Packet 7: Inputs and Outputs

Dear Parents/Guardians,

A major goal of Packet 7 is to explore the connections between algebra and proportional reasoning. In Lesson 1, visual patterns lead to generating tables, graphs, and equations. Students learn about dependent and independent variables and identify them within each representation. In Lesson 2, students compare prices of similar items using tables, double number lines, graphs, and equations. In Lesson 3, students identify the unit rate in tables, graphs, and equations; and solve rate problems using their representations of choice.

Visual Patterns
Students explore "tile patterns," predicting how they will grow in order to describe the sequence.

Step #	Step 1	Step 2	Step 3	Step 4
Picture				
# of tiles	3	4	5	6

Students see that the pattern may be described as the number of tiles is equal to the step number plus two. Algebraically, for step number n, the number of tiles is $n + 2$.

Analyzing Tables, Graphs, and Words
Students describe how "tile patterns" grow using pictures, words, tables, graphs, and input-output rules.

Example: Aaron and Ben are going to school. Aaron rides his bike at a rate of 8 miles per hour. It takes Ben 5 minutes to go half a mile on his skateboard. If each boy continues at his rate of speed, who is moving faster?

Table
Students create a table using the given rate as a starting point.

Aaron's Rate

Time (hours)	Distance (miles)
1	8
$\frac{1}{2}$	4
2	16
3	24
4	32
5	40

Graph
Students create a graph. The independent variable is time and the dependent variable is distance.

Aaron's graph is steeper than Ben's, because he is covering more distance over any given time. We can say that Aaron is moving at a faster rate.

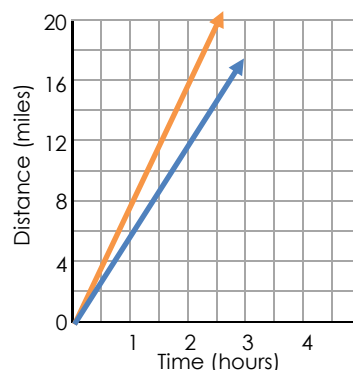We can also compare their speeds at 4 miles on the table and double number line.

Double Number Line
Students create a double number line to represent the data. Note that Ben's time is measured in minutes, not hours.

Time (min)
0 5 10   20   30   40   50

0 0.5 1   2   3   4   5
Distance (miles)

By the end of the packet, your student should know…
- How to describe visual patterns verbally, as a sequence of numbers in a table, in a graph, and using input-output rules (equations) [Lesson 7.1]
- The difference between dependent and independent variables and how they are related [Lesson 7.1]
- How to use tables of numbers, double number lines, graphs, equations, unit rates, and words to compare similar situations [Lessons 7.2, 7.3]
- How to identify unit rates in tables, graphs and equations and use rates to solve problems in context [Lesson 7.3]

Additional Resources
- For definitions and additional notes please refer to section 7.5.
- For an example on independent and dependent variables: https://bit.ly/30UXl1N
- For an example on graphing independent and dependent variables: https://bit.ly/2ClITFQ
- For comparing rates and unit rates graphically: https://youtu.be/BdStUDXHT6s