EUREKA MATH™ TIPS FOR PARENTS

KEY CONCEPT OVERVIEW

In this topic, students interpret and use **linear models** to provide explanations for how one variable changes in relation to the other variable for linear and nonlinear associations. Students use scatter plots to describe patterns of positive and negative associations. Students also use graphs and the patterns of linear associations to answer questions about the relationship of the data, including finding the equation of the line that best fits the data.

You can expect to see homework that asks your child to do the following:

▪ Using descriptive words, write a linear model describing the relationship between two variables. (See Sample Problems.)

▪ Write an equation, in symbols, that models a given context.

▪ Interpret the slope and y-intercept of an equation within the context of a problem. Draw a scatter plot and line that best fit the data given.

▪ Determine whether scattered data are best fit with the graph of a line or a curve. Draw the line or curve to model the data.

SAMPLE PROBLEMS *(From Lesson 10)*

A cell phone company offers the following basic cell phone plan to its customers: A customer pays a monthly fee of $40.00. In addition, the customer pays $0.15 per text message sent from the cell phone. There is no limit to the number of text messages per month that the customer can send, and there is no charge for receiving text messages.

1. Use descriptive words to write a linear model describing the relationship between the number of text messages sent and the total monthly cost.

Total monthly cost = $40.00 + (number of text messages) ⋅ $0.15

2. Let x represent the **independent variable** and y represent the **dependent variable**. Use these variables to write the function representing the relationship you described in Problem 1.

$y = 40 + 0.15x$ or $y = 0.15x + 40$

3. During a typical month, Abbey sends 25 text messages. What is her total cost for a typical month?

Abbey's typical monthly cost is $40.00 + 0.15(25), or $43.75.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are some tips to help you get started.

- Go through the examples and exercises from these lessons with your child. Given the context of each problem, ask your child to interpret the slope and y-intercept of the equation in words, determine the independent and dependent variables, and choose any point that satisfies the equation and describe that point in words. For example, using the equation from the Sample Problems, the slope is the cost, in dollars, per text message; the y-intercept is the monthly fee, in dollars; the independent variable is the number of text messages sent; the dependent variable is the total monthly bill, in dollars; and the point $(25, 43.75)$ means that if you send 25 text messages, your bill will be \$43.75.

- Discuss the differences between linear models and nonlinear models. Determine how looking at an equation or a graph can yield enough information to help you decide whether the situation is linear or nonlinear. (Linear models appear as straight lines on a graph and typically have an equation in the form $y = mx + b$. Nonlinear models appear as curves on a graph, and their equations cannot be put in the form $y = mx + b$.)

TERMS

Dependent variable: The variable that represents the output or outcome. Its value changes according to the value of the independent variable.

Independent variable: The variable that represents the input or cause. Its value stands alone and is not affected by any other variables being measured.

Linear model: A way of representing data that follows a linear pattern, using words, graphs, or equations. For example, a linear model might be represented with descriptive words: (an exam score) = 57 + 8(study time). Equivalently, a linear equation that uses symbols might describe the same model: $y = 57 + 8x$, where y represents the exam score and x represents the study time in hours. Thus, an increase of one hour of study time produces an increase of 8 points on the predicted exam score.

Linear pattern: A pattern that can be satisfactorily represented by a line and shows a constant rate of change.

Nonlinear pattern: A pattern that cannot be satisfactorily represented by a line (the data are best represented as a curve) because there is not a constant rate of change.