MSTAR INTERVENTION

L10

Lesson 10: Generate Equivalent Rates

Lesson Objective

- Students will generate equivalent rates, using unit rates and a ratio table.

Instructional Materials

Material	Quantity	Description
How Am I Doing? graph	1 per student	
Colored pencils	1 per student	
Display Masters	1 each	• Preview: Key Idea: Generate Equivalent Rates • Demonstrate: Birds to Nests A • Demonstrate: Birds to Nests B • Demonstrate: Birds to Nests C • Demonstrate: Birds to Nests D • Demonstrate: Birds to Nests E • Demonstrate: Birds to Nests Model – Unit Rate (optional) • Demonstrate: Birds to Nests Model – Equivalent Rate (optional)
Handouts	1 each per student	• Cumulative Review • Practice 1 • Practice 2 • Independent Practice
Answer Keys	1 each	• Cumulative Review • Practice 1 • Practice 2 • Independent Practice

Cumulative Review

Have students answer the questions on the Cumulative Review handout. Go over the answers. Correct misconceptions. Have students make corrections, as needed, using a colored pencil. Collect student papers to determine who needs additional instruction.

Preview

This lesson will build on students' prior conceptual knowledge of equivalent rates. Students will generate equivalent rates by calculating the unit rate and then scaling up to the desired equivalent rate.

Display and introduce through a brief explanation the key idea for this lesson:

- Equivalent rates can be generated by calculating the unit rate and then multiplying to find the equivalent rate.

Use the Key Idea: Generate Equivalent Rates 

display master as needed.

Engage Prior/Informal Knowledge

To open the lesson, present questions to activate students' background knowledge or preskills related to the content to be taught in this lesson. Ask students questions such as:

- What is the difference between ratios and rates? After discussing the answer, explain to students that although ratios and rates represent slightly different situations, the rules for working with ratios and rates are the same.
- How can you determine whether 2 ratios or rates are equivalent?
- Which of the following pairs of rates are equivalent? (Have students work with a partner and explain their answers.)

$$\frac{24 \text{ miles}}{4 \text{ gallons}} \text{ and } \frac{27 \text{ miles}}{3 \text{ gallons}}$$

$$\frac{12 \text{ pens}}{\$3} \text{ and } \frac{20 \text{ pens}}{\$5}$$

$$\frac{18 \text{ feet}}{6 \text{ seconds}} \text{ and } \frac{15 \text{ feet}}{5 \text{ seconds}}$$

- How is a unit rate different from a rate?
- What is the unit rate for each of the following rates? (Have students work with a partner):

$$\frac{\text{30 apples}}{\text{6 teachers}}$$

$$\frac{\text{36 cookies}}{\text{9 students}}$$

Demonstrate

1. Find the rate.

Say: *In the previous lesson, we found the unit rate for 8 birds to 4 nests. We did this by finding the rate and then calculating the unit rate.*

Say: *In this lesson, we will learn how to calculate equivalent rates.*

Say: *For example, assuming that the rate is the same, 8 birds to 4 nests, I want to find how many nests there would be for 10 birds. So, I need to find a rate that is equivalent to* $\frac{8}{4}$ *and that has 10 birds.*

Say: *What number can I multiply 8 by to get 10? (no whole number works) There isn't a whole number that, when multiplied by 8, equals 10. What should I do?*

Use the Birds to Nests A **DM** display master as needed.

2. Find the unit rate.

Say: *To find the equivalent rate, I first calculate the unit rate.*

Use the Birds to Nests B **DM** display master as needed.

Say: *I write the 2 units I am comparing in the first column, birds to nests, and the rate I am given in the second column, 8 to 4.*

Use the Birds to Nests C DM display master as needed.

Say: *I find the unit rate, like we did in the previous lesson. Do we multiply or divide to find the unit rate? (divide) Why?*

Say: *What should I divide 4 by to get 1? (4) I divide 8 by 4 as well because I want to divide by* $\frac{4}{4}$*, which is equal to 1. 8 divided by 4 equals 2, so the unit rate is 2 birds per 1 nest.*

Use the Birds to Nests D DM display master as needed.

3. Find the equivalent rate.

Say: *Now I can find an equivalent rate with 10 birds, using the same strategy I used to find equivalent. Do I multiply or divide? (multiply) Why?*

Say: *What number do I multiply 2 birds by to get 10 birds? (5) I multiply 1 nest by 5 as well because I want to multiply by* $\frac{5}{5}$*, which is equal to 1.*

Use the Birds to Nests E DM display master as needed.

Say: *10 birds to 5 nests is equivalent to 8 birds to 4 nests. How can I confirm that these are equivalent rates? (Determine whether they simplify to the same rate.)*

Say: *10 birds to 5 nests and 8 birds to 4 nests both simplify to the same rate: 2 birds to 1 nest. This confirms that the rates are equivalent.* 1

1 TEACHER NOTE

If students struggle to understand the reasoning behind scaling down to a unit rate and then back up to an equivalent rate, use the optional Birds to Nests Model display masters to further explain the process.

Practice

For each practice activity, provide detailed feedback to students, highlighting what was done correctly and what needs improvement. Provide opportunities for students to correct their errors. Collect student work to review and monitor student progress.

Activity 1: Have students complete the activity on the Practice 1 handout. Select a few students to verbalize their reasoning.

Activity 2: Have students work in pairs to complete the activity on the Practice 2 handout. Have students verbalize their reasoning and each step of the process to their partners.

Independent Practice

1. Have students work independently to complete the activity on the Independent Practice handout.

2. Go over the answers (students self-check and correct, using a colored pencil).

3. Have students record the number correct in the box and complete their How Am I Doing? graph.

4. Collect the papers to review student progress.

Closure

Review the key idea. Have students provide examples from the lesson.

Have students discuss their answers to the following questions:

- How would you explain equivalent rates to a fifth-grader?
- What representations would you use?

Clear up any misconceptions. Students who struggle to generate and identify equivalent rates need additional instruction.