

6.8 Equations Involving Fractions

An equation in which one or more terms is a fraction is called a fractional equation or rational equation.

We multiply the equation (every term, both sides)
by the least common denominator (nonzero quantity)
to clear the denominator.

LCD = 24

$$\frac{x}{12} + \frac{1}{8} = \frac{x+2}{6}$$

- ① Find the L.C.D.
- ② Multiply the equation by the L.C.D. to clear out denominators.
- ③ Check your solution in the original equation.

$$2x + 3 = 4x + 8$$

$$\begin{array}{r} 2x + 3 = 4x + 8 \\ -2x \quad -2x \\ \hline 3 = 2x + 8 \\ -8 \quad -8 \\ \hline -5 = 2x \\ \frac{-5}{2} = \frac{2x}{2} \end{array}$$

$$\frac{5-3x}{4} + \frac{3-5x}{8} = \frac{3}{2} - \frac{5x}{8}$$

LCD = 12

$$15 - 9x + 12 - 20x = 18 - 20x$$

$$\begin{array}{r} -29x + 27 = 18 - 20x \\ +20x \quad +20x \\ \hline -9x + 27 = 18 \end{array}$$

$$\begin{array}{r} -9x + 27 = 18 \\ -27 \quad -27 \\ \hline -9x = -9 \end{array}$$

$$\frac{-9x}{-9} = \frac{-9}{-9}$$

$$x = 1$$

$$\frac{\cancel{(2x-3)} x}{\cancel{2x-3}} = 4(2x-3) \quad 2\left(\frac{12}{7}\right) - 3$$

$$x = 8x - 12$$

$$-7x = -12$$

$$x = \frac{12}{7}$$

$$2(2x-3)$$

$$2x-3$$

$$2^2$$

$$2^2(2x-3) = \text{LCD}$$

$$\frac{\cancel{4(2x-3)} 3}{\cancel{4x-6}} + \frac{1}{4} = \frac{5}{\cancel{2(2x-3)}} \quad 2x-3$$

$$6 + 2x - 3 = 20$$

$$2x + 3 = 20$$

$$-3 \quad -3$$

$$\frac{2x}{2} = \frac{17}{2}$$

$$x = \frac{17}{2}$$

$$2\left(\frac{17}{2}\right) - 3$$

$$\frac{5x}{x+1} + \frac{2}{7} = \frac{3}{x+1}$$

$$\text{LCD} = x+1$$

$$5x + 2x + 2 = 3$$

$$7x = 1$$

$$x = \left(\frac{1}{7}\right)$$

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

$\frac{(x-1)(x+1)}{(x-1)(x+1)}$
 $\frac{(x-1)(x+1)}{(x-1)}$
 $\frac{(x+1)}{(x+1)}$

$$\text{LCD: } (x-1)(x+1)$$

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

$$4 = -x + 5$$

$$-1 = -x$$

$$1 = x$$

No solution

$$\frac{\cancel{(x+4)}\cancel{(x-4)}^9}{x^2 - 16} + \frac{\cancel{(x+4)}\cancel{(x-4)}^2}{\cancel{x-4}} = \frac{6}{\cancel{x+4}} \cancel{(x-4)}$$

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

$$9 + 2x + 8 = 6x - 24$$

$$\begin{array}{r} 17 = 4x - 24 \\ +24 \quad \quad +24 \end{array}$$

$$\frac{41}{4} = 4x$$

$$\frac{41}{4} \quad \sqrt{4}$$

$$\boxed{x = \frac{41}{4}}$$