

## **Dear Family,**

The first 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.

### **UNIT GOALS**

This unit's focus is on ways to describe situations that change. 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. These representations are compared to one another to elicit the strengths of each presentation.

Students learn to write symbolic expressions as a shorter, quicker way to give a summary of the relationship between two variables. After writing symbolic rules, students learn how to use graphing calculators to make tables and graphs for a given rule, which allows students to interpret and compare more data sets.

### **HELPING WITH HOMEWORK**

The overall goal of *Connected Mathematics* is to help students develop sound mathematical habits. As your child studies this unit, you can help with homework, and at the same time, encourage sound mathematical habits by asking questions such as:

- What are the variables in the problem?
- Which variables depend on 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?
- What does it mean when we see predictable changes in a table of data or a graph?
- How can we use these predictable changes to find out about other possible data?

In your child's notebook, you can find worked-out examples from problems done in class, notes on the mathematics of the unit, and descriptions of the vocabulary words.

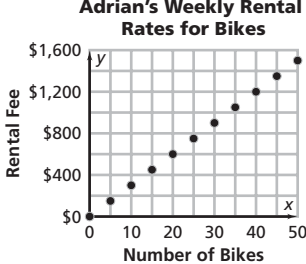
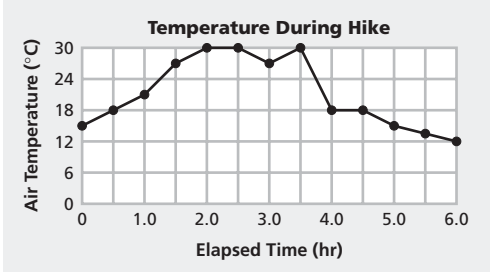
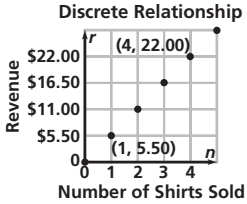
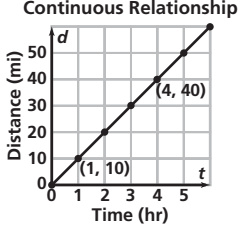
### **HAVING CONVERSATIONS ABOUT THE MATHEMATICS IN VARIABLES AND PATTERNS**

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

- Look over your child's homework and make sure all questions are answered and that explanations are clear.
- Have your child share his or her mathematics notebook with you, showing you the tables and graphs he or she has constructed and what has been recorded about patterns and variables. Ask your child to explain why these ideas are important.
- Have your child pick a question that was interesting to him or her and explain it to you.

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

Sincerely,

Important Concepts	Examples																		
<p><b>Variables</b> A variable is a quantity that can change. Letters are often used as symbols to represent variables in rules that describe patterns.</p>	<p>The <i>number of students, n</i>, who go on a trip is related to the <i>price of the trip, p</i>, for each student.</p>																		
<p><b>Patterns</b> A change that occurs in a predictable way. The problems in this unit require students to investigate the patterns of change in values of one variable in relation to changes in value of the other variable.</p>	<p>As the <i>number of bikes</i> increases by one, the <i>rental fee</i> increases by \$30.</p>  <p>The graph shows a linear relationship between the number of bikes (x-axis, 0 to 50) and the rental fee (y-axis, \$0 to \$1,600). The fee increases by \$30 for every additional bike.</p>																		
<p><b>Tables</b> A list of values for two or more variables that shows the relationship between them.  The table shows how a change in one variable affects the change in the other variable. The table may show a pattern of change.</p>	<p>As the <i>number of campsites, x</i>, changes by one unit, the <i>total campground fee, y</i>, changes by 12.5 units. The table can be continued by adding 1 to the previous entry in the x row and 12.5 to the previous entry in the y row.</p> <p style="text-align: center;"><b>Campground Fees</b></p> <table border="1" data-bbox="646 831 1437 940"> <tr> <td>Number of Campsites</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>Total Campground Fee</td> <td>\$12.50</td> <td>\$25.00</td> <td>\$37.50</td> <td>\$50.00</td> <td>\$62.50</td> <td>\$75.00</td> <td>\$87.50</td> <td>\$100.00</td> </tr> </table>	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
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<p><b>Coordinate Graphs</b> A representation of pairs of related numerical values that show the relationship between two variables. 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 patterns of change.</p>	 <p>The graph shows air temperature in degrees Celsius (y-axis, 0 to 30) over elapsed time in hours (x-axis, 0 to 6.0). The temperature starts at 15°C at 0 hours, rises to a peak of 30°C at 2.0 hours, and then gradually decreases to 12°C at 6.0 hours.</p>																		
<p><b>Discrete vs. Continuous Data</b> There are two basic types of quantitative variables—those with only a countable set of values (discrete data) and those with any real number values (continuous data). Tables can only represent discrete collections of (x, y) values. Graphs can represent both but often suggest continuous variables.</p>	<p>The <i>number of shirts sold</i> and <i>revenue</i> is a discrete relationship. Connecting two points does not make sense. It would imply that part of a shirt could be sold.</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="740 1381 984 1583"> <p style="text-align: center;"><b>Discrete Relationship</b></p>  <p>The graph shows revenue (r) on the y-axis and number of shirts sold (n) on the x-axis. Points are plotted at (1, 5.50), (2, 11.00), (3, 16.50), and (4, 22.00). No lines connect the points.</p> </div> <div data-bbox="1105 1356 1341 1583"> <p style="text-align: center;"><b>Continuous Relationship</b></p>  <p>The graph shows distance (d) in miles on the y-axis and time (t) in hours on the x-axis. Points are plotted at (1, 10) and (4, 40). A straight line connects these points, representing a continuous relationship.</p> </div> </div> <p>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.</p>																		
<p><b>Rules and Equations</b> 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.</p>	<p>Rule (in words): Total profit equals profit per T-shirt times the number of shirts sold</p> <p>Rule (written as an Equation): <math>y = 10x</math></p> <p>A formula or equation for finding the area of a circle: <math>A = \pi r^2</math></p>																		