



No solution

if $x = 4 \Rightarrow$ denominator $= 0$

$x = 4$

$2x = 8$

$16 = 2x + 8$

$16 = 2(x + 4)$

$\frac{x-4}{(x-4)(x+4)}$

$\frac{x-4}{2} = \frac{x^2-16}{2(x+4)(x-4)}$ (1)
 $\frac{x-4}{2} = \frac{x-4}{2(x+4)}$ (2)

\therefore there is no solution

if $x = 3 \Rightarrow$ denominator $= 0$ (undefined)

$x = 3$

$3x = 2x + 3$

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

LCD: $x-3$

Extraneous Solutions

Solve Rational Equations

Steps:

- 1) Find Least Common Denominator
- 2) Multiply each term by the LCD to clear the denominator
- 3) Add or subtract numerators and distribute, if needed
- 4) Solve the equation
- 5) Check

LCD: 10

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

$x = 5(x+5)$

$x = 5x + 25$

$-4x = 25$

$x = \frac{-25}{4}$

LCD: $3x^2$

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

$x \cdot 1 + 5 = 3x$

$x + 5 = 3x$

$5 = 2x$

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

LCD: $(x+2)(x-3)$

$\frac{8}{x+2} + \frac{4}{1} = \frac{4x}{x-3}$

$8(x-3) + 4(x+2)(x-3) = 4x(x+2)$

$8x - 24 + 4x^2 - 4x - 24 = 4x^2 + 8x$

$4x^2 + 4x - 48 = 4x^2 + 8x$

$-4x - 48 = 0$

$-4x = 48$

$x = -12$

LCD: $x(x+4)$

$$1) \frac{x(x+4)x}{x+4} = \frac{x+6}{x} \cdot x(x+4)$$

$$x(x) = (x+6)(x+4)$$

$$x^2 = x^2 + 10x + 24$$

$$0 = 10x + 24$$

$$-24 = 10x$$

$$x = \frac{-24}{10} = \boxed{\frac{-12}{5}}$$

LCD: $2x(x-5)$

$$2) \frac{2x(x-5)1}{x-5} = \frac{7}{2x} \cdot 2x(x-5)$$

$$1(2x) = 7(x-5)$$

$$2x = 7x - 35$$

$$-5x = -35$$

$$\boxed{x = 7}$$

LCD: $8x$

$$3) \frac{8x \cdot 1}{1 \cdot 8} + \frac{8x \cdot 2}{1 \cdot x} = \frac{17}{8x} \cdot \frac{8x}{1}$$

$$1 \cdot x + 2(8) = 17$$

$$x + 16 = 17$$

$$\boxed{x = 1}$$

LCD: $6x$

$$4) \frac{1 \cdot 6x}{x} = \frac{6x \cdot x}{6} - \frac{5 \cdot 6x}{6}$$

$$1(6) = x(x) - 5(x)$$

$$6 = x^2 - 5x$$

$$0 = x^2 - 5x - 6$$

$$0 = (x-6)(x+1)$$

$$x-6=0 \quad x+1=0$$

$$x=6 \quad x=-1$$

$$x = \{6, -1\}$$

LCD: $(x+3)(x-2)$

$$5) \frac{(x+3)(x-2)5}{x-2} - \frac{(x+3)(x-2)3}{x+3} = \frac{24}{\frac{x^2+x-6}{(x+3)(x-2)}}$$

$$5(x+3) - 3(x-2) = 24$$

$$5x+15 - 3x+6 = 24$$

$$2x+21 = 24$$

$$2x = 3$$

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

- Factor denominator if possible
- Find LCD
- Multiply each numerator by LCD to clear denominator
- Check for extraneous solutions

LCD: $m(2m+5)$

$$7) \frac{m(2m+5)1}{2m+5} = \frac{m^2-4m-5}{\frac{m^2-4m-5}{m(2m+5)}} - \frac{1}{\frac{m^2-4m-5}{m(2m+5)}}$$

$$1(m) = m^2 - 4m - 5 - 1$$

$$m = m^2 - 4m - 6$$

$$0 = m^2 - 5m - 6$$

$$0 = (m-6)(m+1)$$

$$m = \{6, -1\}$$