

Lesson 23: Problem Solving Using Rates, Unit Rates, and Conversions

Classwork

- If work is being done at a constant rate by one person, and at a different constant rate by another person, both rates can be converted to their unit rates and then compared directly.
- “Work” can include jobs done in a certain time period, rates of running or swimming, etc.

Example 1: Fresh-Cut Grass

Suppose that on a Saturday morning you can cut 3 lawns in 5 hours, and your friend can cut 5 lawns in 8 hours. Who is cutting lawns at a faster rate?

$$\frac{3 \text{ lawns}}{5 \text{ hours}} = \frac{\quad \text{lawns}}{1 \text{ hour}}$$

$$\frac{5 \text{ lawns}}{8 \text{ hours}} = \frac{\quad \text{lawns}}{1 \text{ hour}}$$

Example 2: Restaurant Advertising

$$\frac{\quad \text{menus}}{\quad \text{hours}} = \frac{\quad \text{menus}}{1 \text{ hour}}$$

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Example 3: Survival of the Fittest

$$\frac{\underline{\hspace{1cm}}}{\underline{\hspace{1cm}}} \frac{\text{feet}}{\text{seconds}} = \frac{\underline{\hspace{1cm}}}{1} \frac{\text{feet}}{\text{second}}$$

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Example 4: Flying Fingers

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Lesson Summary

- Rate problems, including constant rate problems, always count or measure something happening per unit of time. The time is always in the denominator.
- Sometimes the units of time in the denominators of the rates being compared are not the same. One must be converted to the other before calculating the unit rate of each.

Problem Set

1. Who walks at a faster rate: someone who walks 60 feet in 10 seconds or someone who walks 42 feet in 6 seconds?
2. Who walks at a faster rate: someone who walks 60 feet in 10 seconds or someone who takes 5 seconds to walk 25 feet? Review the lesson summary before answering.
3. Which parachute has a slower decent: a red parachute that falls 10 feet in 4 seconds or a blue parachute that falls 12 feet in 6 seconds?
4. During the winter of 2012–2013, Buffalo, New York received 22 inches of snow in 12 hours. Oswego, New York received 31 inches of snow over a 15-hour period. Which city had a heavier snowfall rate? Round your answers to the nearest hundredth.
5. A striped marlin can swim at a rate of 70 miles per hour. Is this a faster or slower rate than a sailfish, which takes 30 minutes to swim 40 miles?
6. One math student, John, can solve 6 math problems in 20 minutes while another student, Jaquane, can solve the same 6 math problems at a rate of 1 problem per 4 minutes. Who works faster?