

TOPIC: RATIONAL EQUATIONS

Intro to Rational Expressions

◆ A **rational equation** is an equation with a _____ in the _____ of a fraction.

► We can solve a rational equation by turning it into a _____ equation.

$$\begin{array}{c} \text{Rational Equation} \\ \hline \frac{1}{\underbrace{x-1}} = 12 \end{array}$$

◆ Solutions **CANNOT** be any value that makes a denominator _____; this is the _____.

EXAMPLE: Solve the rational equation.

$$\frac{x}{x-1} = \frac{7}{6} \quad x \neq \underline{\hspace{2cm}}$$

SOLVING RATIONAL EQUATIONS

- 1) Determine _____ by setting denom. = ____
- 2) Multiply by ____ to eliminate fractions
- 3) Solve linear equation
- 4) Check solution with restriction

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PRACTICE

Is the following a rational expression or equation?

(A)

$$\frac{17x + 1}{21x - 2}$$

[EXPRESSION | EQUATION]

(B)

$$\frac{3m}{m^2 - 9} = \frac{11}{2x + 13}$$

[EXPRESSION | EQUATION]

PRACTICE

Solve the following.

(A)

$$-\frac{3n}{n + 2} + \frac{2n}{4n + 8} = \frac{6}{8n + 16}$$

(B)

$$\frac{p^2}{p - 4} + \frac{4}{4 - p} = 1$$

EXAMPLE

Solve for the given variable in the following equations.

(A) Solve for M .

$$A = \frac{M - N}{k}$$

(B) Solve for d .

$$\frac{1}{d} = \frac{2}{p} + \frac{3}{q} + k$$

(C) Solve for S .

$$V = \frac{xF}{S + xs}$$

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Solution Equal to Restriction

EXAMPLE: Solve the rational equation.

$$\frac{x-5}{x-2} = \frac{-3}{x-2} + 6 \quad x \neq \underline{\hspace{2cm}}$$

SOLVING RATIONAL EQUATIONS

- 1) Determine restriction by setting denom. = 0
- 2) Multiply by LCD to eliminate fractions
- 3) Solve linear equation
- 4) Check solution with restriction

◆ If your answer is **equal** to the **restriction**, then there is _____, i.e. solution set = _____.

PRACTICE

Solve the equation.

(A)

$$\frac{2x+4}{x-1} = 5$$

(B)

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

(C)

$$\frac{-5}{x+4} - 3 = \frac{x-1}{x+4}$$