Objective   Determining Equivalent Ratios

Warm-Up

Scale down each ratio to determine the unknown quantity.

f. $\dfrac{12 \text{ hours}}{720 \text{ miles}} = \dfrac{4 \text{ hours}}{?}$

g. $\dfrac{20 \text{ hours of work}}{\$240} = \dfrac{1 \text{ hour of work}}{?}$

h. $\dfrac{3 \text{ gallons of red paint}}{2 \text{ gallons of yellow paint}} = \dfrac{?}{1 \text{ gallon of yellow paint}}$
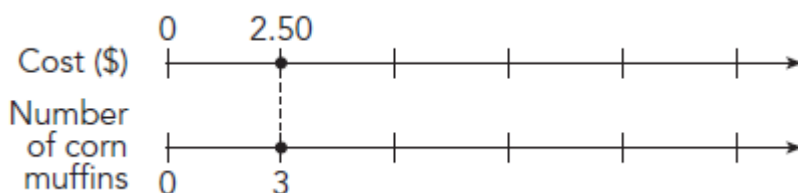
Double Number Lines

You know several strategies to determine the relationship between two quantities: drawing models, building tape diagrams, and scaling up or down. You can also use a double number line to visualize
these relationships. A double number line is a model that is made up of two number lines used together to represent the ratio between two quantities. The intervals on each number line maintain the same ratio.
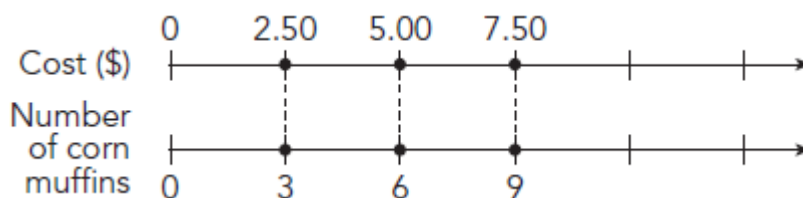
The Muffin Man Bakery offers two types of muffins—corn or
cinnamon raisin. It costs the bakery $2.50 to make 3 corn muffins.

WORKED EXAMPLE

The ratio $2.50 : 3 corn muffins is shown on the double number line

You can see other equivalent ratios of cost : number of corn
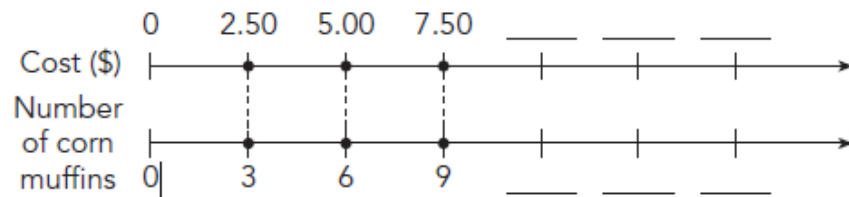muffins by continuing to label each interval.

1. State the two new ratios of cost : number of corn muffins shown on the second double number line.

2. Describe the interval represented on each number line.

3. Use the double number line to determine equivalent ratios.
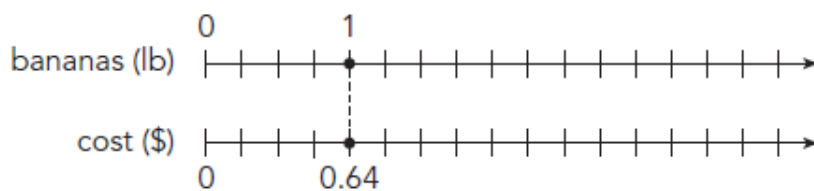a. Plot the new ratios. Explain your calculations.

b. What is the cost of making 12 corn muffins?

c. What is the cost of making 15 corn muffins?

d. What is the cost of making 18 corn muffins?

e. Describe any patterns you notice between the cost and the number of corn muffins made.

4. One pound of bananas costs $0.64. Use the double number lines to determine the cost for each quantity of bananas.

$$\begin{array}{c} \text{bananas (lb)} \quad \begin{array}{c} 0 \qquad 1 \\ \vdash\!+\!+\!+\!\bullet\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!\rightarrow \end{array} \\[2mm] \text{cost (\$)} \quad \begin{array}{c} \vdash\!+\!+\!\bullet\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!\rightarrow \\ 0 \qquad 0.64 \end{array} \end{array}$$
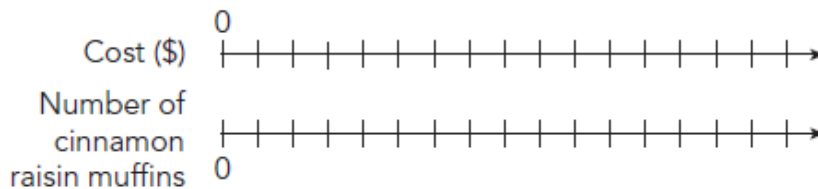
a. $2\frac{1}{2}$ pounds

b. $\frac{1}{2}$ pound

c. 2 pounds

5. The cost for The Muffin Man Bakery to make 4 cinnamon raisin muffins is $3.20. Use the double number line to determine equivalent ratios and answer each question. Explain your calculations.

