

# Solving Rational Equations (Day 2)

Ex 1

$$\frac{20}{3x-5} = \frac{5}{x-2}$$

$$20(x-2) = 5(3x-5)$$
$$20x - 40 = 15x - 25$$
$$5x = 15$$

check

$$\frac{20}{3(3)-5} \stackrel{?}{=} \frac{5}{3-2}$$
$$5 = 5 \checkmark$$

$$x = 3$$

Restrictions:  $\left\{ x \neq 2, \frac{5}{3} \right\}$

Ex 2

$$\frac{2}{3x} + \frac{1}{6} = \frac{4}{3x}$$

Option 1

$$\frac{2 \cdot 2}{2 \cdot 3x} + \frac{1 \cdot x}{6 \cdot x} = \frac{4 \cdot 2}{3x \cdot 2}$$

$$\frac{4}{6x} + \frac{x}{6x} = \frac{8}{6x}$$

$$4 + x = 8$$
$$x = 4$$

Option 2 LCD:  $6x$

$$6x \left( \frac{2}{3x} + \frac{1}{6} = \frac{4}{3x} \right)$$

$$\frac{12x}{3x} + \frac{6x}{6} = \frac{24x}{3x}$$

$$4 + x = 8$$

$$x = 4$$

Ex 3

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

Option 1

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

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

$$x+2 + 2x^2 - 8 = 3x^2 - 6x$$

$$0 = x^2 - 7x + 6$$

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

$$x = 1, 6$$

Restrictions  
 $x \neq 2, -2$

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

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

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

$$x = 1, 6$$

Ex 4

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

LCD:  $x(x-3)$

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

$$2x + x - 3 = (x-1)x$$

$$2x + x - 3 = x^2 - x$$

$$0 = x^2 - 4x + 3$$

$$0 = (x+3)(x-1)$$

$x = \cancel{3}, 1$   
Ex      ↑  
          Yay

Restrictions  
 $x \neq 3, 0$