Section 4.5 - Solving Rational Equations

Rational Equation

- an equation that contains at least one rational expression.

For example:

$$x = \frac{x-3}{x+1}$$
 and $\frac{x}{4} - \frac{7}{x} = 3$

To Solve a Rational Equation:

1. Factor each denominator

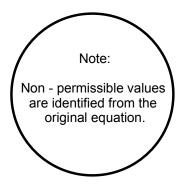
- 2. Identify the non permissible values
- Method 1: Multiply both sides of the equation by the LCD OR

Method 2: Add/Subtract fractions by obtaining LCD to get a single fraction on both sides of the equation and then equate numerators.

- 4. Solve the resulting linear or quadratic equation
- 5. Check your answers for extraneous roots

Example 1:

Solve:
$$\frac{x}{4} - \frac{7}{x} = 3$$



Example 2: (ex. 2, p. 254)

Solve for x: $\frac{18}{x^2 - 3x} = \frac{6}{x - 3} - \frac{5}{x}$

Example 4:

Solve:	3x-5	$\frac{2x+2}{2}$	x-3
Solve.	$x^2 + 4x + 3$	$\frac{1}{x+3}$	$\frac{1}{x+1}$

Besides factoring, we may have to use the Quadratic Formula to solve for the variable in a trinomial.

Quadratic Formula:
Recall:
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Example 3:

Solve for x: $3x^2 + 4x - 6 = 0$

Your Turn:

1. Solve for x:
$$\frac{2}{a+2} - \frac{a^2+4}{a^2-4} = \frac{a}{2-a}$$

Practice Questions:

p. 258, Section 4.5 Worksheet

Part 2: Word Problems

Example 1:

The sum of a number and its reciprocal is $\frac{5}{2}$. Determine the number.

Example 2:

One positive integer is 5 more than the other. When the reciprocal of the larger number is subtracted from the reciprocal of the smaller the

result is $\frac{5}{14}$. Find the two integers.

Example 3:

Sherry can mow a lawn in 5 hours. Terry can mow the same lawn in 4 hours. Determine how long it would take to mow the lawn if Sherry and Terry worked together.

	Time to mow lawn	Fraction of lawn mowed in 1 hour
Sherry		
Terry		
Together		

Example 4:

Gerard takes 5 hours longer than Hubert to assemble a play set. If Gerard and Hubert worked together, they could assemble the play set in 6 hours. Determine how long it takes each person to assemble the play set if they worked alone.

	Time	Fraction of time in 1 hour
Gerard		
Hubert		
Together		

Example 5:

A skiing club is going on a skiing trip that costs 1500 total for bussing. If 10 non-members are allowed to go, the price per person drops by 5. If x represents the number of members and the situation is modelled by

$$\frac{1500}{x} - \frac{1500}{x+10} = 5$$

algebraically determine how many members there are.

Example 6:

Priddle Inc. is having a Christmas party for all of its employees. Initially, all employees agree to attend. The cost of the catering is \$1800, which is to be divided amongst all people who attend the party. At the last minute, 30 people decide not to come, increasing the cost per person by \$2. If x represents the number of employees and the situation is modelled by

$$\frac{1800}{x-30} - \frac{1800}{x} = 2$$

algebraically determine the number of people who are employed at Priddle Inc.

Practice Questions:

p. 259, #10,11,12 + Worksheet