$$\begin{array}{c} \text{Cost (\$)} \quad \begin{array}{c} 0 \\ \vdash\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!\rightarrow \end{array} \\[2mm] \begin{array}{c} \text{Number of} \\ \text{cinnamon} \\ \text{raisin muffins} \end{array} \quad \begin{array}{c} \vdash\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!+\!\rightarrow \\ 0 \end{array} \end{array}$$
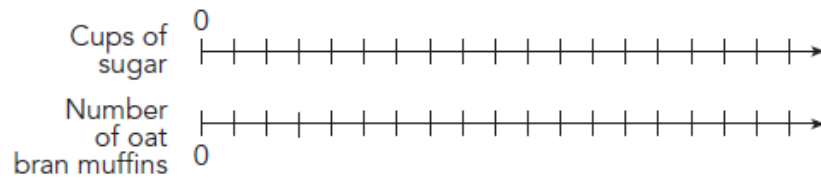
a. What is the cost to make 8 cinnamon raisin muffins?

b. How many cinnamon raisin muffins are made for $12.80?

c. What is the cost of making 12 cinnamon raisin muffins?

6. It takes 1 cup of sugar to make 12 oat bran muffins. Use the double number line to determine equivalent ratios and answer each question. Explain your calculations.

Cups of sugar 0

Number of oat bran muffins 0

a. Plot the given ratio on the double number line.

b. How many oat bran muffins can be made using $\frac{1}{2}$ cup of sugar? $\frac{2}{3}$ cup of sugar? $1\frac{1}{2}$ cups of sugar?

c. How many cups of sugar are needed to make 3 muffins? 15 muffins? 9 muffins?

Make a Choice

Answer each question by using pictures, a tape diagram, or a double number line. Show all of your work and explain why you chose your strategy.

1. A T-shirt store keeps 7 white T-shirts on the shelves for every 3 purple T-shirts on the shelves.
a. How many white T-shirts are on the shelves if there are 15 purple T-shirts on the shelves?

b. How many purple T-shirts are on the shelves if there are 49 white T-shirts on the shelves?

c. How many white shirts are on the shelves if there are 40 total shirts (purple and white) on the shelves?

2. A grocery store advertises 4 pounds of apples for $6.00.
a. What is the cost for 3 pounds of apples?

b. What is the cost for 1 pound of apples?

c. How many pounds of apples can you purchase with $40.00?

Homework HW

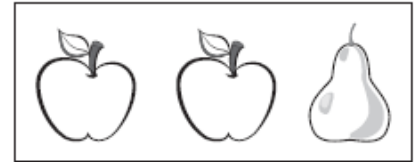**LESSON 4.3c**
Oh, Yes, I am the Muffin Man

Objective Determining Equivalent Ratios

Practice

1. Ms. Yoto is putting together bags of fruit that contain 1 pear for every 2 apples. For each ratio given, create a picture module. Then, calculate the answer from your model, and explain your reasoning.

   a. How many apples are in the bag if there are a total of 9 pieces of fruit?

   b. How many apples are in the bag if there are a total of 15 pieces of fruit?

   c. How many pieces of fruit are there if there are 8 apples in the bag?

2. When creating playlists for dances, DJ Lew likes to maintain a ratio of 4 hip hop songs : 3 country songs : 1 slow song.

   a. Create a tape diagram to represent this ratio.

   b. Suppose DJ Lew has 40 songs on his playlist. Use the tape diagram to illustrate how many hip hop, country, and slow songs are on the playlist.

   c. Suppose DJ Lew wants to put 36 hip hop songs on the playlist. How many total songs will be on the playlist? Use a tape diagram to determine the answer.

3. Scale up or scale down each ratio to complete the proportion.

   a. $\dfrac{2 \text{ teachers}}{26 \text{ students}} = \dfrac{8 \text{ teachers}}{?}$

   b. $\dfrac{12 \text{ inches}}{1 \text{ foot}} = \dfrac{?}{18 \text{ feet}}$

   c. $\dfrac{\$39,000}{1 \text{ year}} = \dfrac{?}{3 \text{ years}}$

   d. $\dfrac{18 \text{ pencils}}{1 \text{ box}} = \dfrac{108 \text{ pencils}}{?}$

   e. $\dfrac{\$40}{15 \text{ gallons}} = \dfrac{?}{3 \text{ gallons}}$

   f. $\dfrac{1200 \text{ boxes}}{9 \text{ truckloads}} = \dfrac{?}{3 \text{ truckloads}}$

   g. $\dfrac{280 \text{ beats}}{4 \text{ seconds}} = \dfrac{70 \text{ beats}}{?}$

   h. $\dfrac{520 \text{ cm}}{5.2 \text{ m}} = \dfrac{260 \text{ cm}}{?}$