TOPIC 4

LESSON 4.3b

Oh, Yes, I am the Muffin Man

6.RP.1
6.RP.3

Objective: Determining Equivalent Ratios

Warm-Up

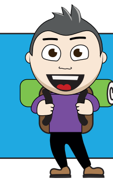
Find the Least Common Multiple of the following. Show your work

1. 3, 6, 12

2. 4, 6, 8

EXPLORE 3

Rates and Proportions



One of the rounds at the Math Quiz Bowl tournament is a speed round. A team of four students will represent Stewart Middle School in the speed round of the Math Quiz Bowl. One student of the team will be chosen to solve as many problems as possible in 20 minutes.

The results from this week's practice are recorded in the table.

Student	Number of Correctly Solved Problems in a Specified Time
Kaye	4 problems correct in 5 minutes
Susan	7 problems correct in 10 minutes
Doug	1 problem correct in 2 minutes
Mako	3 problems correct in 4 minutes

1. Explain how Tia's reasoning and Lisa's reasoning about who should compete in the speed round are incorrect.

Tia

Susan should definitely compete in the speed round because she correctly solved the most problems.

Lisa

It took Susan the longest time to complete her problems. She should not compete in the speed round.

Each quantity in the table is a rate. A rate is a ratio that compares two quantities that are measured in different units. The rate for each student in this situation is the number of problems solved per amount of time.

WORKED EXAMPLE

Kaye's rate is 4 problems correct per 5 minutes. This rate can be written as:

$$\frac{4 \text{ problems correct}}{5 \text{ minutes}}$$

2. Write the rates for the other three team members.

a. Susan

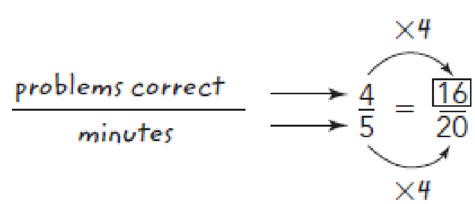
b. Doug

c. Mako

When two ratios or rates are equivalent to each other, you can write them as a proportion. A proportion is an equation that states that two ratios are equal. In a proportion, the quantities composing each part of the ratio have the same multiplicative relationship between them.

WORKED EXAMPLE

For example, you know that Kaye got four problems correct per 5 minutes. So, you can predict how many problems she could answer correctly in 20 minutes.



Kaye can probably answer 16 problems correctly in 20 minutes.

When you change one ratio to an equivalent ratio with larger numbers, you are scaling up the ratio. Scaling up means you multiply both parts of the ratio by the same factor greater than 1.

3. Use the definition of a ratio to verify that $\frac{4}{5}$ is equivalent to $\frac{16}{20}$.

Remember, one way to represent a ratio is in fractional form. It doesn't matter which quantity is in the numerator or denominator; it matters that the unit of measure is consistent among the ratios.

WORKED EXAMPLE

You can write the proportion in a different way.

$$\frac{\text{minutes}}{\text{problems correct}} \rightarrow \frac{5}{4} \overset{\times 4}{=} \frac{20}{\boxed{16}}$$

4. Determine the number of problems each student can probably solve in 20 minutes. Explain the scaling up you used to determine the equivalent ratio.

Susan

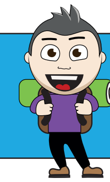
Doug

Mako

5. Which team member is the fastest? Who would you pick to compete? Explain your reasoning.

EXPLORE 4

Scaling Up and Scaling Down



The muffin variety packs baked by the Healthy for U Bakery come in a ratio of 2 blueberry muffins to 5 total muffins.

1. Scale up each muffin ratio to determine the unknown quantity.

a. $\frac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \frac{\text{20 blueberry muffins}}{\text{? total muffins}}$

b. $\frac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \frac{\text{30 blueberry muffins}}{\text{? total muffins}}$

c. $\frac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \frac{\text{? blueberry muffins}}{\text{100 total muffins}}$

d. $\frac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \frac{\text{50 blueberry muffins}}{\text{? total muffins}}$

e. $\frac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \frac{\text{? blueberry muffins}}{\text{15 total muffins}}$

f. $\frac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \frac{\text{28 blueberry muffins}}{\text{? total muffins}}$

When you change a ratio to an equivalent ratio with smaller numbers, you are scaling down the ratio. Scaling down means you divide both parts of the ratio by the same factor greater than 1, or multiply both parts of the ratio by same factor less than 1. Scaling down a ratio often makes it easier to understand.

2. Scale down each ratio to determine the unknown quantity.

a. $\frac{\text{3 people}}{\text{9 pizza}} = \frac{?}{\text{3 pizzas}}$

b. $\frac{\text{2 hoagies}}{\text{6 people}} = \frac{\text{1 hoagie}}{?}$

c. $\frac{\text{100 track shirt}}{\text{25 people}} = \frac{?}{\text{1 person}}$

d. $\frac{\text{60 tracks}}{\text{5 CDs}} = \frac{?}{\text{1 CD}}$

e. $\frac{\text{3 tickets}}{\text{\$26.25}} = \frac{\text{1 ticket}}{?}$

Name: ______________________ Date: ____________ Class: __________

Homework HW

LESSON 4.3b

Oh, Yes, I am the Muffin Man

Objective: Determining Equivalent Ratios

Review

1. In planning for the upcoming regional girls' tennis tournament, Coach McCarter looked at her players' statistics from the previous 2 months.

   Sarah: 7 matches won, 3 matches lost

   Sophie: 6 matches won, 4 matches lost

   Grace: 7 matches won, 4 matches lost

   Based on their records, which player should Coach McCarter choose to attend the regional tournament? Explain your reasoning.

2. Hydrate sports drink calls for 7 scoops for every gallon of water. Sarah thinks the drink is too weak, and she wants to change it. Describe how she can change either the number of scoops or the amount of water to make the drink stronger.

3. Decide whether each amount is more closely related to volume or surface area.
   a. the amount of air in a room
   b. I recommend changing the example since a hamster cage is made of wire, not sheet metal.

4. Determine each product.

   a. $\frac{2}{5} \times \frac{7}{3}$ b. $4\frac{1}{6} \times 3\frac{4}{5}$