

Operations on Rational Expressions

Find the product

$$\frac{x-2}{x+5} \cdot \frac{3x+15}{x^2-4} = \frac{\cancel{(x-2)} \cdot 3\cancel{(x+5)}}{\cancel{(x+5)} \cdot (x+2)\cancel{(x-2)}}$$

$(x)^2 - (2)^2$

$$\boxed{\frac{3}{x+2}}$$

Find the product

$$\frac{x^2 + x - 12}{x + 4} \cdot \frac{8}{6x - 18}$$

Find the product

$$\frac{x^2 + x - 12}{x + 4} \cdot \frac{8}{6x - 18} = \frac{\cancel{(x+4)}\cancel{(x-3)} \cdot 8}{\cancel{(x+4)} \cdot 6\cancel{(x-3)}}$$

$$\begin{array}{r} -12 \\ 4 \times -3 \\ \hline 1 \end{array}$$

$$\frac{8}{6} = \boxed{\frac{4}{3}}$$

Find the quotient

$$\frac{-2 \cancel{2} -1}{-3} \frac{6}{x^2 - 3x + 2} \div \frac{3x}{1 - x^2} = \frac{6}{(x-2)(x-1)} \cdot \frac{-1 \overset{(x^2)}{x^2} \overset{(1)^2}{-1}}{3x}$$

$$\frac{-\overset{2}{6}(x+1)(x-1)}{1 \cancel{3}x(x-2)(x-1)}$$

$$\boxed{\frac{-2(x+1)}{x(x-2)}}$$

Find the quotient

$$\frac{6 - 4x}{6x^2 - 30} \div \frac{4x^2 - 9}{3}$$

Find the quotient

$$\frac{6-4x}{6x^2-30} \div \frac{4x^2-9}{3} = \frac{-2\cancel{(2x-3)}}{6(x^2-5)} \cdot \frac{3}{\cancel{(2x-3)}(2x+3)}$$

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

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

Find the difference

$$\frac{x^2}{x+2} - \frac{4}{x+2} = \frac{\overset{(x)^2}{x^2} - \overset{(2)^2}{4}}{x+2} = \frac{\cancel{(x+2)}(x-2)}{\cancel{x+2}}$$

$$\boxed{x-2}$$

Find the sum

$$\frac{2x^2}{x+3} + \frac{6x}{x+3}$$

Find the sum

$$\frac{2x^2}{x+3} + \frac{6x}{x+3} = \frac{2x^2+6x}{x+3} = \frac{2x(x+3)}{\cancel{x+3}}$$

$$\boxed{2x}$$

Simplify

$$\frac{\overbrace{(x+4)}^{\text{green}} \cdot x}{\overbrace{(x+4)}^{\text{red}} \cdot (x-1)} + \frac{3 \cdot \overbrace{(x-1)}^{\text{green}}}{\overbrace{(x+4)}^{\text{red}} \cdot \overbrace{(x-1)}^{\text{green}}} \cdot \frac{\overbrace{(x-1)(x+4)}^{\text{blue}}}{\overbrace{(x-1)(x+4)}^{\text{blue}}}$$

$$\frac{x^2 + 4x}{(x+4)(x-1)} + \frac{3x-3}{(x+4)(x-1)} - \frac{x^2 + 4x - x - 4}{(x-1)(x+4)} = \frac{\underbrace{(x^2 + 4x)}_{\text{blue}} + \underbrace{(3x-3)}_{\text{blue}} - \underbrace{(x^2 + 3x - 4)}_{\text{red}}}{(x+4)(x-1)}$$

$$\frac{\cancel{x^2} + \underline{7x} - \underline{3}}{(x+4)(x-1)} - \frac{\cancel{x^2} - \underline{3x} + \underline{4}}{(x+4)(x-1)} = \boxed{\frac{4x+1}{(x+4)(x-1)}}$$

Simplify

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

Simplify

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

$$\frac{2(x^2 - 3x - 10) + 3(x-5) - (x^2 + 3x + 2)}{(x+2)(x-5)}$$

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

$$\frac{2x^2 - 6x - 20 + 3x - 15 - x^2 - 3x - 2}{(x+2)(x-5)}$$

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

$$\frac{x^2 - 6x - 37}{(x+2)(x-5)}$$