

Lesson 11: Ratios of Fractions and Their Unit Rates

Classwork

Example 1: Who is Faster?

During their last workout, Izzy ran $2\frac{1}{4}$ miles in 15 minutes and her friend Julia ran $3\frac{3}{4}$ miles in 25 minutes. Each girl thought she was the faster runner. Based on their last run, which girl is correct? Use any approach to find the solution.

Example 2: Is Meredith Correct?

A turtle walks $\frac{7}{8}$ of a mile in 50 minutes. What is the unit rate expressed in miles per hour?

- a. To find the turtle's unit rate, Meredith wrote the following complex fraction. Explain how the fraction $\frac{5}{6}$ was obtained.

$$\frac{\left(\frac{7}{8}\right)}{\left(\frac{5}{6}\right)}$$

- b. Determine the unit rate, expressed in miles per hour.

Exercises

1. For Anthony's birthday, his mother is making cupcakes for his 12 friends at his daycare. The recipe calls for $3\frac{1}{3}$ cups of flour. This recipe makes $2\frac{1}{2}$ dozen cupcakes. Anthony's mother has only 1 cup of flour. Is there enough flour for each of his friends to get a cupcake? Explain and show your work.

2. Sally is making a painting for which she is mixing red paint and blue paint. The table below shows the different mixtures being used.

Red Paint (Quarts)	Blue Paint (Quarts)
$1\frac{1}{2}$	$2\frac{1}{2}$
$2\frac{2}{5}$	4
$3\frac{3}{4}$	$6\frac{1}{4}$
4	$6\frac{2}{3}$
1.2	2
1.8	3

- a. What is the unit rate for the values of the amount of blue paint to the amount of red paint?
- b. Is the amount of blue paint proportional to the amount of red paint?
- c. Describe, in words, what the unit rate means in the context of this problem.

Lesson Summary

A fraction whose numerator or denominator is itself a fraction is called a **complex fraction**.

Recall: A **unit rate** is a rate, which is expressed as $\frac{A}{B}$ units of the first quantity per 1 unit of the second quantity for two quantities A and B .

For example: If a person walks $2\frac{1}{2}$ miles in $1\frac{1}{4}$ hours at a constant speed, then the unit rate is

$$\frac{2\frac{1}{2}}{1\frac{1}{4}} = \frac{\frac{5}{2}}{\frac{5}{4}} = \frac{5}{2} \cdot \frac{4}{5} = 2. \text{ The person walks 2 mph.}$$

Problem Set

- Determine the quotient: $2\frac{4}{7} \div 1\frac{3}{6}$
- One lap around a dirt track is $\frac{1}{3}$ mile. It takes Bryce $\frac{1}{9}$ hour to ride one lap. What is Bryce's unit rate, in miles, around the track?
- Mr. Gengel wants to make a shelf with boards that are $1\frac{1}{3}$ feet long. If he has an 18-foot board, how many pieces can he cut from the big board?
- The local bakery uses 1.75 cups of flour in each batch of cookies. The bakery used 5.25 cups of flour this morning.
 - How many batches of cookies did the bakery make?
 - If there are 5 dozen cookies in each batch, how many cookies did the bakery make?
- Jason eats 10 ounces of candy in 5 days.
 - How many pounds will he eat per day? (Recall: 16 ounces = 1 pound)
 - How long will it take Jason to eat 1 pound of candy?