

# Solving Rational Equations

Tuesday, December 3, 2019 2:07 PM

Review:  $\frac{3}{6} \left( \frac{x}{2} \right) + \frac{2}{6} \left( \frac{7}{3} \right) = \frac{5}{6}$

LCD = 6

$$3x + 14 = 5$$

$$\begin{array}{r} -14 \\ \hline 3x = -9 \\ \hline x = -3 \end{array}$$

eg  $\frac{2}{4x} \left( \frac{x}{2} \right) = \frac{5}{x} + \frac{2x+5}{4}$

$$2x^2 = 20 + 2x^2 + 5x$$

$$\begin{array}{r} -2x^2 \\ \hline 0 = 20 + 5x \\ -5x = 20 \\ \hline -5 \quad -5 \\ x = -4 \end{array}$$

- ① write nrv's  $\rightarrow x \neq 0$ .
- ② find LCD =  $4x$ .
- ③  $\times$  all terms by LCD
- ④ Linear or Quadratic?
- ⑤ solve
- ⑥ check ans. against nrv's

Try solve  $\left( \frac{3}{1} \right)^x - \left( \frac{6}{x} \right)^x = \left( \frac{x+8}{1} \right)^x \quad x \neq 0$

$$\begin{aligned} \rightarrow 3x - 6 &= x^2 + 8x \\ 0 &= x^2 + 5x + 6 \\ 0 &= (x+3)(x+2) \\ x &= -3, -2 \end{aligned}$$

$(x-3)(2x-5)$  ✓

Eg  $\frac{4(x-3)(2x-5)}{x-3} = \frac{5(x-3)(2x-5)}{2x-5}$  ✓  
 npv's  $x \neq 3, \frac{5}{2}$   
 LCD =  $(x-3)(2x-5)$

$$4(2x-5) = 5(x-3)$$

$$8x - 20 = 5x - 15$$

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

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

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

Try  $\frac{2x(x-4)}{x-4} = \frac{8(x-4)}{x-4} + \frac{1(x-4)}{x-4}$   $x \neq 4$

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

$$\begin{array}{r} -x \\ -x \end{array}$$

$$x = 4$$

NO SOLUTION

Eg  $\frac{3(x+3)(x-3)}{x+3} + \frac{4(x+3)(x-3)}{x^2-9} = \frac{1(x+3)(x-3)}{(x+3)(x-3)}$   $x \neq \pm 3$

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

$$3x - 9 + 4 = x^2 - 9$$

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

$$0 = (x-4)(x+1)$$

$$x = 4, -1$$

Try:  $\frac{3(x-5)(x+1)}{x-5} = \frac{3(x-5)(x+1)}{3(x-5)(x+1)}$

Try: Solve  $\frac{x \cancel{(x-5)}(x+1)}{x-5} - \frac{3 \cancel{(x-5)}(x+1)}{x+1} = \frac{30}{\cancel{x^2-4x-5} \cancel{(x-5)}(x+1)}$

$x \neq 5, -1$

$$x(x+1) - 3(x-5) = 30$$

$$x^2 + x - 3x + 15 = 30$$

$$x^2 - 2x - 15 = 0$$

$$(x-5)(x+3) = 0$$

$$x = \cancel{5}, -3$$

$$x = -3$$

eg  $\frac{4}{2x-1} = \frac{2}{x+3} \quad x \neq \frac{1}{2}, -3$

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

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

$$-4x \quad -4x$$

$$12 = -2 \text{ not true}$$

no solution.

Try  $\frac{\cancel{5} \cancel{2} \cancel{x} \cancel{(x-7)}}{x-7} - \frac{1 \cancel{2} \cancel{x} \cancel{(x-7)}}{2x} = \frac{9x+7}{\cancel{2x^2-14x}}$

$10x - (x-7) = 9x+7$

$9x + 7 = 9x + 7 \quad x \neq 0, 7$

$-9x \quad -9x$

$7 = 7$

$0 = 0$

$x \in \mathbb{R}$  except 0, 7.

Pg 581-587 # 3-14