

Unit 4 Worksheet 5
Applied Problems with Rational Equations

Name: _____
Date: _____ **Per:** _____

1. Aubrey can wash all the windows of a retail store in 6 hours. Maxwell can wash all the windows of the same retail store in 9 hours.
 - a) Write an equation that can be used to find the time t , in hours, it would take Aubrey and Maxwell to wash all the windows of the retail store together.

 - b) Solve the equation for t that you wrote in part a)

2. Der can wash all the dishes in the house in 20 minutes. Her brother Yashua can wash all the dishes in the house in 30 minutes.
 - a) Write an equation that can be used to find the time t , in minutes, it would take Der and Yashua to wash all dishes in the house together.

 - b) Solve the equation for t that you wrote in part a)

3. A group of friends decide to evenly divide the \$72 cost of watching a premiere boxing match on pay-per-view TV. Initially, there are x friends, but then 3 friends decide not to watch the boxing match and spend their money to see, Star Wars: Episode 23: The Neverending Force, at the movie theatre instead. This causes each remaining friend to have to each pay \$2 more.
 - a) Create an equation that represents the situation and can be used to solve for x .

 - b) Use the equation you created in part a) to solve for x , the initial number of friends.

4. A group of college students rent a large house to live in and agree to evenly divide the \$1200 monthly rent. Initially, there are n college students, but then 5 additional college students decide to join the group, causing each college student to pay \$40 less per month.
 - a) Create an equation that represents the situation and can be used to solve for n .

 - b) Use the equation you created in part a) to solve for n the initial number of college students.

5. The density, D , of an object is defined as $D = \frac{M}{V}$ where M represents the mass of the object, and V represents the volume of the object. Solve this equation for V .
6. Suppose a basketball player has a shooting percentage, P , that is inversely proportional to the square root of her distance from the basket, d according to the equation $P = \frac{k}{\sqrt{d}}$ where k is the proportionality constant. Solve this equation for d .
7. Joule's Law states that $P = \frac{E^2}{R}$ where P is the power in watts, E is the voltage in volts, and R is the resistance in ohms. Solve this equation for E .
8. Newton's law of universal gravitation, $F = \frac{Gm_1m_2}{r^2}$, measures the force of gravity between two masses m_1 and m_2 , where r is the distance between the centers of the masses, and G is universal gravitational constant. Solve this equation for G .
9. Consider the rational equation $\frac{1}{R} = \frac{1}{x} + \frac{1}{y}$. Solve this equation for R and simplify.
10. Consider an ecosystem of rabbits in a park that starts with 10 rabbits and can sustain up to 60 rabbits. An equation that roughly models this scenario is $P(t) = \frac{60}{1 + \frac{5}{t+1}}$, where $P(t)$ represents the rabbit population in year t of the study.
- What is the rabbit population in year 10? Round your answer to the nearest whole rabbit.
 - Solve this equation for t . Describe what this equation represents in the context of this problem.
 - At what time does the population reach 50 rabbits?