Word Problems: Unit Rates

Procedural Lesson
Grade 7 · Unit 3 · Lesson 4
MC: 7.RP.1▲

Problem of the Day

Objective: _____

Vocabulary

Ratio: a comparison of any two quantities

The ratio of circles to stars is $\frac{2}{5}$ or 2:5 or 2 to 5.

Unit Rate: a ratio showing a comparison to one; a rate with a denominator of 1

$$70 \text{ miles per hour} = \frac{70}{1}$$

Equivalent Ratios: ratios, in fraction form, that are equivalent

Ratios 5:2 and 10:4 are equivalent because $\frac{5}{2} = \frac{10}{4}$.

Notes

Steps:

1. Identify and write the rate in words.
2. Express the units/quantity as a ratio in fraction form.
3. Divide the numerator by the denominator to get a denominator of 1.
4. Solve for the variable.
5. Use the unit rate to solve for the given measurement.

Directions: Find the unit rate and solve.

1. Whitney is starting a clothing store. With 12 spools of thread, she can sew 28 sweaters. If Whitney needs 150 sweaters for the opening day in 14 days, and each spool of thread costs $9.65, how much will the thread cost to make the sweaters for opening day?

2. Laura is mowing the lawn. She covers $\frac{3}{5}$ yd² every $\frac{3}{4}$ of a minute. How long will it take her to mow the entire lawn? The yard is 25 yards long and 15 yards wide.

Directions: Find the unit rate and solve.

1. The average hawk flaps its wings 4.5 times to rise 1.2 meters. Each flap of the wings burns 0.85 calories. If a piece of food sits at the top of a tree 17 meters above, how many calories will the hawk have to burn to get the food?

2. Oliver is driving $\frac{1}{2}$ a mile every $\frac{2}{3}$ of a minute. His car gets 35 miles per gallon and holds a total of 10 gallons. If he started his trip on a full tank, how long will Oliver be able to drive until he needs to stop and get gas?

Directions: Find the unit rate and solve.

1. An average person blinks 50 times every 2.5 minutes. How many blinks occur in 10 minutes?	2. The car travels 752 miles in 16 days. How many miles will the car travel in 17 days?
3. An average 7th grader reads $3\frac{1}{2}$ books every 2 months. If the average book contains 300 pages, how many pages a year do most 7th graders read?	4. The grocery clerk stacks 38 items onto 4 shelves in 2 hours. At that rate, how many items would the clerk stack in 30 hours?
5. A gas station pump puts out 62 gallons in $\frac{1}{2}$ of an hour. How many gallons will be pumped in 24 hours?	6. The teenager's playlist lasts 105 minutes and contains 21 songs. How many songs are needed if the teenager would like the playlist to last 2 hours?

Directions: Find the unit rate and solve.

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1. An oil derrick pumps $28\frac{3}{5}$ barrels per $\frac{1}{3}$ of an hour. If the oil company's goal is to pump at least 50,000 barrels a day, how many oil derricks will they need?

2. A movie runs at a rate of 10 frames per $\frac{1}{3}$ of a second. A special effects company is expected to add graphics to 25% of a $2\frac{1}{2}$ hour film and charges the company $75 per frame they need to work on. How much money will the graphics company charge the movie studio to add special effects?

Extension Activity

* **MP1:** Make sense of the problem and persevere in solving it.
* **MP4:** Apply mathematics in everyday life.

Jeannine solved the following unit rate problem incorrectly. Find her error and fix it.

Step 1: $\dfrac{\text{cost of rice}}{\text{pound}} = \dfrac{94.50}{27} = \dfrac{x}{1}$

Step 2: $\dfrac{\text{cost of rice}}{\text{pound}} = \dfrac{94.50 \div 94.50}{27 \div 94.50} = \dfrac{1}{0.285}$

Step 3: The rice costs 28.5 cents per pound.

Reaching Consensus

Reaching Consensus

  MP3: *Do you agree or disagree with your classmate? Why or why not?*

Student Presentations

  MP1: *What steps in the process are you most confident about?*
  MP6: *Explain how you might show that your solution answers the problem.*

Closure

Recap today's lesson with one or more of the following questions:

✓*MP1:* *What can you do if you do not understand a word problem?*
✓*MP5:* *Which way of finding an unknown in an equivalent fraction/ratio do you usually try first?*