***Linear Relationships and Slope* Family Letter**

**Dear Family,**

In this module, ***Linear Relationships and Slope***, students will draw on their knowledge of unit rates and proportional relationships to understand **slope** and will use similar triangles to explain why the slope is the same between any two points on a line. They will explore similarities and differences between linear and proportional models, and derive the **linear equation** *y* = *mx* + *b*.

**What Did Students Learn Previously?**

In previous modules, students graphed proportional relationships on the coordinate plane. They learned that if the graph of a line contains the point (0, 0), then the graph represents a proportional relationship, and the point (1, *r*) shows the constant of proportionality. For example, the line below passes through the point (0, 0). This means that the graph represents a proportional relationship and the point (1, 2) indicates the constant of proportionality, 2.

**What Will Students Learn in This Module?**

**Slope**

* Students will recognize that, in proportional relationships, the **slope** is the unit rate. In the graph shown, the unit rate is $2.00 per muffin, so the slope is 2.
* Students will learn slope as the ratio . They will construct right triangles to help them determine **rise** and **run**, and then calculate the slope ratio. For example, the triangle shaded in the graph has a rise of 8 units and a run of 4 units, for a slope of , or 2.
* Students will use the slope formula, , to calculate the slope from two points, (*x*1, *y*1) and (*x*2, *y*2). For example, the slope between the points (2, 4) and (3, 6) can be found by writing = = 2

**Proportional and Linear Relationships**

* Students will learn that the ratio  is equivalent for every point (*x, y*) on the line, and it is equal to the slope. For example, in the graph above = 2 and = 2.
* Students will learn that the graph of a non-proportional linear relationship does not pass through the origin, and the ratio is not the same for every point on the line.

**What Vocabulary Terms Will Students Use?**

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| **Term** | **Definition** |
| **constant rate change** | An unchanging rate which describes how one quantity changes in relation to another. |
| **slope** | The rate of change between any two points on a line as described by the ratio . |
| **rise** | The vertical change between two points on a line. |
| **run** | The horizontal change between two points on a line. |
| **slope triangles** | Similar right triangles whose hypotenuses lie on the line of a linear equation. |
| **linear equation** | An equation whose graph is a straight line. |
| **slope-intercept form** | A linear equation written in the form *y* = *mx* + *b*, where *m* is the slope and *b* is the *y*-intercept. |
| **y-intercept** | The coordinate of the point where the line crosses the *y*-axis. |
| **direct variation** | A relationship between two variable quantities with a constant ratio, resulting in a proportional linear relationship. |
| **constant of proportionality****or constant of variation** | The constant ratio in a proportional (direct variation) linear relationship. |

**How You Can Provide Support**

1. Support your child’s understanding of linear equations by asking them to explain how they can use reasoning about slope in everyday life.
* *Driving:* Ask your child to explain the rise and run indicated by *Hill with Grade* road signs. For example, in the sign shown, your child might say that cars will descend 8 feet every 100 feet that they travel.
* *Stairs:* When you encounter a staircase, ask your child to estimate its rise and run. Discuss how the staircase might be different if the run was increased or decreased.
1. Encourage your child to have a positive, growth-oriented attitude towards mathematics and their learning.
	* Encourage them to ask questions – both at home and in class. Sometimes, an answer to a question will generate more questions. That’s how you know they are learning!
	* Encourage your child to embrace challenges and remind them that every challenge is an opportunity to learn something new.
	* Celebrate successes – both small and large.
2. Contact me to arrange a time to discuss the specifics of your child’s performance and how we can work together to help them succeed in this module.

Sincerely,

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(Teacher’s Name) (Email/Phone)