

# Solving Rational Equations

Extraneous Solution: A solution that does Not satisfy the original equation

Ex 1

$$\frac{m-1}{5} = \frac{8}{2}$$

check

$$\frac{21-1}{5} \stackrel{?}{=} \frac{8}{2}$$
$$4 = 4 \checkmark$$

$$2(m-1) = 5(8)$$

$$2m - 2 = 40$$

+2            +2

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$$\frac{2m}{2} = \frac{42}{2}$$

$$m = 21 \checkmark$$

\* No Restrictions

Ex 2

$$\frac{v-5}{v+6} = \frac{4}{9}$$

check

$$\frac{\frac{69}{5} - 5}{\frac{69}{5} + 6} \stackrel{?}{=} \frac{4}{9}$$

✓

$$4(v+6) = 9(v-5)$$

$$4v + 24 = 9v - 45$$

$$\frac{69}{5} = \frac{5v}{5}$$

$$v = \frac{69}{5} \checkmark$$

Restrictions:  $\{v \neq -6\}$

Ex 3

$$\frac{x+5}{5} = \frac{6}{x-2}$$

$$(x+5)(x-2) = 30$$

$$x^2 + 5x - 2x - 10 = 30$$

$$x^2 + 3x - 10 = 30$$

$$\begin{array}{r} -30 \\ -30 \end{array}$$

$$x^2 + 3x - 40 = 0$$

$$(x+8)(x-5) = 0$$

$$x = -8, 5$$

Restrictions:  $\{x \neq 2\}$

check -8

$$\frac{-8+5}{5} \stackrel{?}{=} \frac{6}{-8-2}$$

$$\frac{-3}{5} = \frac{6}{-10} \checkmark$$

check 5

$$\frac{5+5}{5} \stackrel{?}{=} \frac{6}{5-2}$$

$$\frac{10}{5} = \frac{6}{3} \checkmark$$

Ex 4

$$\frac{1}{v} + \frac{3v+12}{v^2-5v} = \frac{7v-56}{v^2-5v}$$

$$\frac{(v-5)}{(v-5)v} + \frac{3v+12}{v(v-5)} = \frac{7v-56}{v(v-5)}$$

$$\frac{v-5}{v(v-5)} + \frac{3v+12}{v(v-5)} = \frac{7v-56}{v(v-5)}$$

$$\frac{\cancel{v-5} + 3v+12}{v(v-5)} = \frac{\cancel{7v-56}}{v(v-5)}$$

$$v-5 + 3v+12 = 7v-56$$

$$4v + 7 = 7v - 56$$

$$63 = 3v$$

$$v = 21$$

Be sure to check it!

Restrictions:  $\{v \neq 5, 0\}$