

LESSON 7.5 Assignment

Name _____ Date _____

The Breaking Point
Using Rational Functions to Solve Problems

1. Fernando is making a homemade bubble solution to use with his new bubble blowing wand. He is filling a 20-ounce bottle with a mixture of water and dish detergent.
 - a. Write an expression to represent the ratio of water to dish detergent if he completely fills the 20-ounce bottle. Let w represent the number of ounces of water in the solution.

 - b. Fernando reads in the bubble wand instruction manual that the optimum ratio of water to dish detergent is $\frac{3}{5}$. Determine the number of ounces of water and the number of ounces of dish detergent Fernando must use to completely fill the 20-ounce bottle with the optimum mixture. Explain your reasoning.

 - c. After filling the 20-ounce bottle with a $\frac{3}{5}$ ratio of water to dish detergent, Fernando discovers that he has misread the instructions. The instructions actually call for a $\frac{5}{3}$ ratio of water to dish detergent. Fernando doesn't want to waste the bubble solution he has, so he dumps it into a large bucket. He decides to add water to the solution until he has achieved the correct ratio. Write an expression to represent the ratio of water to dish detergent when Fernando adds x ounces of water to his original solution. Determine the number of ounces of water he must add to achieve the correct ratio.

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2. Marcella is a member of a backgammon club. She has won 605 out of her 968 matches for a winning percentage of 62.5%. Marcella hopes to get her winning percentage to at least 65% by her 1000th match. Can Marcella achieve a winning percentage of 65% by her 1000th match? Determine the minimum number of total matches Marcella would have to play in order to have a chance to achieve a winning percentage of at least 65%. Explain your reasoning.

3. Harvey must purchase 4 new security lights for his company's parking lot. His first option is to purchase metal halide lights that cost \$150 each. Each metal halide light uses 90 kilowatt hours of electricity per month. His second option is to purchase high-efficiency LED lights that cost \$400 each. Each LED light uses 30 kilowatt hours of electricity per month. The cost of electricity is \$0.10 per kilowatt hour.
 - a. Write expressions to represent the average monthly cost associated with each option.

 - b. Determine when the average monthly cost of the second option will be less than the average monthly cost of the first option. Explain your reasoning.

 - c. As the number of months increases, what does the average monthly cost of the second option approach? Explain your reasoning.