

 Check Skills You'll Need

Find the LCD of each pair of fractions.

1. $\frac{1}{3t}, \frac{1}{5t^2}$

$$3t, 5t^2$$
$$3 \cdot 5t^2$$

2. $\frac{x}{2}, \frac{3x}{8}$

3. $\frac{4}{3h^2}, \frac{2h}{h^3}$

4. $\frac{4}{y+2}, \frac{3}{y-1}$

5. $\frac{z}{2z+1}, \frac{1}{z}$

6. $\frac{1}{k+2}, \frac{3k}{k^2-4}$

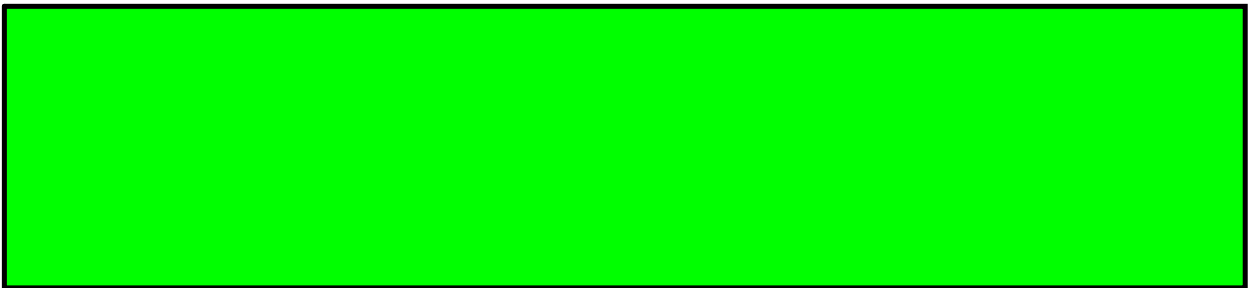
9-6**Solving Rational Equations***Day 22***What You'll Learn**

- To solve rational equations
- To use rational equations in solving problems



Extraneous solutions can be introduced when you multiply both sides of an equation by the same algebraic expression. An extraneous solution is a solution of the derived equation, but not of the original equation.

You must check all solutions of the derived equation in the original equation to find whether any of them are not solutions of the original equation.



1 EXAMPLE Solving Rational Equations

Solve $\frac{5}{2x-2} = \frac{15}{x^2-1}$. Check each solution.

$\frac{5}{8} = \frac{15}{24} \checkmark$

First Cross Multiply since it is a proportion, then Solve.

$5(x^2-1) = 15(2x-2)$

$5x^2 - 5 = 30x - 30$
 $+30 \quad -30x + 30$
 $-30x$

$5x^2 - 30x + 25 = 0$

$5(x^2 - 6x + 5)$
 $(x-5)(x-1)$

solve using quad. formula or factoring

$x = 5$ and 1


extraneous

Then Check for Extraneous Solutions.

$x = 5$

Check

Pull

 **Quick Check** 1 Solve each equation. Check each solution.

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

$$-4(x+2) = 3 \cdot 5(x+2)$$

$$= 15(x+2)$$

$$\begin{array}{r} -4x - 8 = 15x + 30 \\ +4x - 30 \quad +4x - 30 \end{array}$$

$$\frac{-38}{19} = \frac{19x}{19}$$

$$-2 = x$$

No solution
extraneous

Solving Rational Equations that are NOT Proportions!!!

When an equation has a sum or difference of two rational expressions, you can use the least common denominator (LCD) to simplify the equation.

2 EXAMPLE Solving Rational Equations

Solve $\frac{1}{2x} - \frac{2}{5x} = \frac{1}{2}$.

LCD = 10x


$$\frac{5}{10x} \cdot \frac{1}{2x} + \frac{-2 \cdot 2}{5x} = \frac{1}{2} \cdot \frac{5}{10x}$$

$$5 + -4 = 5x$$

$$\frac{1}{5} = \frac{5x}{5}$$

$$\frac{1}{5} = x$$

STEPS:

- Find the LCD 
- Multiply each term on both sides of the equation by the LCD
- After this step, the fractions should be gone, solve the remaining equation.
- Check for extraneous solutions.

 Quick Check

$$LCD = x(x+1)$$

2 Solve $\frac{4}{x} + \frac{-3}{x+1} = 1$. Check your solution.

$$\cancel{x(x+1)} \frac{4}{\cancel{x}} + \frac{-3 \cancel{x(x+1)}}{\cancel{x+1}} = 1 \cancel{x(x+1)}$$

$$4x + 4 - 3x = x^2 + 1x$$

$$\cancel{1x} + 4 = x^2 + \cancel{1x}$$

$$\sqrt{4} = \sqrt{x^2}$$

$$\pm 2 = x$$

$d = r \cdot t$	distance	rate
carlos	40mi	R
paul	15mi	R-20

$$\frac{d}{r} = \frac{r}{r} \cdot t$$

$$\frac{40}{R} = \frac{15}{R-20}$$

Carlos
32 mi/hr
Paul
12 mi/hr

$$15R = 40(R-20)$$

$$15R = 40R - 800$$

$$-40R \quad -40R$$

$$\frac{-25R}{-25} = \frac{-800}{-25}$$

$$R = 32$$

(25)

	time	Volume Filled per hour
1st pump	4 HRS	$\frac{x}{4}$
2nd pump	3 HRS	$\frac{x}{3}$

$$12 \cdot \frac{x}{4} + \frac{x \cdot 12}{3} = 12 \leftarrow \text{eq.}$$

$$3x + 4x = 12$$

$$\frac{7x}{7} = \frac{12}{7} \quad x = \frac{12}{7} \text{ HR}$$