Use Unit Rates and Equivalent Rates

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4.2 Use Unit Rates and Equivalent Rates

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[Figure 1]

Myra's junior soccer team scored 10 goals in the last 2 games. At this rate, how many goals will Myra's team score in the next 5 games?

In this concept, you will learn to use underline unit rates and find equivalent rates.

Unit Rate

A **unit rate** is a special kind of ratio, where the second number, or the denominator, is equal to one. With a unit rate, you are comparing a quantity to one. Some common unit rates are miles per gallon, price per pound, and pay rate per hour. To find a unit rate, simplify the ratio so that you have a 1 in the denominator. You can simply divide the first number in the ratio by the second. Make sure you keep track of the units.

Let's look at an example.

Kayla bought 5.5 pounds of apples. She paid a total of $7.15. What was the unit rate of the apples per pound?

First, write the ratio of the price to pounds.

$$\frac{\text{price}}{\text{pounds}} = \frac{\$7.15}{5.5}$$

Next, divide the price by the pounds so you can find the unit rate.

$$5.5\overline{)7.15} \quad \frac{1.3}{}$$

The answer is 1.3.

The unit price for the apples is $1.30 per pound.

Let's look at another example.

Brian worked for 8 hours yesterday and made a total of $86. What is his pay rate?

First, write the ratio of the wages to hours.

$$\frac{\text{wages}}{\text{hours}} = \frac{\$86}{8}$$

Next, divide the wages by the hours so you can find the unit pay rate.

$$8\overline{)86} \quad \frac{10.75}{}$$

The answer is 10.75.

Brian is paid $10.75 per hour.

Next, let's look at equivalent rates. Equivalent rates are rates that are equal.

Let's look at an example.

Find an equivalent rate for this comparison.

$$\frac{\$2.00}{1} = \frac{x}{8}$$

In order to find the equivalent rate for this unit rate, cross multiply.

$$\frac{\$2.00}{1} = \frac{x}{8}$$
$$(1)x = \$2.00 \times 8$$
$$x = \$16.00$$

The answer is $16.00.

The rate is $\dfrac{\$2.00}{1}$ is equivalent to the rate $\dfrac{\$16.00}{8}$.

Examples

Example 1

Earlier, you were given a problem about Myra's winning streak.

Myra's team scores on 10 goals in the last 2 games. You want to find out how many goals, at this rate, they will score in the next 5 games.

First, write an equivalent ratio.

$$\frac{10}{2} = \frac{x}{5}$$

Next, cross multiply.

$$\frac{10}{2} = \frac{x}{5}$$
$$2x = 5 \times 10$$
$$2x = 50$$

Then, divide by 2 to isolate x.

$$2x = 50$$
$$\frac{2x}{2} = \frac{50}{2}$$
$$x = 25$$

The answer is 25.

In the next 5 games, Myra's team should score 25 goals if the team keeps their current rate.

Example 2

A store sells salmon for $6.99 per pound. What is the rate for 6 pounds of salmon?

First, write the ratios from the question.

$$\frac{\$6.99}{1} = \frac{x}{6}$$

Next, cross multiply to find the cost of 6 pounds of salmon.

$$
\begin{aligned}
\frac{\$6.99}{1} &= \frac{x}{6} \\
(1)x &= \$6.99 \times 6 \\
x &= \$41.94
\end{aligned}
$$

The answer is $41.94. Six pounds of salmon will cost $41.94.

Example 3

Write find the unit rate for the following ratio.

$$\frac{14}{7}$$

First, divide the numerator by the denominator.

$$7\overline{)14}\ \ ^2$$

The answer is 2.

The unit rate is $\frac{2}{1}$.

Example 4

Write find the unit rate for the following ratio.

$$\frac{36}{12}$$

First, divide the numerator by the denominator.

$$12\overline{)36}^{\,3}$$

The answer is 3.

The unit rate is $\dfrac{3}{1}$.

Example 5

Write find the unit rate for the following ratio.

$$\dfrac{48}{8}$$

First, divide the numerator by the denominator.

$$8\overline{)48}^{\,6}$$

The answer is 6. Therefore the unit rate is $\dfrac{6}{1}$.

Review

Use what you have learned about ratios to solve each problem.

In Kyle's drawer, there are 14 pairs of white socks and 8 pairs of black socks

1. Without simplifying, write the ratio of black socks to white socks.

2. Without simplifying, write the ratio of black socks to total socks.

3. Without simplifying, write the ratio of white socks to total socks.

4. Simplify your answer for number 1.

5. Simplify your answer for number 2.

6. Simplify your answer for number 3.

There are 150 apartments in the Gray building. Of these, 60 are rented and the rest are owned. There are 65 apartments in the Black building. Of these, 45 are rented and the rest

are owned. Simplify each answer.

7. What is the ratio of rented to owned in the Gray building?

8. What is the ratio of rented to owned in the Black building?

9. Write the ratio of rented to total apartments in the Gray building.

10. Write the ratio of rented to total apartments in the Black building.

11. Write the ratio of owned to total apartments in the Gray building.

12. Write the ratio of owned to total apartments in the Black building.

13. Holly works at a library re-shelving books. She re-shelved 960 books in 4 hours. What is Holly's rate of re-shelving in books per hour?

14. Sam bought 9.5 pounds of peaches to make a pie. The peaches cost $15.39. What was the unit rate of the peaches?

15. Don can wrap 8 presents in an hour. How long will it take Don to wrap 12 presents?

Review (Answers)

To see the review answers, return to the Table of Contents and select 'Other Versions' or 'Resources'.

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1.0 REFERENCES

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