

Accelerated 65 - 95 HW 34 (R 4.4b) Applications of Solving Rational Equations

Name: _____

87. Suppose that cars are arriving randomly at a construction zone and the flag person can instruct x drivers per hour. If cars arrive at an average rate of 80 cars per hour, the average time T in minutes for each driver to wait and talk to the flag person is given by the formula

$$T(x) = \frac{1}{x - 80}$$

where $x > 80$. How many drivers per hour should the flag person be able to instruct to keep the average wait to 0.5 minute?

89. Suppose that a person with a push mower can mow a large lawn in 5 hours, whereas the same lawn can be mowed with a riding mower in 2 hours. How long will it take to mow the lawn if both mowers are used at the same time?

91. Before a new product such as a mobile phone is released, there is usually a time period when people test it to find any problems. After several people have tested a product, most problems are found and fixed. The rational function

$$f(x) = \frac{100x}{x+1}, 0 \leq x \leq 20$$

approximates the percentage of the problems that are found after x testers have used a new product.

- a. Calculate $f(3)$. Interpret your answer. b. How many testers are necessary to find 95% of glitches?

93. The top picks in the NFL draft are often paid high salaries. However, compared to the top draft picks, lower picks often receive considerably lower salaries. The following function S Approximates the percentage of salary that draft pick x receives compared to the number one draft pick's salary.

$$S(x) = \frac{500}{x+4}$$

- a. Evaluate $S(36)$ and interpret your answer. b. Determine the pick that receives 20% of the number one pick's salary.

95. Suppose that a large pump can empty a swimming pool in 40 hours and that a small pump can empty the same pool in 70 hours. How long will it take to empty the pool if both pumps are working together?

97. The winner of a 5-mile race finishes 7.5 minutes ahead of the second-place runner. On average, the winner ran 2 miles per hour faster than the second-place runner. Find the average running speed for each runner.

99. In still water a tugboat can travel 15 miles per hour. It travels 36 miles upstream and then 36 miles downstream in a total time of 5 hours. Find the speed of the current.

101. When there is a 50-mile-per-hour wind, an airplane can fly 675 miles with the wind in the same time that it can fly 450 miles against the wind. Find the speed of the plane when there is no wind.

103. It takes one employee 3 hours longer to mow a football field than it does a more experienced employee. Together they can mow the grass in 2 hours. How long does it take for each person to mow the football field working alone?

105. One person can walk 1 mile per hour faster than another person. The faster person can walk 12 miles in the time it takes the slower person to walk 9 miles. What is the walking speed of each person?

107. An inlet pipe can fill a pool in 60 hours, whereas an outlet pipe can empty the pool in 40 hours. If both pipes are left open, how long will it take to empty the pool if the pool is full initially?