Just In Time Quick Check

Standard of Learning (SOL) 6.12c

Strand: Patterns, Functions, and Algebra

Standard of Learning (SOL) 6.12c

The student will determine whether a proportional relationship exists between two quantities.

Grade Level Skills:

- Determine whether a proportional relationship exists between two quantities, when given a table of values or a verbal description, including those represented in a practical situation. Unit rates are limited to positive values.
- Determine whether a proportional relationship exists between two quantities given a graph of ordered pairs. Unit rates are limited to positive values.

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - 6.12cd – Identifying and Representing Proportional Relationships (Word) / PDF
- VDOE Algebra Readiness Formative Assessments
  - 6.12c (Word) / PDF
- VDOE Algebra Readiness Remediation Plans
  - Proportional Relationships (Word) / PDF
- VDOE Word Wall Cards: Grade 6 (Word) / PDF
  - Proportional Relationship
  - Ratio Table
  - Connecting Representations
- Desmos Activity
  - Marcellus the Giant

Supporting and Prerequisite SOL: 6.1, 6.12a, 6.12b, 5.18, 4.15

SOL 6.12c - Just in Time Quick Check

1. Ms. Thompson asks her students if they are soccer fans, and they answer "yes" or "no." Of these students, 20 say "yes" and 5 say "no." Describe as many relationships as you can about those who are soccer fans and those who are not.

2. Jackson and Carlos were running around a track. They started running at the same time. When Jackson had run 9 laps, Carlos had run 3 laps. The table shows the laps Jackson and Carlos completed.

Laps Completed

Jackson	Carlos
9	3
18	6
27	9

Does a proportional relationship exist between the number of laps Jackson and Carlos ran? Explain your reasoning.

3. Examine the table.

Cost of Wi-Fi to Run Cell Phone	
Time (minutes)	**Cost (in cents)**
5	15
8	24
12	36
24	72

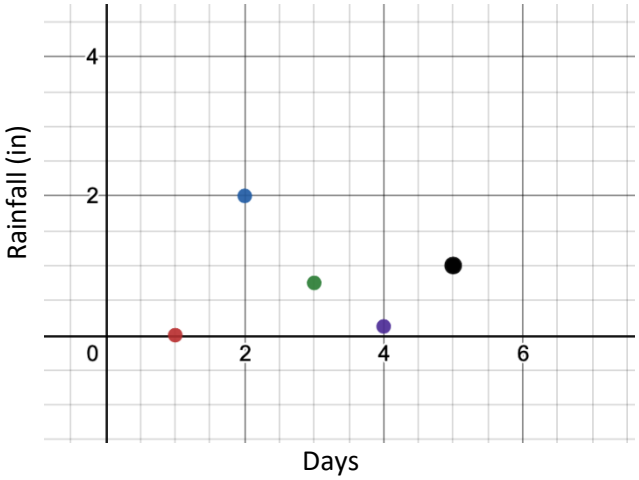
Does a proportional relationship exist between the time spent on a cell phone and the cost of Wi-Fi? Explain your reasoning.

4. Dionni collects data on the amount of rainfall for 5 days. Soliana collects data on the amount of water wasted if the faucet is not turned completely off for 5 days. Their data is shown below.

Dionni

Amount of Rainfall for 5 Days

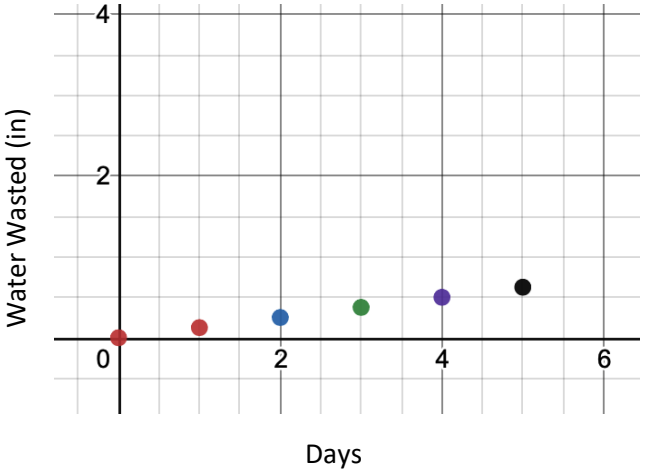
Day (x)	1	2	3	4	5
Rainfall (In.) (y)	0	2	$\frac{3}{4}$	$\frac{1}{8}$	1



Soliana

Amount of Water Wasted

Day (x)	1	2	3	4	5
Wasted water (In.) (y)	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{2}{4}$	$\frac{5}{8}$



Does Dionni's data or Soliana's data represent a proportional relationship? Explain how you know.

SOL 6.12c - Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

1. Ms. Thompson asks her students if they are soccer fans, and they answer "yes" or "no." Of these students, 20 say "yes" and 5 say "no." Describe as many relationships as you can about those who are soccer fans and those who are not.

   A common misconception some students may have is describing relationships within a context. It is also common for students to struggle with the language of the additive or proportional relationship. For example, they may say, "is four times more than" instead of "is four times the value of." As students work through problems comparing additive and proportional relationships, they can model the context using manipulatives and notate the appropriate phrases that go with each type of wording. Consider asking: How do we describe what your model shows in words? How do the two groups compare to one another?

