6.4 Solving Rational Equations

To solve Rational Equations

1. Factor where possible

2. State restrictions

3. Multiply all rational terms by the lowest common denominator (on both sides).

→ new terms should all be simplified (no more fractions)

4. Algebraically solve for x

→ x^2 terms should be factored (or use quadratic formula)

Example 1: Solve for x

a.) $\frac{x}{3} - \frac{2}{x} = \frac{x+6}{3}$

b.) $\frac{4}{x-3} = \frac{24}{2x-6}$

c.) $\frac{2}{x-3}+\frac{3}{x}=2$

d.) $\frac{8}{x+3}-\frac{6}{x-1}=-3$

e.) $\frac{3x}{x+1}-\frac{x}{x-1}=\frac{2x+3}{x+1}$

f.) $\frac{x-3}{x-4}+\frac{3x-5}{x-3}=x+2$

g.) $\frac{2x}{x-1}-\frac{4}{3-x}=\frac{5x^2-7}{x^2-4x+3}$

h.) $\frac{3x}{x+2}-\frac{5}{x-3}=-\frac{25}{x^2-x-6}$

Use a table to organize information to solve word problems.

Note: $time = \frac{distance}{rate}$

Example 2: Use a rational Equation to solve a problem

A roundtrip boat ride from Vancouver to Prince Rupert is 980 km in both directions. The total time of the trip was 17 hours, but the return trip was 12 km/hour slower than the departing speed. How fast was the average speed of the boat leaving Vancouver to Prince Rupert?

Example 3: "Work" Problems Formula

$$\frac{1}{t_1} + \frac{1}{t_2} = \frac{1}{t_{total}}$$

Where

t_1 is the time taken by the first person to complete the task

t_2 is the time taken by the 2nd person to complete the task

t_{total} is the total time to complete the task

a.) Peter can mow the lawn in 40 minutes and John can mow the lawn in 60 minutes. How long will it take for them to mow the lawn together?

b.) A tank can be filled by pipe A in 3 hours and by pipe B in 5 hours. When the tank is full, it can be drained by pipe C in 4 hours. if the tank is initially empty and all three pipes are open, how many hours will it take to fill up the tank?

HW p. 348 #2-5, 7, 8, 12, 14

6.4 Worksheet