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

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

Classwork

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?

|  |  |
| --- | --- |
| $$\frac{3 lawns}{5 hours}=\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_ lawns}{1 hour}$$ | $$\frac{5 lawns}{8 hours}=\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_ lawns}{1 hour}$$ |

Example 2: Restaurant Advertising

|  |  |
| --- | --- |
| $$\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_ menus}{\\_\\_\\_\\_\\_\\_\\_\\_\\_ hours}=\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_ menus}{1 hour}$$ | $$\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_ menus}{\\_\\_\\_\\_\\_\\_\\_\\_\\_ hours}=\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_ menus}{1 hour}$$ |

Example 3: Survival of the Fittest

|  |  |
| --- | --- |
| $$\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_ feet}{\\_\\_\\_\\_\\_\\_\\_\\_\\_ seconds}=\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_ feet}{1 second}$$ | $$\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_ feet}{\\_\\_\\_\\_\\_\\_\\_\\_\\_ seconds}=\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_ feet}{1 second}$$ |

Example 4: Flying Fingers

|  |  |
| --- | --- |
| $$\frac{ }{ }=\frac{ }{ }$$ | $$\frac{ }{ }=\frac{ }{ }$$ |

Lesson Summary

* 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 two rates are not the same. One must be converted to the other before calculating the unit rate of each.
* Dividing the numerator by the denominator calculates the unit rate; this number stays in the numerator. The number in the denominator of the equivalent fraction is always 1.

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 these 6 math problems in 20 minutes while another student, Juaquine, can solve them at a rate of 1 problem per 4 minutes. Who works faster?