Packet 11: Ratios and Unit Rates

Dear Parents/Guardians,

Packet 11 introduces ratio and unit rate definitions and notation. Students explore these concepts and solve problems using different representations, including tables of numbers, tape diagrams and double number lines.

Ratios and Unit Rates

A ratio is a pair of non-negative numbers, not both zero, in a specific order.

These are ratios:			These are NOT ratios:		
2 to 5	7 : 3	$\frac{3}{4}$: 6	0 to 0	3 : -2	$\frac{3}{4}$

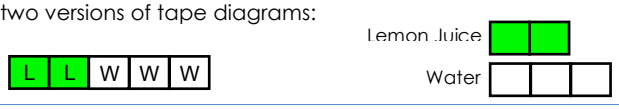
Students can simplify ratios to a single value. This value is known as the unit rate.
Example: Jen can run 12 miles in 2.5 hours.

The unit rate would be $\frac{12}{2.5} = 4.8\ m/h$ (miles per hour).

Tape Diagrams

A tape diagram is a visual representation of two variables. Each individual rectangle in the diagram has the same value.

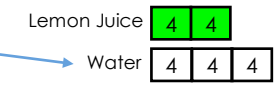
Example: A recipe calls for 2 parts lemon juice for every 3 parts water.
Here are two versions of tape diagrams:



Students will often use tape diagrams to represent and solve ratio problems when the units are the same.

Example: A recipe calls for 2 parts lemon juice for every 3 parts water.
How many cups of lemon juice are needed for 12 cups of water?

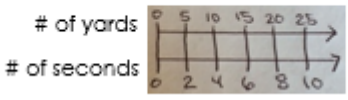
1. We know the total water is 12 cups.
   Divide the 12 cups into 3 equal parts.
   Each part has a value of 4 cups.
2. The 2 parts lemon juice also have the same value, so 2 × 4 = 8 cups.



Double Number Lines

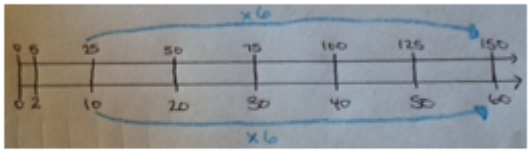
A double number line diagram is a graphical representation of two variables in which the corresponding values are placed on two parallel number lines for easy comparison.

Alberto jogs 5 yards every 2 seconds. Make a double number line to represent this relationship if he continues jogging at this rate.



Students will often use double number lines to solve ratio problems when the two quantities have different units.

Alberto jogs 5 yards every 2 seconds. At this rate, how many yards can he jog in 1 minute?



From the original number line, students could notice that Alberto jogs 25 yards in 10 seconds. Students could either continue the double number line or notice that, since $6 \times 10(seconds)$ is 60 seconds (or 1 minute), $6 \times 25(yards)$ is 150 yards.

By the end of the packet, your student should know…

Ratio terminology Lesson 11.1

How to represent ratios using symbols, words, tables, tape diagrams, and double number lines Lessons 11.1 and 11.2

How to solve ratio and unit rate problems Lesson 11.3

Additional Resources

Resource Guide (RG)
Part 2, pages 27-29