Functions Family Letter

Dear Family,

In this module, ***Functions***, students will use their prior knowledge of linear relationships to develop an understanding of functions. They will use diagrams, **function tables**, graphs, verbal descriptions, and equations to analyze relations and develop skill and fluency with linear models.

What Did Students Learn Previously?

In previous modules, students investigated the structure of linear relationships and the slope-intercept equation, $y = mx + b$. For example, students learned that the graph of the equation $y = \frac{3}{2}x - 1$ crosses the y-axis at –1 and increases at a constant rate of $\frac{3}{2}$, rising three units vertically for every two units that it runs horizontally.

What Will Students Learn in This Module?

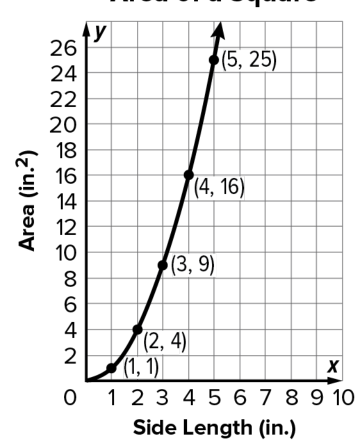
Identify and Represent Function Relations

- Students will determine whether a mapping diagram represents a function.
- Students will represent a **function** by creating a table of values and graphing. For example, given the **relation** *the area of a square is a function of its side length*, students should be able construct the table above and use it to produce the graph shown below.

Side length (in.)	1	2	3	4	5
Area (in.^{2})	1	4	9	16	25

- Students will determine whether a table represents a function. In the table, students should recognize that there is only one area associated with each side length, so the values in the table represent a function.
- Students will determine whether a graph represents a function. In the graph shown, any vertical line drawn would cross the graph at only one point. Therefore, the graph represents a function.
- Students will write **linear functions** given a table, a graph, or a verbal description.

Area of a Square



Interpret Functions

- Students will use tables, graphs, and equations to compare linear relations.
- Students will determine whether a function is linear or non-linear from tables, graphs, and equations. For example, students should recognize that, because the graph shown above is not a straight line, it is not a linear function.

- Students will interpret and compare **qualitative graphs**.

What Vocabulary Terms Will Students Use?

Term	Definition
function	A relation in which each member of the input is paired with exactly one member of the output.
function table	A table that uses a function rule to organize the input and output values of a function.
input	The set of x-values in a relation.
linear function	A function in which the solutions form a straight line.
non-linear function	A function whose rate of change is not constant and whose graph does not form a straight line.
output	The set of y-values in a relation.
qualitative graph	A graph used to represent situations that do not necessarily have numerical values.
relation	Any set of ordered pairs.
vertical line test	A test used to determine whether a graph is a function: If, for any value of x, a vertical line passes through no more than one point on a graph, then the graph represents a function.

How You Can Provide Support

1. Support your child's understanding of functions by comparing costs and exploring nonlinear functions.
   - *TV Streaming*: Compare with your child the costs of streaming television from two different streaming services, making sure to account for any initial start-up costs. Have your child write an equation for each that represents the total cost c after any number of months m.
   - *Savings Accounts*: Compare with your child different interest rates for savings accounts and have them explain why these relationships are nonlinear functions.
2. 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.
3. 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,

(Teacher's Name)

(Email/Phone)