

Solving Rationals!

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

* Simplifying so we have 1 rational on each side of (=)

$$\frac{3}{2x} - \left(\frac{1}{1}\right)^{2x} = \frac{1}{2x}$$

* Make common denominator

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

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

* Cross Multiply!

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

Solve!

$$\begin{array}{r} 2x \\ -2x \\ \hline \end{array} = \begin{array}{r} 6x - 4x^2 \\ -2x \\ \hline \end{array}$$

Set = 0!

$$\begin{array}{r} 0 = 4x - 4x^2 \\ 0 = 4x(1-x) \end{array}$$

Factor!

$$\frac{4x}{4} = \frac{0}{4} \quad 1-x = 0$$

$$x = 0$$

$$x = 1$$

~~X~~ cannot divide by 0

✓

CHECK!

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

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

SHORTCUT

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

Bye to demon!

$$\begin{array}{r} 3 - 2x = 1 \\ + 2x \quad + 2x \end{array}$$

$$\begin{array}{r} 3 = 2x + 1 \\ -1 \quad - \end{array}$$

CHECKED EARLY!

$$2 = 2x$$

$$x = 1 \quad \checkmark$$

EX: $\left(\frac{1}{2}\right)^{3x} = \left(\frac{1}{3}\right)^{2x} + \frac{1}{6x}$

* Make Common Denominator

$$\frac{3x}{6x} = \frac{2x}{6x} + \frac{1}{6x}$$

$$\begin{array}{r} 2x + 1 = 3x \\ -2x \quad -2x \end{array}$$

$1 = x \quad \checkmark$

CHECK!

$$\frac{1}{2} \stackrel{?}{=} \frac{1}{3} + \frac{1}{6}$$
$$\frac{1}{2} \stackrel{\checkmark}{=} \frac{1}{2}$$

$$\frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$$

EX)

$$4 = \frac{n-4}{n-6} + \frac{2}{n-6}$$

* Simplify

~~$$\frac{4}{1} = \frac{n-2}{n-6}$$~~

CHECK:

$$4(n-6) = (n-2)(1)$$

$$4n - 24 = n - 2$$

$$+24 \quad +24$$

$$4n = n + 22$$

$$-n \quad -n$$

$$\frac{3n}{3} = \frac{22}{3}$$

$$n = \frac{22}{3} \quad \checkmark$$

$$4 = \frac{\frac{22}{3} - 4}{\frac{22}{3} - 6} + \frac{2}{\frac{22}{3} - 6}$$

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

$$4 = \frac{8}{2} \quad 4 = 4 \quad \checkmark$$

Ex)

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

$$x(x+5) \quad x(x+5)$$

$$x - 1 = 4$$

$$+1 \quad +1$$

$$x = 5$$

CHECK!

$$\frac{1}{5+5} - \frac{1}{5^2+5(5)} = \frac{4}{5^2+5(5)}$$

$$\frac{1}{10} - \frac{1}{50} = \frac{4}{50}$$

$$\frac{2}{25} = \frac{2}{25} \quad \checkmark$$

Warm-up:

1.
$$\frac{2x+5}{3x+6} + \frac{2x+3}{3x+6} = \frac{4x+8}{3x+6} = \frac{4(x+2)}{3(x+2)}$$
$$= \frac{4}{3} \quad x \neq -2$$

2.
$$\frac{4x+5}{x-1} - \frac{2x-3}{x-1} = \frac{2x+8}{x-1} = \frac{2(x+4)}{x-1}$$

$5 - (-3)$

$5+3$
 8

$x \neq 1$

3.
$$\frac{2}{x+3} + \frac{x-5}{x^2+5x+6} =$$
$$(x+2)(x+3)$$

$2x+4$

$$\frac{2(x+2)}{(x+3)(x+2)} + \frac{x-5}{(x+2)(x+3)} = \frac{3x-1}{(x+2)(x+3)}$$

$x \neq -3, -2$

$$\textcircled{4} \frac{x-4}{x^2+3x} - \left(\frac{3}{x} \right)^{(x+3)}$$

$x(x+3)$

$$\frac{x-4}{x(x+3)} - \frac{3x+9}{x(x+3)} = \frac{-2x-13}{x(x+3)}$$

$$x \neq -3, 0$$