

Review

$$\frac{x+10}{3x-15} - \frac{3x+15}{6x-30} \Rightarrow \frac{2(x+10)}{2 \cdot 3(x-5)} - \frac{3x+15}{6(x-5)}$$
$$= \frac{2x+20-3x-15}{6(x-5)} = \frac{-x+5}{6(x-5)} = \frac{-(x-5)}{6(x-5)} = \boxed{\frac{-1}{6}}$$
$$\frac{x-5=0}{+5 \quad +5} \\ \underline{\hspace{1.5cm}} \\ x=5$$

Restrictions
 $x \neq 5$

$$\frac{4}{x-3} + \frac{5}{x^2-9} \Rightarrow \frac{(x+3)4}{(x+3)x-3} + \frac{5}{(x+3)(x-3)}$$
$$\sqrt{x^2} = x \\ \sqrt{9} = 3$$
$$= \frac{4x+12+5}{(x+3)(x-3)} = \boxed{\frac{4x+17}{(x+3)(x-3)}}$$

Restrictions
 $x \neq -3, 3$

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

$$63 = 3v$$

$$\boxed{v=21}$$

Solving Rational Equations

Extraneous Solution: "bad answer"; A solution that does not make the original equation true.

Ex1 $\frac{m-1}{5} = \frac{8}{2}$

$$2(m-1) = 8(5)$$
$$\begin{array}{r} 2m-2 = 40 \\ +2 \quad +2 \\ \hline \end{array}$$

$$\frac{2m}{2} = \frac{42}{2}$$
$$m = 21 \checkmark$$

★ When you have two fractions equal, you cross multiply ★

check

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

Ex2

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

~~★ Be sure to distribute ★~~

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

$$\begin{array}{r} 9v-45 = 4v+24 \\ -4v \quad -4v \\ \hline \end{array}$$

$$\begin{array}{r} 5v-45 = 24 \\ +45 \quad +45 \\ \hline \end{array}$$

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

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

check

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

Ex 3

$$\frac{5x-2}{x-4} = \frac{-3}{1}$$

$$1(5x-2) = -3(x-4)$$
$$5x-2 = -3x+12$$
$$8x = 14$$

$$x = \frac{14}{8} \rightarrow \frac{7}{4} \checkmark$$

Check

$$\frac{5(\frac{7}{4})-2}{\frac{7}{4}-4} \stackrel{?}{=} -3$$
$$\frac{7}{4}-4 \quad \checkmark$$

Ex 4

$$\frac{3x-2}{12} - \frac{1}{6} = \frac{1}{6}$$

Can't cross multiply yet \neq

Steps to solve

- ① Combine the fractions into 1
- ② Cross multiply
- ③ Solve & check!

$$\textcircled{1} \quad \frac{3x-2}{12} - \frac{1 \cdot 2}{6 \cdot 2} = \frac{1}{6} \quad \frac{3x-2-2}{12} = \frac{1}{6}$$

$$\textcircled{2} \quad \frac{3x-4}{12} - \frac{1}{6} \quad 6(3x-4) = 12$$

$$\textcircled{3} \quad 18x - 24 = 12$$
$$18x = 36$$
$$x = 2 \checkmark$$

check $\frac{3(2)-2}{12} - \frac{1}{6} \stackrel{?}{=} \frac{1}{6} \checkmark$

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

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

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

$$\frac{4v+7}{v^2-5v} = \frac{7v-56}{v^2-5v}$$

* Because the denominators match, we only set the numerators equal *

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

$$63 = 3v$$

$$v = 21$$