

Rational Expression
 Numerator → Polynomial
 Denominator → Polynomial
 7x+14

Ex.)

a) $\frac{2}{2} \cdot \frac{5}{2x} + \frac{3}{4} \cdot \frac{x}{x} \cdot \frac{9}{4x}$

$$10 + 3x = 9$$

$$3x = -1$$

$x = -1/3$

$x \neq 0$

b) $\frac{3x^2}{1/x} + \frac{1/x}{x} = \frac{4}{x^2}$

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

$$3x^2 + x - 4 = 0$$


$$3x^2 - 3x + 4x - 4 = 0$$


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

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

$x = 1, -4/3$

$x \neq 0$





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Ex.) Solve each equation.

a) $\frac{5}{5} \cdot \frac{1}{2x} - \frac{2}{5} \cdot \frac{2x}{2} \cdot \frac{1}{10x}$

$$5 - 4x = 1$$

$$-4x = -4$$

$x = 1$

$x \neq 0$

b) $\frac{5}{x} \cdot \frac{x}{x} + \frac{6}{x^2} = \frac{6}{1} \cdot \frac{x^2}{x^2}$

$$5x + 6 = 6x^2$$

$$0 = 6x^2 - 5x - 6$$

$$6x^2 - 9x + 4x - 6$$

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

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

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

$x \neq 0$




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Storing 'X' to check your answer...

A graphing calculator can be used to check the solution of a rational equation.

In *Example 1a*, the equation $\frac{5}{2x} + \frac{3}{4} = \frac{9}{4x}$ has solution $x = -\frac{1}{3}$.

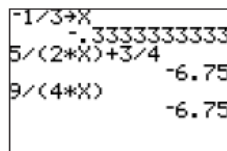
To check this solution, use a TI-83 Plus graphing calculator:

Press: $\boxed{(-)}$ $\boxed{1}$ $\boxed{\div}$ $\boxed{3}$ $\boxed{\text{STO}}$ $\boxed{\text{X,T,}\theta,\text{r}}$ $\boxed{\text{ENTER}}$

This sets X equal to $-\frac{1}{3}$.

Enter the expression on the left side of the equation, then press $\boxed{\text{ENTER}}$.

Enter the expression on the right side of the equation, then press $\boxed{\text{ENTER}}$.



The left side equals the right side, so the solution is correct.




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Don't forget to **factor** first, if possible!

Ex.) Solve.

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

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

$$5x - 10 = 3x + 12$$

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

$$2x - 10 = 12$$

$$2x = 22$$

$$x \neq -4, 2. \quad \boxed{x = 11}$$

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

$$(x+1)(x-1)$$

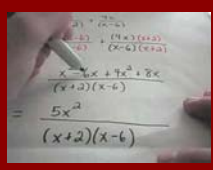
$$3x+1 = -x^2+x$$

$$x^2+2x+1 = 0$$

$$(x+1)^2 = 0$$

$$\cancel{x = -1} \quad x \neq \pm 1$$

extraneous



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

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

$-3x+9 = 2x^2+4x$

$0 = 2x^2+7x-9$

$2x^2+9x \quad | \quad -2x-9$
 $x(2x+9) \quad | \quad -1(2x+9)$
 $(2x+9)(x-1) = 0$

$x = -9/2, 1$

$x \neq -2, 3.$

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

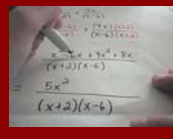
$(x-1)(x+2) = x(x-5)$

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

$6x = 2$

$x = 1/3$

$x \neq 1, 5$



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a) $\frac{-10}{(x-7)(x-5)} = \frac{x}{(x-5)} \cdot \frac{(x-7)}{(x-7)}$

$-10 = x^2 - 7x$

$0 = x^2 - 7x + 10$

$0 = (x-5)(x-2)$

$x = 2$

$x \neq 5, 7$ ~~extraneous~~

$\frac{(x+4)}{(x+4)} \cdot \frac{(x+1)}{(x+6)} + \frac{(x-2)(x+2)}{(x+4)(x+4)} = \frac{11x+32}{(x+6)(x+4)}$

$(x+4)(x+1) + (x-2)(x+6) = 11x+32$

$x^2+5x+4 + x^2+4x-12 = 11x+32$

$2x^2+9x-8 = 11x+32$

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

$2(x^2-x-20) = 0$

$2(-x-5)(x+4) = 0$

$x = -5$

~~extraneous~~ $x \neq -4, -6$

Pg. 348 # 1-5