Dear Family,

The next unit in your child's mathematics class this year is ***Variables and Patterns: Introducing Algebra***. This is the first formal Unit of the *Connected Mathematics*™ algebra strand. Students are introduced to algebraic concepts as they explore situations that change, such as the number of miles covered over several hours of a bicycle trip and how the profit earned in running a bicycle company is related to changes in income or expenses.

Unit Goals

This unit has two main goals:

- *Identify variables and relationships in problem situations and describe patterns of change in words, data tables, graphs, and equations.*
- *Use data tables, graphs, and equations to solve problems.*

In the first part of the Unit, students explore three ways of representing a changing situation: with a description in words, with a data table, and with a graph.

Later in the Unit, students write symbolic expressions as a shorter, faster way to give a summary of the relationship between two variables. The advantages of a symbolic rule over a data table or graph are investigated. Students use informal reasoning to find values for x or y when given a value for the other.

Homework and Having Conversations About the Mathematics

In your child's notebook, you can find worked-out examples, notes on the mathematics of the Unit, and descriptions of the vocabulary words.

You can help with homework and encourage sound mathematical habits during this Unit by asking questions such as:

- *What are the variables in the problem?*
- *What variables depend on others, or change in relation to others?*
- *How can the relationships of the problem be described in words?*
- *How can the relationships between variables be represented and analyzed with tables, graphs, and equations?*

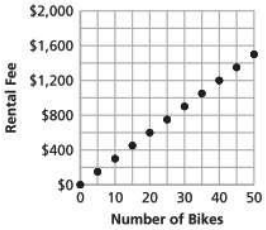
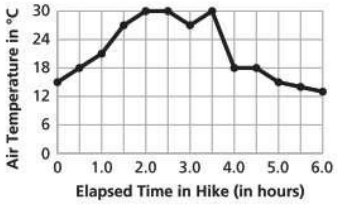
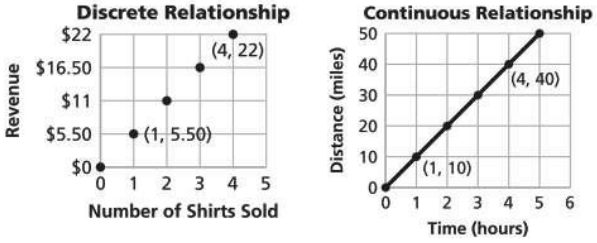
You can help your child with his or her work for this Unit in several ways:

- Invite your child to describe the jumping jacks experiment and keep you informed about the events that happen in the bicycle tours.
- Encourage your child to do his or her homework every day. Look over the homework and make sure all questions are answered and that explanations are clear.
- Have your child pick a question that was interesting to him/her and explain it to you.

Common Core State Standards

While all of the Standards for Mathematical Practice are developed and used by students throughout the curriculum, students spend significant time *using appropriate tools strategically*. *Variables and Patterns* focuses largely on applying and extending previous understandings of arithmetic to algebraic expressions.

A few important mathematical ideas that your child will learn in *Variables and Patterns* are on the next page. As always, if you have any questions or concerns about this Unit or your child's progress in the class, please feel free to call.

Important Concepts	Examples
Variables A variable is a quantity that can change. Letters are often used as symbols to represent variables in rules that describe patterns.	The *number of students n* who go on a trip is related to the *price of the trip p* for each student.
Patterns A pattern is change that occurs in a predictable way. Students work on problems that require them to predict the pattern of change in values of one variable, as it relates to changes in values of another variable.	As the *number* of bikes increases by 1, the *rental fee* increases by $30. 
Tables A table is a list of values for two or more variables that shows the relationship between them. A table may show a pattern of change between two variables that can be used to predict values for other entries in the table. The table shows how a change in one variable affects the change in the other variable.	As the *number of campsites x* changes by one unit, the *total campground fee y* changes by 12.5 units. The table can be continued by adding 1 to the previous entry in the *x* row and adding 12.5 to the previous entry in the *y* row. Number of campsites: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 Total campground fee: $12.50 | $25.00 | $37.50 | $50.00 | $62.50 | $75.00 | $87.50 | $100.00
Coordinate Graphs A coordinate graph shows a representation of pairs of related numerical values. It relates the independent variable (shown on the *x*-axis) and the dependent variable (shown on the *y*-axis). Graphs are another way to view the patterns of change between the variables.	
Discrete vs. Continuous Data From a statistical perspective, there are two basic types of quantitative variables—those with only a countable set of values (discrete data) and those with real-number values (continuous data). Tables can only represent discrete collections of (*x*, *y*) values. Graphs can represent both but often suggest continuous variables.	The *number of shirts sold* and *revenue* is a discrete relationship. Connecting two points does not make sense. It would imply that part of a shirt could be sold.  Situations such as the distance/time/rate relation are continuous. If a bicyclist peddles at a rate of 10 miles per hour, it is reasonable to connect the points, because you can go a distance in part of an hour.
Rules and Equations Rules are a summary of a predictable relationship that tells how to find the values of a variable. A rule may be given in words or as an equation. Equations (or formulas) are rules containing variables that represent a mathematical relationship. The advantage of a symbolic rule is that it is brief and represents a complete picture of the pattern, while tables and graphs can represent only parts of the relationships.	These rules relate time, rate, and distance: *distance is equal to rate times time* $d = rt$ Rule (in words): Total profit equals profit per T-shirt times the number of shirts sold. Rule (written as an Equation): $y = 10x$ A formula or equation for finding the area of a circle: $A = \pi r^2$