MULTIPLYING AND DIVIDING RATIOINAL EXPRESSIONS

Example 1:

$\frac{x^2-16}{3x+12} \cdot \frac{x^2+5x}{x^2+x-20}$ factor all parts $\frac{(x+4)(x-4)}{3(x+4)} \cdot \frac{x(x+5)}{(x+5)(x-4)}$

Cross out all that are the same top to bottom $= \frac{x}{3}$

Example 2:

$\frac{x-7}{x^2+6x} \cdot \frac{4x+24}{x^2-3x-28}$ factor all parts $\frac{(x-7)}{x(x+6)} \cdot \frac{4(x+6)}{(x-7)(x+4)}$

Cross out all that are the same top to bottom $= \frac{4}{x(x+4)}$

Example 3:

$\frac{x^2-11x+32}{x^2-64} \div \frac{x^2-16}{5x+20}$ Flip second fraction $\frac{x^2-11x+32}{x^2-64} \div \frac{5x+20}{x^2-16}$

factor all parts $\frac{(x-8)(x-4)}{(x-8)(x+8)} \cdot \frac{5(x+4)}{(x-4)(x+4)}$

Cross out all that are the same top to bottom $= \frac{5}{(x+8)}$

ADDING AND SUBTRACTING RATIOINAL EXPRESSIONS

Example 1:

$$\frac{5}{x^2-x-30}+\frac{8}{x-6}^{(x+5)}$$

(x-6)(x+5)

$$\frac{5}{(x-6)(x+5)}+\frac{8x+40}{(x-6)(x+5)}=\frac{\mathbf{8x+45}}{\mathbf{(x-6)(x+5)}}$$

Example 2:

$$\frac{3x}{x+9}^{(x+5)}-\frac{7x-2}{x^2+4x-45}$$

(x+9)(x-5)

$$\frac{3x^2+15x}{(x+9)(x-5)}-\frac{7x-2}{(x+9)(x-5)}=3x^2+15x-7x+2=\frac{\mathbf{3x^2+8x+2}}{\mathbf{(x+9)(x-5)}}$$

Example 3:

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

$(x-4)(x-2) = x^2-2x-4x+8 = x^2-6x+8$

$(x+5)(x+3) = x^2+3x+5x+15 = x^2+8x+15$

$$\frac{x^2-6x+8}{(x+3)(x-2)}-\frac{x^2+8x+15}{(x+3)(x-2)}=x^2-6x+8-x^2-8x-15=\frac{\mathbf{-14x-7}}{\mathbf{(x+3)(x-2)}}$$

SOLVING
RATIOINAL EXPRESSIONS

Example 1:

$\frac{4}{x-3} = \frac{8}{x^2-3x}$ **Cross multiply**

$4(x^2-3x) = 8(x-3)$

$4x^2-12x = 8x - 12$ move all to right

$-8x$

$4x^2-20x+12 = 0$

$4(x^2-4x+3)$

$(x-3)(x-4)$

$x = 3, 4$

Example 2:

$\frac{3}{2x} - \frac{5}{3x} = 2$ **Multiply all by 6x**

$9 - 10 = 12x$

$-1 = 12x$ $\quad x = \frac{-1}{12}$