

Mr. Ward Answer Key

Rational Equations/Inequalities

Definition – A **rational equation** is an equation that contains one or more *rational expressions*.

Recall that a *rational expression* was just a polynomial divided by a polynomial.

Series of Steps: ** (REMEMBER THESE!!!) **

1. "Clear out" fractions

- Multiply every term by the Least Common Denominator (LCD)

2. Simplify

- Distribute or FOIL
- Add/Subtract like parts
- Set = to zero (if quadratic) so it can be factored

3. Solve

4. Check "extraneous" solutions

Example #1

$$\frac{x}{1} + \frac{8}{x} = \frac{6}{1}$$

Step 1: "Clear out" fractions

What is the LCD? x

Multiply every term by the LCD.

$$\frac{x}{1}(\underline{x}) + \frac{8}{x}(\underline{x}) = \frac{6}{1}(\underline{x}) \rightarrow x^2 + 8 = 6x$$

Step 2: Simplify

We have a quadratic term so we're going to want to set everything = to zero so we can factor it.

$$x^2 + 8 = 6x \rightarrow \frac{x^2 - 6x + 8}{-6x \quad -6x} \rightarrow (x - 4)(x - 2)$$

Step 3: Solve

Set each factor = to zero and solve for x.

$$x = \underline{4} \text{ and } x = \underline{2}$$

Step 4: Check "extraneous" solutions

Do our answers for x cause the denominators of the original equation to be zero?

If you are not sure, plug each value we got for x into the original equation and see if a denominator comes out to be zero.

In this case it does not, so we say there are no extraneous solutions.

Practice Problem #1

$$\frac{2x-5}{x-8} + \frac{x}{2} = \frac{11}{x-8}$$

Step 1: "Clear out" fractions

What is the LCD? $2(x-8)$

$$\frac{2x-5(\cancel{2(x-8)})}{\cancel{x-8}} + \frac{x(\cancel{2(x-8)})}{\cancel{2}} = \frac{11(\cancel{2(x-8)})}{\cancel{x-8}}$$

$$4x - 10 + x^2 - 8x = 22$$

Step 2: Simplify

$$x^2 - 4x - 10 = 22$$

$$x^2 - 4x - 32 = 0$$

$$(x-8)(x+4) = 0$$

Step 3: Solve

$$x = 8 \quad x = -4$$

Step 4: Check "extraneous" solutions

Do our answers for x cause the denominators of the original equation to be zero?

If you are not sure, plug each value we got for x into the original equation and see if a denominator comes out to be zero.

Yes or No? Yes

So we would say that " $x = 8$ is an extraneous solution".

Come show me your steps and final answers so I know you're on the right track!!

Assignment: pg 605 #2-10, 19-27