   The types of relationships that students describe when comparing numbers can help the teacher to understand if they are thinking of multiplicative relationship. If students only focus on the difference between the two numbers (i.e. 15 more people said yes), they are thinking additively as opposed to considering the 4-to-1 ratio. It may beneficial to have teams of students consider problems, which represent additive or multiplicative relationships using ratios and proportional reasoning.

2. Jackson and Carlos were running around a track. They started running at the same time. When Jackson had run 9 laps, Carlos had run 3 laps. The table shows the laps Jackson and Carlos completed.

Laps Completed

Jackson	Carlos
9	3
18	6
27	9

Does a proportional relationship exist between the number of laps Jackson and Carlos ran? Explain your reasoning.

A common misconception some students may have is to approach this problem using an additive relationship. If a student suggests "adding 9" or "adding 3" each time, they are not recognizing the multiplicative relationship of the ratio 9:3. Comparing and contrasting two very similar problems can help students to understand the differences in additive and multiplicative reasoning. It would also be beneficial for students to use models, such as a number line, to support the additive vs. multiplicative reasoning comparisons.

3. Examine the table.

Cost of Wi-Fi to Run Cell Phone	
Time	**Cost (in cents)**
5	15
8	24
12	36
24	72

Does a proportional relationship exist between the time spent on a cell phone and the cost of Wi-Fi? Explain your reasoning.

A common misconception some students might have is utilizing strategies to determine if there is a proportional relationship when the data in the table has no sequential order. This misconception could stem from the understanding of ratios in connection to proportions. A possible strategy that may benefit students is to connect proportions, ratios, and tables by having them match cards that contain visuals of the same ratio. For example, cards might show varying amounts of machines and robots. On one card, there might be two machines and eight robots, and on another card, it might show four machines and six robots. Students could match these cards, and then record them in a table. Additional cards might show four machines with only ten robots, which would not fit the ratio table or proportional relationship. This strategy could be used for different contexts, having students make sense of proportional relationships. This type of activity could also be adapted to use with manipulatives. Ask students questions like, "How do these cards/sets go together? How do you know they are proportional? What do you notice about the table that show us that the cards/sets are proportional?

4. Dionni collects data on the amount of rainfall for 5 days. Soliana collects data on the amount of water wasted if the faucet is not turned completely off for 5 days. Their data is shown below.

Dionni

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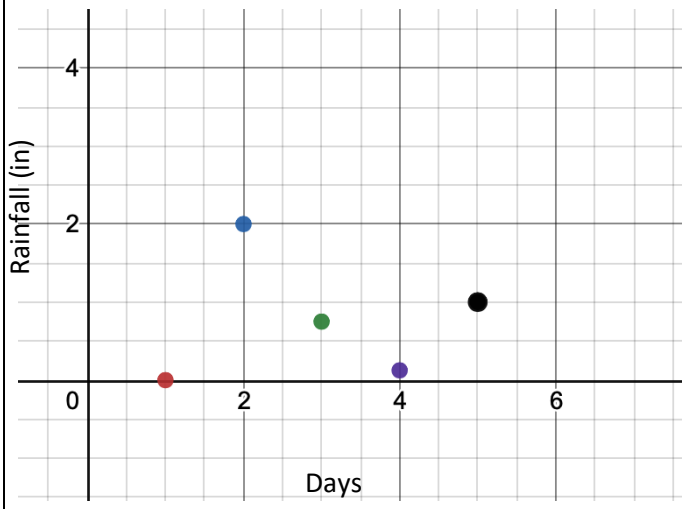

Soliana

Amount of Water Wasted

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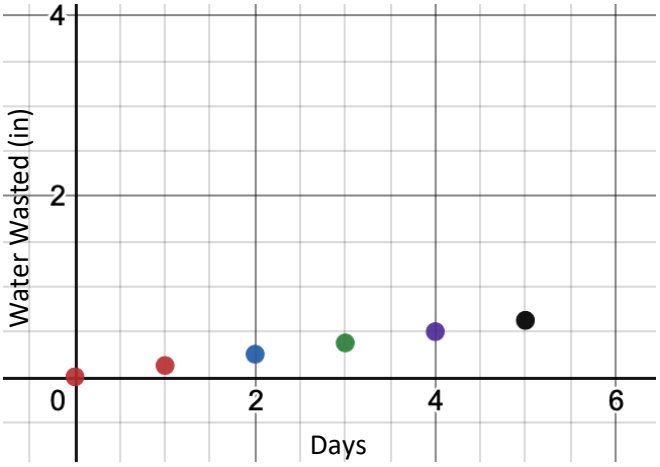

Does Dionni's data or Soliana's data represent a proportional relationship? Explain how you know.

This question helps to highlight possible misconceptions about graphing proportional relationships. A common misconception some students may have is difficulty reading the graphs to interpret the context of the problem. If a student selects Dionni's table, they may reason that the dataset does contain a data point on the x-axis, which makes it proportional, even though it does not pass through the origin of (0,0). The student may also not recognize that the graph of a proportional relationship should indicate a pattern that is indicative of a constant rate. Students may benefit from additional support in connecting proportional relationships to algebraic thinking when using graphs. Have students collaborate about graphs created from real world contexts and their corresponding ratio tables. In addition, have students create graphs from non-examples of proportional graphs and compare them to graphs that represent proportional relationships. What do you notice? What do you wonder? Why does the graph of a proportional relationship look like this? What are the characteristics of a graph of a proportional relationship? What is the unit rate in the graph? How can we determine the common ratio?