

Dear Family,

The next unit in your child's mathematics class this year is ***Moving Straight Ahead: Linear Relationships***. In this unit, students are developing skills in areas that are traditionally known as algebra. This unit introduces them to situations that can be modeled with linear functions and graphed with straight lines.

UNIT GOALS

The primary goal of this unit is to develop understanding of linear relationships or linear functions. Students learn to recognize linear functions by the constant rate of change between two variables in a verbal context, table, graph, and equation.

Students identify, represent, and interpret linear relationships. They solve linear equations and write equations for lines. These last two ideas will be revisited with more complexities in later units—in particular, the *Thinking with Mathematical Models* and *Say It with Symbols* units.

HELPING WITH HOMEWORK

You can help with homework and encourage sound mathematical habits as your child studies this unit by asking questions such as:

- What are the variables in the problem?
- How are the variables related? Is the relationship linear?
- How can I recognize a linear relationship if it is represented in a problem, a table, a graph, or with an equation?
- How can tables, graphs, and equations of linear relationships be used to express and answer given questions?

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 MOVING STRAIGHT AHEAD

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

- Ask your child to describe some real-world situations in which linear functions are used to explain how the situations can be described using a table, a graph, and an equation. An example is phone charges that increase at a constant rate based on the length of the call.
- Look at your child's mathematics notebook. You may want to read some of the explanations that have been written and, if they are unclear, talk with your child about why you think they may need more explanations.
- Look over your child's homework and make sure all questions are answered and that explanations are clear.

A few important mathematical ideas that your child will learn in *Moving Straight Ahead* 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 and Examples

Linear Relationships

A relationship is linear if there is a constant rate of change between the two variables. That is, for each unit change in x there is a constant change in y .

TABLES In the table the **constant rate of change** can be observed as a pattern of consistent change in the variables.

Gilberto's Walking Rate

Time (seconds)	Distance (meters)
0	0
+2 1	2
2	4
3	6
+3 4	8
5	10
6	12
7	14
8	16
9	18

As time increases by 1 second, the distance increases by 2 meters. The constant rate of change is 2 meters per second.

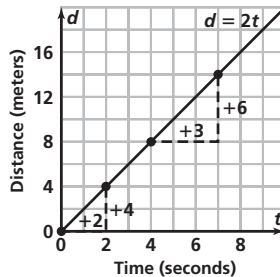
GRAPHS If we graph the data, the constant rate of change between the two variables shows up as a straight line.

This constant rate of change is called the **slope of the line**. It is the ratio of change between the two variables.

$$\text{Slope} = \frac{\text{vertical change}}{\text{horizontal change}}$$

for any two points on the line.

Gilberto's Walking Rate



Here, the slope is $\frac{4}{2}$ or $\frac{6}{3}$ or $\frac{2}{1}$.

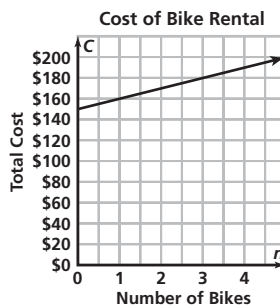
EQUATIONS In this symbolic representation the constant rate of change shows up as the **coefficient** of t .

$$d = 2t \text{ (Gilberto)}$$

Here, the coefficient is 2.

y-INTERCEPT The point where the graph of a line crosses the y -axis (vertical axis).

Suppose the cost to rent bikes is represented by $C = \$150 + \$10n$, where C is the cost in dollars and n is the number of bikes.



The y -intercept is \$150.

The y -intercept is the constant term in the equation, $C = 150 + 10n$.

The slope (or the constant rate of change) of the line is 10.

Solving Equations

Write a series of equivalent equations until it is easy to read the value of the variable. Equality or equivalence is maintained when you add, subtract, multiply, and divide the same quantity to each side of the equation. These procedures are called the *properties of equality*.

EQUATION

$$\begin{aligned} 750 &= 150 + 10n \\ 750 - 150 &= 150 - 150 + 10n \\ 600 &= 10n \\ \frac{600}{10} &= \frac{600n}{10} \\ 60 &= n \end{aligned}$$

REASONS

Original equation
Undo "adding 150" by subtracting 150 from each side.

Undo "multiplying by 10" by dividing by 10.
The value of n must be 60.

Note that if n is replaced by 60 in each step, we have a true equation. The original equation would give $750 = 750$.