

RATIONAL EQUATIONS

Ex1

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

$$1 \cdot (x+5) = 4 \cdot 5$$

$$\begin{array}{r} x+5 \\ -5 \\ \hline \end{array} = \begin{array}{r} 20 \\ -5 \\ \hline \end{array}$$

$$\boxed{x = 15}$$

$$\frac{a}{b} = \frac{c}{d}$$

$$\underline{\underline{a \cdot d = b \cdot c}}$$

Ex2

$$\frac{2}{x-1} = \frac{3}{x}$$

$$2 \cdot x = 3 \cdot (x-1)$$

$$\begin{array}{r} 2x \\ -3x \\ \hline \end{array} = \begin{array}{r} 3x-3 \\ -3x \\ \hline \end{array}$$

$$\frac{2x}{-1} = \frac{-3}{-1}$$

$$\boxed{x = 3}$$

check:

$$\frac{2}{(3)-1} \stackrel{?}{=} \frac{3}{(3)}$$

$$\frac{2}{2} \stackrel{?}{=} 1 \quad \checkmark$$

Ex3

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

$$5 \cdot (x+1) = -2(2x-3)$$

$$\begin{array}{r} 5x+5 \\ 4x \\ \hline \end{array} = \begin{array}{r} -4x+6 \\ 4x \\ \hline \end{array}$$

$$\begin{array}{r} 9x+5 \\ -5 \\ \hline \end{array} = \begin{array}{r} 6 \\ -5 \\ \hline \end{array}$$

$$\frac{9x}{9} = \frac{1}{9}$$

$$\boxed{x = 1/9}$$

Ex 4

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

$$\frac{2}{4x-5} = \frac{3}{1}$$

$$2 \cdot 1 = 3 \cdot (4x-5)$$

$$2 = 12x - 15$$

$$\frac{17}{12} = \frac{12x}{12}$$

$$\frac{17}{12} = \frac{12x}{12}$$

$$x = \frac{17}{12} = 1 \frac{5}{12}$$

Ex 5

$$\frac{3x}{x-5} = 5 - \frac{5}{x-5}$$

$(x-5)$ - c.d.

$$\cancel{(x-5)} \cdot \frac{3x}{\cancel{x-5}} = (x-5) \cdot \left(5 - \frac{5}{x-5} \right)$$

$$3x = \overbrace{(x-5) \cdot 5} - \cancel{(x-5)} \cdot \frac{5}{\cancel{x-5}}$$

$$3x = 5x - 25 - 5$$

$$3x = 5x - 30$$

$$-5x \quad -5x$$

$$\frac{-2x}{-2} = \frac{-30}{-2}$$

$$x = 15$$

Ex 6

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

$$\text{LCM} = (x-2) \cdot (3x-4)$$

$$\cancel{(x-2)}(3x-4) \cdot \frac{2x}{\cancel{x-2}} = (x-2)(3x-4) \cdot \left(\frac{1}{3x-4} + 2 \right)$$

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

$$(3x-4) \cdot 2x = (x-2) \cdot 1 + 2(x-2)(3x-4)$$

$$6x^2 - 8x = x - 2 + 2(3x^2 - 4x - 6x + 8)$$

$$6x^2 - 8x = \underline{x} - \underline{2} + 6x^2 - \underline{8x} - \underline{12x} + \underline{16}$$

$$6x^2 - 8x = 6x^2 - 19x + 14$$

$$-6x^2 \quad -6x^2$$

$$-8x = -19x + 14$$

$$19x = 19x$$

$$\frac{14x}{11} = \frac{14}{11}$$

$$\boxed{x = \frac{14}{11}}$$

Ex 7 $\frac{2}{x-3} + 4 = \frac{6}{x-3}$

$$(x-3) \left(\frac{2}{x-3} + 4 \right) = \cancel{(x-3)} \cdot \frac{6}{\cancel{x-3}}$$

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

$$2 + (x-3) \cdot 4 = 6$$

$$2 + 4x - 12 = 6$$

$$4x - 10 = 6$$

$$\frac{4x}{4} = \frac{16}{4}$$

$$\textcircled{x=4}$$