Name: _____ Date: _____

Learning Goal 6.2	Solving equations, identifying any non-permissible values and extraneous roots.

Expressions **vs.** **Equations**

Simplifying

Solving
$x = ?$
↑
equals sign.

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

a. $\frac{5}{x+4} = \frac{3}{x-2}$ $(x+4)(x-2)$

LCM $(x+4, x-2) = (x+4)(x-2)$

NPV: $x+4 \neq 0$ $x-2 \neq 0$

$-4 \quad -4$ $+2 \quad +2$

$x \neq -4$ $x \neq 2$

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

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

$5x - 10 = 3x + 12$

$-3x \quad -3x$

$2x - 10 = 12$

$+10 \quad +10$

$\frac{2x}{2} = \frac{22}{2}$

$x = 11$

CHECK: $\frac{5}{x+4}$ $\frac{3}{x-2}$

$= \frac{5}{11+4}$ $= \frac{3}{11-2}$

$= \frac{5}{15}$ ✓ $= \frac{3}{9}$

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

b. $\frac{x+2}{x-3} = \frac{x-1}{x-2}$ $(x-3)(x-2)$

LCM $(x-3, x-2) = (x-3)(x-2)$

NPV: $x-3 \neq 0$ $x-2 \neq 0$

$+3 \quad +3$ $+2 \quad +2$

$x \neq 3$ $x \neq 2$

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

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

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

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

$-4 = -4x + 3$

$-3 \quad -3$

$\frac{-7}{-4} = \frac{-4x}{-4}$

$x = \frac{7}{4}$

CHECK: $\frac{x+2}{x-3}$ $\frac{x-1}{x-2}$

$= \frac{7/4 + 2}{7/4 - 3}$ ✓ $= \frac{7/4 - 1}{7/4 - 2}$

$= \frac{15/4}{-5/4}$ $= \frac{3/4}{-1/4}$

Assignment p. 348 # 1 – 9, 11, 13, 18, 21 Quiz Next Day!

= -3 = -3

c. $\frac{2}{z^2-4}+\frac{10}{6z+12}=\frac{1}{z-2}$ LCM: $6(z+2)(z-2)$

$\frac{2}{(z+2)(z-2)}+\frac{10}{6(z+2)}=\frac{1}{z-2}$

NPV: $z+2\neq 0$, $z\neq -2$; $z-2\neq 0$, $z\neq 2$

$\frac{2[6(z+2)(z-2)]}{(z+2)(z-2)}+\frac{10[6(z+2)(z-2)]}{6(z+2)}=\frac{6(z+2)(z-2)}{z-2}$

$12+10(z-2)=6(z+2)$

$12+10z-20=6z+12$

$10z-8=6z+12$

$-6z \quad -6z$

$4z-8=12$

$+8 \quad +8$

$\frac{4z}{4}=\frac{20}{4}$

$z=5$

CHECK: $\frac{2}{z^2-4}+\frac{10}{6z+12}=\frac{1}{z-2}$

$\frac{2}{5^2-4}+\frac{10}{6(5)+12}\quad \frac{1}{5-2}$

$=\frac{2}{25-4}+\frac{10}{30+12}\quad =\frac{1}{3}$ ✓

$=\frac{14}{42}+\frac{10}{42}=\frac{24}{42}=\frac{7}{21}=\frac{1}{3}$

d. $\frac{4k-1}{k+2}-\frac{k+1}{k-2}=\frac{k^2-4k+24}{k^2-4}$

Example The measure, d degrees, of each angle in a regular polygon with n sides is given by the equation

$$d=180-\frac{360}{n}.$$

all sides are equal
all angles are equal.

a. What is the measure of each angle in a regular polygon with 15 sides?

$d=180-\frac{360}{15}$

$=180-24$

$=156$

Each angle is 156°

b. When each angle in a regular polygon is $162°$, how many sides does the polygon have?

$162=180-\frac{360}{n}$

$-180 \quad -180$

$n\times -18=-\frac{360}{n}\times n$

$\frac{-18n}{-18}=\frac{-360}{-18}$

$n=20$

The polygon has 20 sides.

$$\left(\frac{4k-1}{k+2}-\frac{k+1}{k-2}=\frac{k^2-4k+24}{k^2-4}\right)(k+2)(k-2)$$

$$\frac{4k-1}{k+2}-\frac{k+1}{k-2}=\frac{k^2-4k+24}{(k+2)(k-2)}$$

LCM $(k+2, k-2) = (k+2)(k-2)$

NPV: $k+2 \neq 0$ $\quad k-2 \neq 0$

$-2\ -2$ $\quad +2\ +2$

$k \neq -2$ $\quad k \neq 2$

$$\frac{(4k-1)(k+2)(k-2)}{k+2}-\frac{(k+1)(k+2)(k-2)}{k-2}=\frac{(k^2-4k+24)(k+2)(k-2)}{(k+2)(k-2)}$$

$$(4k-1)(k-2)-(k+1)(k+2)=k^2-4k+24$$

$$4k^2-8k-k+2-(k^2+2k+k+2)=k^2-4k+24$$

$$4k^2-9k+2-k^2-3k-2=k^2-4k+24$$

$$3k^2-12k=k^2-4k+24$$

$$-k^2+4k-24 \quad -k^2+4k-24$$

$$2k^2-8k-24=0$$

$$2(k^2-4k-12)=0$$

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

$k-6=0$ $\quad +6\ +6$ $\quad k=6$

$k+2=0$ $\quad -2\ -2$ $\quad k=-2$ Non-permissible value!

CHECK:

$$\frac{4k-1}{k+2}-\frac{k+1}{k-2}=\frac{k^2-4k+24}{k^2-4}$$

$$\frac{4(6)-1}{6+2}-\frac{6+1}{6-2} \qquad \frac{(6)^2-4(6)+24}{(6)^2-4}$$

$$=\frac{24-1}{8}-\frac{7}{4} \qquad =\frac{36-24+24}{36-4}$$

$$=\frac{23}{8}-\frac{14}{8} \qquad =\frac{36}{32}$$

$$=\frac{9}{8} \qquad =\frac{9}{8}$$