

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Learning Goal 6.2**

Solving equations, identifying any non-permissible values and extraneous roots.

**Expressions**

vs.

**Equations**

- Simplify  
 BEDMAS  
 →

\*equal signs\*  
 - solve  
 ← BEDMAS

**Example** Solve the following rational equations. State any non-permissible values and/or extraneous roots.

a.  $\left( \frac{5}{1} = \frac{3x}{x} \right) x$  NPV:  $x \neq 0$   
 LCM(1, x) = x

$$5x = \frac{3x^2}{x}$$

$$\begin{array}{r} 5x \\ -3x \\ \hline -3x \end{array}$$

$$\frac{2x}{2} = \frac{0}{2}$$

$$x = 0$$

No Solutions!

c.  $x^2 \left( \frac{3}{1} + \frac{1}{x} = \frac{4}{x^2} \right)$  NPV:  $x \neq 0$   
 LCM(1, x, x<sup>2</sup>) = x<sup>2</sup>

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

$$\begin{array}{r} 3x^2 + x \\ -4 \\ \hline -4 \end{array}$$

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

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

$$3x(x-1) + 4(x-1) = 0$$

$$(x-1)(3x+4) = 0$$

Assignment

$$x = 1$$

$$3x + 4 = 0$$

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

b.  $\left( \frac{5}{2x} + \frac{3}{4} = \frac{9}{4x} \right) 4x$  NPV:  $x = 0$   
 LCM(2x, 4, 4x) = 4x

$$\begin{array}{r} 10 \\ 20x \\ \hline 2x \end{array} + \begin{array}{r} 3 \\ 12x \\ \hline 4 \end{array} = \begin{array}{r} 9 \\ 36x \\ \hline 4x \end{array}$$

$$\begin{array}{r} 10 \\ -10 \\ \hline 3x \end{array} = \begin{array}{r} 9 \\ -10 \\ \hline -10 \end{array}$$

$$\begin{array}{r} 3x \\ 3 \\ \hline -1 \\ -1 \\ \hline 3 \end{array}$$

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



CHECK:  $-\frac{15}{2} + \frac{3}{4} = -\frac{27}{4}$

d.  $\left( \frac{3}{2z} = \frac{4}{3z} - \frac{1}{2} \right) 12z$

$$\begin{array}{r} 18 \\ 36z \\ \hline 2z \end{array} = \begin{array}{r} 16 \\ 48z \\ \hline 3z \end{array} - \begin{array}{r} 6 \\ 12z \\ \hline 2 \end{array}$$

$$\begin{array}{r} 18 \\ -16 \\ \hline -2 \\ -2 \\ \hline 0 \end{array} = \begin{array}{r} 16 \\ -16 \\ \hline -32 \\ -32 \\ \hline 0 \end{array} - \begin{array}{r} 6 \\ -12 \\ \hline -6 \\ -6 \\ \hline 0 \end{array}$$

$$0 = -2 - 6z$$

$$0 = -2(1 + 3z)$$

$$0 = 1 + 3z$$

$$\begin{array}{r} -1 \\ -1 \\ \hline -2 \\ -2 \\ \hline 0 \end{array} = 3z$$

$$-1 = 3z$$

$$-\frac{1}{3} = z$$

$$Quiz\ Next\ Day!$$

Handout

CHECK:  $-\frac{9}{2} - 4 - \frac{1}{2}$

CHECK:  $3 + 1 \checkmark 4$ 

$$3 - \frac{3}{4} = \frac{3}{16}$$

$$\frac{-8-1}{2} = \frac{-9}{2}$$

## Chapter 6

## Section 6.4 Rational Equations

Rational Expressions  
and Equations

$$= \frac{12 - 3}{4} = \frac{9}{4} = \frac{36}{4}$$

e.  $\left( x + \frac{6}{x+4} = 3 \right)$  NPV:  
 $x+4 \neq 0$   
 $x \neq -4$

$$x(x+4) + \frac{6(x+4)}{x+4} = 3(x+4)$$

$$x^2 + 4x + 6 = 3x + 12$$

$$-3x - 12 \quad -3x - 12$$

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

$$(x-2)(x+3) = 0$$

$$\begin{array}{l} \downarrow \\ x=2 \end{array}$$

$$\begin{array}{l} \downarrow \\ x=-3 \end{array}$$

$$\text{Check: } 2 + \frac{6}{2+4} \quad 3$$

$$\begin{aligned} &= 2 + \frac{6}{6} \checkmark \\ &= 2 + 1 \\ &= 3 \end{aligned}$$

$$\begin{aligned} &(-3) + \frac{6}{(-3)+4} \quad 3 \\ &= -3 + \frac{6}{1} \checkmark \\ &= 3 \end{aligned}$$

f.  $\left( -1 = x - \frac{15}{x+3} \right)$  NPV:  $x+3 \neq 0$   
 $x \neq -3$

$$\begin{aligned} -1(x+3) &= x(x+3) - \frac{15(x+3)}{x+3} \\ -x - 3 &= x^2 + 3x - 15 \\ +x + 3 & \quad +x + 3 \end{aligned}$$

$$0 = x^2 + 4x - 12$$

$$0 = (x-2)(x+6)$$

$$\begin{array}{l} \downarrow \\ x=2 \end{array}$$

$$\begin{array}{l} \downarrow \\ x=-6 \end{array}$$

$$2 - \frac{15}{2+3}$$

$$= 2 - \frac{15}{5}$$

$$= 2 - 3 = \checkmark$$

$$-6 - \frac{15}{-6+3}$$

$$= -6 - \frac{15}{-3}$$

$$= -6 + 5 = \checkmark$$

1. NPV

2. LCM and multiply

\* no more denominators

3. Solve

4. Check.