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

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

$5x = 3x$
$-3x \quad -3x$

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

$\boxed{x = 0}$

No Solutions!

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

$\dfrac{\overset{10}{20x}}{2x} + \dfrac{\overset{3}{12x}}{4} = \dfrac{\overset{9}{36x}}{4x}$

$10 + 3x = 9$
$-10 \qquad -10$

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

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

CHECK: $-\dfrac{15}{2} + \dfrac{3}{4} \qquad -\dfrac{27}{4}$

B
E
D
$\boxed{U}$
A
$\boxed{S}$

c. $x^2\left(\dfrac{3}{1} + \dfrac{1}{x} = \dfrac{4}{x^2}\right)$ NPV: $x \neq 0$
$\text{LCM}(1, x, x^2) = x^2$

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

$3x^2 + x = 4$
$\qquad -4 \quad -4$

$3x^2 + x - 4 = 0$
$3x^2 - 3x + 4x - 4 = 0$
$3x(x-1) + 4(x-1) = 0$
$(x-1)(3x+4) = 0$

$\downarrow \qquad\qquad \downarrow$
$\underset{\sim}{x = 1} \qquad 3x + 4 = 0$
$\qquad\qquad \underset{\sim}{x = -\dfrac{4}{3}}$

d. $\left(\dfrac{3}{2z} = \dfrac{4}{3z} - \dfrac{1}{2}\right) 12z$ $-\dfrac{30}{4} + \dfrac{3}{4}$

$-\dfrac{27}{4}$ NPV: $z \neq 0$

CM = $12z$

$\dfrac{\overset{18}{36z}}{2z} = \dfrac{\overset{16}{48z}}{3z} - \dfrac{\overset{6}{12z}}{2}$

$18 = 16 - 6z$
$-16 \quad -16$

$\dfrac{2}{-6} = \dfrac{-6z}{-6}$

$-\dfrac{2}{6} = z$

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

$0 = -2 - 6z$
$0 = -2(1 + 3z)$

$0 = 1 + 3z$
$-1 = 3z$
$-\dfrac{1}{3} = z$

CHECK: $-\dfrac{9}{2}$, $-4 - \dfrac{1}{2}$

Assignment   Handout   Quiz Next Day!

CHECK: $3 + 1 \checkmark 4$

$3 - \dfrac{3}{4} \qquad \dfrac{36}{16}$

$= \dfrac{12 - 3}{4} \qquad = \dfrac{9}{4} = \dfrac{36}{4}$

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

e. $\left(x + \dfrac{6}{x+4} = 3 \right)(x+4)$

NPV:

$x + 4 \neq 0$

$x \neq -4$

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

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

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

$x^2 + x - 6 = 0$

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

$\downarrow \qquad\qquad \downarrow$

$x = 2 \qquad x = -3$

Check:

$2 + \dfrac{6}{2+4} \quad 3$

$= 2 + \dfrac{6}{6} \checkmark$

$= 2 + 1$

$= 3$

$(-3) + \dfrac{6}{(-3)+4} \quad 3$

$= -3 + \dfrac{6}{1}$

$= 3 \checkmark$

f. $\left(-1 = x - \dfrac{15}{x+3} \right)(x+3)$

NPV: $x + 3 \neq 0$

$x \neq -3$

$-1(x+3) = x(x+3) - \dfrac{15(x+3)}{x+3}$

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

$+x + 3 +x + 3$

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

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

$\downarrow \qquad\qquad \downarrow$

$x = 2 \qquad x = -6$

CHECK

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

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

$= 2 - 3 = -1$

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

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

$= -6 + 5$

$= -1 \checkmark$

1. NPV

2. LCM and multiply

     * no more denominators

3. Solve

4. Check.