

# 1.2B Rational Equations

Learning Target:

- Solve rational equations with variables in the denominators

- A **rational equation** is an equations containing one or more rational expressions.
- When **solving** rational equations, we must determine the **excluded values**.

## **Steps for Solving**

1. Determine the LCD
2. Multiply both sides by the LCD
3. Simplify each side
4. Isolate the variable and solve

# Solve

Example 4:

$$\frac{1}{x} = \frac{1}{5} + \frac{3}{2x}$$

$$\overset{10}{\cancel{(10x)}} \frac{1}{x} = \overset{2x}{\cancel{(10x)}} \frac{1}{5} + \overset{5}{\cancel{(10x)}} \frac{3}{2x}$$

$$10 = 2x + 15$$

$$-5 = 2x$$

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

Determine the LCD:  $10x$

Multiply both sides by the LCD

Simplify

Subtract 15

Divide by 2

# Solve

Your Turn 4:

$$\frac{5}{2x} = \frac{17}{18} - \frac{1}{3x}$$

$$\overset{9}{\cancel{(18x)}} \frac{5}{\cancel{2x}} = \overset{x}{\cancel{(18x)}} \frac{17}{\cancel{18}} - \overset{6}{\cancel{(18x)}} \frac{1}{\cancel{3x}}$$

$$45 = 17x - 6$$

$$51 = 17x$$

$$3 = x$$

Determine the LCD:  $18x$

Multiply both sides by the LCD

Simplify

Add 6

Divide by 17

# Solve

Example 5:  $\frac{x}{x-3} = \frac{3}{x-3} + 9$

$$\overset{1}{\cancel{(x-3)}} \frac{x}{\cancel{x-3}} = \overset{1}{\cancel{(x-3)}} \frac{3}{\cancel{x-3}} + \cancel{(x-3)} \frac{9}{1}$$

$$x = 3 + 9x - 27$$

$$x = 9x - 24$$

$$-8x = -24$$

$$x = 3$$

Determine the LCD:  $x - 3$

Multiply both sides by the LCD

Simplify

Combine like terms

Subtract 9x

Divide by -8

# Solve

Your Turn 5:

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

$$3(x-2) \frac{x}{x-2} = 3(x-2) \frac{2}{x-2} - 3(x-2) \frac{2}{3}$$

$$3x = 3(2) - 2(x-2)$$

$$3x = 6 - 2x + 4$$

$$3x = -2x + 10$$

$$5x = 10$$

$$x = 2$$

Determine the LCD:  $3(x-2)$

Multiply both sides by the LCD

Simplify

Distribute and multiply

Combine like terms

Add 2x

Divide by 5

1.2B

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