

Solving Rational Equations
Springboard 30.1

3.20.17

Warm-up

Simplify

$$1) \frac{2x^2y^3}{4x} \cdot \frac{3xy}{8x^4y^5} =$$

$$2) \frac{2x^2-16}{x^2-4} - \frac{x+4}{x+2} =$$

A **Rational Equation** is an equation that contains one or more rational expressions.

I do:

Example:

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

$$x^2 + 8 = 6x$$

$$x^2 - 6x + 8 = 0$$

$$(x - 4)(x - 2) = 0$$

$$x=4,2$$

Check your answers

$$4 + \frac{8}{4} = 6$$

$$4 + 2 = 6$$

$$2 + \frac{8}{2} = 6$$

$$2 + 4 = 6$$

We do:

$$x - \frac{x}{5} = 2$$

You do:

$$\frac{x}{4} = x + 1$$

I do:

Example 2:

$$\frac{3x}{x-3} = \frac{2x+3}{x-3}$$

Cancel out common denominators	$\frac{3x}{x-3} (x-3) = \frac{2x+3}{x-3} (x-3)$
Solve for x	$3x = 2x + 3$ $x = 3$
Check solutions	$\frac{3(3)}{(3)-3} = \frac{2(3)+3}{(3)-3}$ $\frac{9}{0} = \frac{9}{0}$ Undefined No solution

We do:

$$\frac{x^2}{x+1} = \frac{-3x-2}{x+1}$$

Example 3:

$$\frac{2x - 9}{x - 7} + \frac{x}{2} = \frac{5}{x - 7}$$

Find common denominator	$(2)(x - 7)$
Convert the fractions	$\frac{(2x - 9)(2)}{(x - 7)2} + \frac{x(x - 7)}{2(x - 7)} = \frac{(2)5}{2(x - 7)}$ $\frac{4x - 18}{2(x - 7)} + \frac{x^2 - 7x}{2(x - 7)} = \frac{10}{2(x - 7)}$
Cancel out denominators	$(4x - 18) + (x^2 - 7x) = 10$
Solve for x	$(4x - 18) + (x^2 - 7x) = 10$ $x^2 - 3x - 18 = 10$ $x^2 - 3x - 28 = 0$ $(x - 7)(x + 4) = 0$ $x = 7, -4$
Check Solutions	<p>7 is an extraneous.</p> <p>$x = -4$.</p>

We try:

$$1) \frac{10}{3} = \frac{4}{x} + 2$$

$$2) \frac{6}{x} + \frac{5}{x} = -\frac{7}{4}$$

You Try on whiteboards :
Odd talk, even write

$$1) 4 + \frac{1}{x} = \frac{10}{2x}$$

$$2) \frac{14}{z} = 9 - z$$

$$3) \frac{1}{a-7} = 3$$

Pair Share Summary

1) Take 2 minutes and quietly write 3 specific things you learned today on rational functions. Be prepared to share with your partner.

An example is (Find common denominator before adding rational expressions)

2) When the teacher tells you, the odd row will take 1 minute and share with your partner about what you wrote down.

3) When the teacher tells you, the even row will then take 1 minute to share with their partner about what they wrote down.

4) The teacher will call on students to share what teach other wrote.