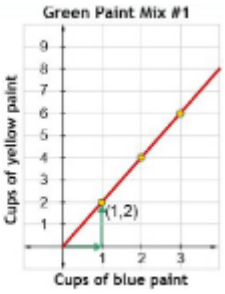
Deliver instruction (Block 2)

Agile Mind materials Opening the lesson Framing questions Lesson activities Suggested assignment

Agile Mind materials

Patterns in proportional relationships:

- *Exploring* "Proportional and non-proportional relationships"
- Block 2 Student Activity Sheet: Teacher, Student



Opening the lesson

- Refer to the table and graph of the paint mixture scenario in the *Overview*. Ask students to describe the proportional relationship between blue and yellow paint in that mixture.

Framing questions

In the paint mixing scenario, what were the variables? As the number of cups of blue paint increased, what happened to the number of cups of yellow paint? How were ratios used in that scenario?

Lesson activities

Exploring "Proportional and non-proportional relationships"

Page 1

- This page consists of an animation that continues with the paint mixture scenario in the *Overview*. In panel 1, students are prompted to write a rule that can be used to determine the number of cups of yellow paint needed for any number of cups of blue paint, using words. **[SAS, question 1a]**
- Before playing panel 2, have students share their algebraic rules. The rules that they write describe a process that can be used to find the number of cups of yellow paint needed for any number of cups of blue paint. Panel 2 introduces the strategy of using a process column as a tool for generating an algebraic rule in symbols. The animation makes the connection between repeated addition and multiplication, as it relates to finding the amount of yellow paint used in the mixture. Make sure students understand this relationship before continuing. Have students complete the table on their Student Activity Sheet. **[SAS, question 1b]**
- With panel 3 students begin to use the information from the first panel to create an algebraic rule to describe the relationship. Variables are used to represent the things that are changing in this scenario. Reinforce the idea that *b* represents the cups of blue paint while *y* represents the cups of yellow paint. **[SAS, question 1c]**
- With panels 4-6, the process column is used to develop an algebraic rule. The word ***coefficient*** is introduced on panel 4 to represent the part of the process column that stays the same
- In Panel 7, students are asked to relate the algebraic rule back to the paint scenario. Ask them to consider a scenario in which there are zero cups of blue paint. How many cups of yellow paint will you have? **[SAS, question 1d, 1e]**
- In Panel 8, students compare the four different representations. Have students write down their observations on the Student Activity Sheet, and then discuss with a partner. **[SAS, question 1f]**

Page 2

- Students are now asked to consider a different shade of green. Have students work together with a partner to generate a table, graph, verbal description, and algebraic rule for the new relationship. Then play the animation and ask students to compare their tables and algebraic rule to those presented in the animation. **[SAS, question 2]**
- Have students complete the reinforcement question. **[SAS, question 3]**

Page 3

- Encourage students to discuss their observations about the two graphs and the algebraic rules that describe them. **[SAS, question 4]** Ask:
    - *How are the graphs similar? How are they different?*
    - *How are the algebraic rules similar? How are the algebraic rules different?*
    - *For the algebraic rule* $y = 2b$*, what does each number or letter represent in the paint scenario?*
    - *How can you see the increase of 2 cups of yellow for every 1 cup of green in the graph? How can you see the increase of 3 cups of yellow for every 1 cup of green in the graph?*
    - *For the graph of* $y = 3b$*, what does the point (3,9) represent in the story? What does the point (1,3) represent in the story?*
- The animation on page 4 will engage students further in these ideas.

Page 4

- This animation introduces the key concept **constant of proportionality**.
- On the initial panel of the animation, clarify that the constant of proportionality is the unit rate and remind students of the definition of unit rate.
- Panels 1 and 2 demonstrate how to determine the constant of proportionality with a graph. For each paint scenario, ask students if they can see the constant of proportionality in the graph and also in the algebraic rule.
- Panel 3 helps students to solidify connections to the algebraic rules, which show 2 times b and 3 times b, respectively.
- Panel 4 provides an opportunity to discuss the two scenarios side-by-side and compare their constants of proportionality as represented in both sets of representations. It illuminates the connection between the constant of proportionality and the point $(1,y)$ in any proportional relationship.
- Panel 5 demonstrates how to find the constant of proportionality in the table of a proportional relationship.
- Have students record the process for finding the constant of proportionality in each representation. **[SAS, question 5]**
- Have students complete the suggested assignment on the Student Activity Sheet for more practice determining the constant of proportionality from a graph and table.

Further questions

- Describe a scenario would have a constant of proportionality of 5. What about a constant of proportionality of 1/5?

Suggested assignment

- Block 2 Student Activity Sheet, question 6a-c
- *Guided practice*, pages 1-2
- *More practice*, pages 1-2