

One way: Use the table.

You can use the table to find the y-intercept by finding the value of y when x is 0. The table shows that the y-intercept is 10. You can use any two pairs of values to find the slope, or rate of change:

$$\frac{\text{change in cost, } y}{\text{change in minutes, } x} = \frac{70 - 50}{300 - 200} = \frac{20}{100} = 0.2$$

This means that the slope is 0.2.

An equation for the function is $y = 0.2x + 10$.

Another way: Use a graph.

Graph the function by plotting points given by the pairs of values in the table. The y-intercept is the y-value when x is 0, so the y-intercept is 10.

You can use any two points to find the slope:

$$\frac{\text{change in cost, } y}{\text{change in minutes, } x} = \frac{70 - 50}{300 - 200} = \frac{20}{100} = 0.2$$

This means that the slope is 0.2.

An equation for the function is $y = 0.2x + 10$.

Answer: Both methods show that an equation for the function is $y = 0.2x + 10$.

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