Packet 3: Proportional Reasoning: Ratios and Rates

Dear Parents/Guardians,

Packet 3 builds from grade 6 ratios and rates. In Lesson 1, students use tables and graphs to solve ratio and rate problems involving the unit rate, and determine when two quantities are in a proportional relationship.
In Lesson 2, students represent proportional relationships as equations and relate equations to specific points on the graphs. In Lesson 3, students use equivalent ratios to write equations and solve problems in context.

Determining Proportionality Using the Unit Rate (Unit Price)

Students create tables to find unit rates to determine if two quantities are proportional. Notice that for a proportional relationship, ratios are constant multiples of one another.

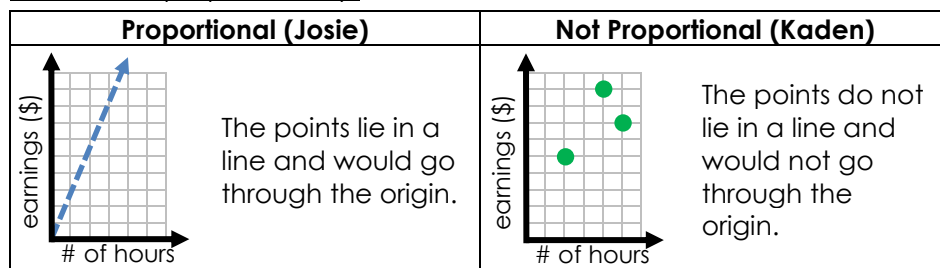Example: Josie's babysitting hours and earnings.

	Friday	Saturday	Sunday
time (hours)	5	2	4
earnings ($)	$26.25	$10.50	$21
Unit rate ($ per hour)	$\frac{26.25}{5} = \$5.25$	$\frac{10.50}{2} = \$5.25$	$\frac{21}{4} = \$5.25$
Proportional?	Yes, because the amount earned is always 5.25 times the number of hours.		

Kaden's babysitting hours and earnings.

	Friday	Saturday	Sunday
time (hours)	5	2	4
earnings ($)	$15	$10	$18
Unit rate ($ per hour)	$\frac{15}{5} = \$3.00$	$\frac{10}{2} = \$5$	$\frac{18}{4} = \$4.50$
Proportional?	No, because there is no single multiplier to represent a proportional relationship.		

Determining Proportional Relationships in Graphs

For a graph to illustrate a proportional relationship, it must go through the origin (0,0) and have a constant rate of change (unit rate), called the constant of proportionality.

Proportional (Josie)	Not Proportional (Kaden)
The points lie in a line and would go through the origin.	The points do not lie in a line and would not go through the origin.

Equivalent Ratios and Equations

Students use equivalent ratios to write and solve equations.

Example: Joey can read 3 pages in 4.5 minutes. At this rate, how many pages can he read in 27 minutes?

Method 1	Method 2
$\frac{3}{4.5} = \frac{x}{27}$ $\frac{3}{4.5}\left(\frac{6}{6}\right) = \frac{x}{27}$ x = 18 pages	$\frac{3}{4.5} = \frac{x}{27}$ 4.5(x) = 3(27) 4.5x = 81 x = 18 pages

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

- How to create tables and graphs to explore and identify the unit rate [Lessons 3.1 and 3.2]
- How to determine when two quantities are in a proportional relationship [Lesson 3.1]
- How to represent proportional relationships as equations [Lesson 3.2]
- How to write equations to solve proportional reasoning problems [Lesson 3.3]

Additional Resources

- For definitions and additional notes please refer to Student Resources at the end of this packet.
- Determining if two quantities are in a proportional relationship: https://tinyurl.com/khan7thproprelations
- For setting up equations to solve proportional word problems: https://tinyurl.com/khan7thwriteproportions
- How to solve equivalent ratio problems using different methods: https://tinyurl.com/khan7thfind-proportion