Lesson 1.4.3: Problem Solving Involving Rational Algebraic Expressions

Rational Equation: an equation that contains one or more rational expressions. It is an equality of two ratios.

How to Solve Rational Equations:

1. Determine which values of the variable are not permissible in the expression.
2. Determine the LCD of all rational expressions.
3. Multiply both sides of the equation by the LCD.
4. Simplify the equation by removing the parenthesis and combining similar terms.
5. Solve the equation resulting from step 4.
6. Check for extraneous solution (the value obtained in solving an equation which does not satisfy the equation).

How to Solve Problems Involving Rational Algebraic Expressions:

1. Identify the quantity being asked in the problem.
2. Use the facts of the problem to form an equation.
3. Solve the equation.
4. Check and interpret the answer.

Practice Exercises 1.4.3

Solve each problem completely.

1. Shaina can clean their house in 3 hours and Ronnie can do it in 4 hours. How long will it take them cleaning if they will work together?
2. The ratio of an angle to its complement is $\frac{2}{3}$. Find the angle.
3. The Jameson river in New Gogi has a current of 3 mph. A local boat charter takes as long to go 12 miles downstream (with the current) as to go 8 miles upstream (against the current). What is the speed of the boat in still water?
4. A local brewery has a vat that can be completely filled with beer from the inlet pipe in 60 minutes. The outlet pipe can completely drain a full vat in 80 minutes. If for some reason, both pipes are left open, how long would it take to completely fill an empty vat?
5. Working alone, it takes Steve 11 hours to complete a restoration project on a truck. Jacob can perform the same task in 110 hours. How long would it take if they worked together?

Activity 1.4.3

1. Working alone, it takes Emily 20 hours to clean a warehouse. Ashley can clean the same warehouse in 5 hours. How long would it take Emily and Ashley to clean the warehouse if they worked together?
2. A local swimming pool contains two pipes. An inlet pipe, which fills the pool and an outlet pipe, which drains the pool. The inlet pipe can completely fill an empty swimming pool in 3 hours. The outlet pipe can drain a full pool in 12 hours. If both pipes are turned on by mistake, how long will it take to fill an empty pool?
3. Sandra can paint a kitchen in 6 hours and Roger can paint the same kitchen in 7 hours. How long would it take for both working together to point the kitchen?
4. Bryan, a high school janitor can wax the floor in 4 hours. His assistant, Larry, would take 6 hours to perform the same job. How long would it take them to wax the floor if they work together?
5. Jason's car uses 20 gallons of gas to travel 400 miles. If Jason currently has 7 gallons of gas in his car, how much gas is needed to travel 200 miles?

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