

Add and Subtract Rational Expressions with a Common Denominator

RATIONAL EXPRESSION ADDITION AND SUBTRACTION

If p , q , and r are polynomials where $r \neq 0$, then

$$\frac{p}{r} + \frac{q}{r} = \frac{p+q}{r} \quad \text{and} \quad \frac{p}{r} - \frac{q}{r} = \frac{p-q}{r}$$

$$\frac{2}{3} + \frac{5}{3} = \frac{7}{3}$$

$$\frac{6}{8} - \frac{2}{8} = \frac{4}{8}$$

$$\frac{7}{x} + \frac{3}{x} = \frac{10}{x}$$

$$\frac{12}{z} - \frac{7}{z} = \frac{5}{z}$$

Add: $\frac{11x+28}{x+4} + \frac{x^2}{x+4}$.

$$\frac{x^2 + 11x + 28}{x+4}$$

$$\frac{(x+7)(\cancel{x+4})}{\cancel{x+4}}$$

$$x+7 \quad x \neq -4$$

Simplify: $\frac{9x+14}{x+7} + \frac{x^2}{x+7}$.

$$\frac{x^2 + 9x + 14}{x+7}$$

$$\frac{(\cancel{x+7})(x+2)}{\cancel{x+7}}$$

$$x+2 \quad x \neq -7$$

Simplify: $\frac{x^2+8x}{x+5} + \frac{15}{x+5}$.

$$\frac{x^2+8x+15}{x+5} \Rightarrow$$

$$\frac{(x+3)\cancel{(x+5)}}{\cancel{x+5}}$$

$$x+3; x \neq -5$$

Subtract: $\frac{5x^2-7x+3}{x^2-3x-18} - \frac{4x^2+x-9}{x^2-3x-18}$.

$$\frac{5x^2-7x+3-4x^2-x+9}{x^2-3x-18}$$

$$\frac{x^2-8x+12}{x^2-3x-18} = \frac{(x-6)(x-2)}{(x-6)(x+3)} = \frac{x-2}{x+3}; x \neq 6, -3$$

Subtract: $\frac{4x^2-11x+8}{x^2-3x+2} - \frac{(3x^2+x-3)}{x^2-3x+2}$

$$\frac{4x^2-11x+8-3x^2-x+3}{x^2-3x+2} = \frac{x^2-12x+11}{x^2-3x+2}$$

$$\frac{(x-11)\cancel{(x-1)}}{(x-2)\cancel{(x-1)}}$$

$$\frac{x-11}{x-2}; x \neq 2, 1$$

Subtract: $\frac{6x^2 - x + 20}{x^2 - 81} - \frac{5x^2 + 11x - 7}{x^2 - 81}$.

$$\frac{6x^2 - x + 20 - 5x^2 - 11x + 7}{x^2 - 81}$$

7.2

79 - 87
odd

$$= \frac{x^2 - 12x + 27}{x^2 - 81}$$

$$= \frac{(x-1)(x-3)}{(x+9)(x-9)}$$

$$\frac{x-3}{x+9} ; x \neq \pm 9$$

Add and Subtract Rational Expressions Whose Denominators are Opposites

$$\begin{aligned}\frac{7}{d} + \frac{5}{-d} & \stackrel{(-1)}{\stackrel{(-1)}{=}} \frac{7}{d} + \frac{(-5)}{d} \\ & = \frac{2}{d} \quad d \neq 0\end{aligned}$$

$$\begin{array}{ccc} m-5 & & \frac{5-m}{-1(m-5)} \\ & \curvearrowright & \end{array}$$

Subtract: $\frac{m^2-6m}{m^2-1} - \frac{3m+2}{1-m^2}$ (-1)
 $\frac{3m+2}{1-m^2}$ (-)

$$\frac{m^2-6m}{m^2-1} - \frac{-3m-2}{m^2-1}$$

$$\frac{m^2-6m+3m+2}{m^2-1} = \frac{m^2-3m+2}{m^2-1}$$

$$\frac{(m-2)(\cancel{m-1})}{(m+1)(\cancel{m-1})}$$

$$\frac{m-2}{m+1} \quad m \neq \pm 1$$