What you will learn about:
Multiplying and Dividing Rational Expressions

Multiply a rational expression
Step 1 – Factor each numerator and denominator completely

Step 2 – Multiply the numerators and denominators

Step 3 – Simplify by dividing out common factors

Multiply:

$\frac{10}{28} \cdot \frac{8}{15}$ $\quad$ $\frac{6}{10} \cdot \frac{15}{12}$ $\quad$ $\frac{20}{15} \cdot \frac{6}{8}$

$\frac{2x}{3y^2} \cdot \frac{6xy^3}{x^2y}$ $\quad$ $\frac{3pq}{q^2} \cdot \frac{5p^2q}{6pq}$ $\quad$ $\frac{6x^3y}{7x^2} \cdot \frac{2xy^3}{x^2y}$

$\frac{5x}{(x+3)(x+2)} \cdot \frac{(x+2)(x-2)}{10x}$ $\quad$ $\frac{1}{2}$

→ Factor First

$\frac{2x}{x^2-7x+12} \cdot \frac{x^2-9}{6x^2}$ $\quad$ $\frac{5x}{x^2+5x+6} \cdot \frac{x^2-4}{10x}$ $\quad$ $\frac{n^2-7n}{n^2+2n+1} \cdot \frac{n+1}{2n}$

$\frac{2x}{(x-3)(x-4)} \cdot \frac{(x-3)(x+3)}{6x^2}$ $\quad$ $\frac{x-2}{2(x+3)}$ $\quad$ $\frac{n(n-7)}{(n+1)(n+1)} \cdot \frac{n+1}{2n}$

$\frac{x+3}{3x(x-4)}$ $\quad$ $\frac{n-7}{2(n+1)}$

$\frac{x^2-25}{x^2-3x-10} \cdot \frac{x+2}{x}$ $\quad$ $\frac{16-4x}{2x-12} \cdot \frac{x^2-5x-6}{x^2-16}$ $\quad$ $\frac{12x-6x^2}{x^2+8x} \cdot \frac{x^2+11x+24}{x^2-4}$

$\frac{(x-5)(x+5)}{(x-5)(x+2)} \cdot \frac{(x+2)}{x}$ $\quad$ $\frac{-4x+16}{2x-12}$ $\quad$ $\frac{-6x^2+12x}{x^2+8x}$

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

$\frac{-2(x+1)}{(x+4)}$ $\quad$ $\frac{-6(x+3)}{(x+2)}$

$\frac{9v-3v^2}{9v+36} \cdot \frac{v^2+7v+12}{v^2-9}$ $\quad$ $\frac{3a-21}{a^2-9a+14} \cdot \frac{a^2-4}{3a+6}$ $\quad$ $\frac{b^2-b}{b^2+9b-10} \cdot \frac{b^2-100}{b^2-10b}$

$\frac{-3v^2+9v}{9v+36}$ $\quad$ $\frac{3(a-7)}{(a-7)(a-2)} \cdot \frac{(a-2)(a+2)}{3(a+2)}$ $\quad$ $\frac{b(b-1)}{(b+10)(b-1)} \cdot \frac{(b+10)(b-10)}{b(b-10)}$

$\frac{-3v(v-3)}{3(v+4)} \cdot \frac{(v+3)(v+4)}{(v-3)(v+3)}$ $\quad$ 1 $\quad$ 1

$\frac{-v(v+3)}{3(v+3)}$

$-\frac{v}{3}$

Dividing Rational Expressions

Step 1 – Rewrite the division as the products of the first rational expressions and the reciprocal of the second

Step 2 – Factor each numerator and denominator completely

Step 3 - Multiply the numerators and denominators

Step 4 – Simplify by dividing out common factors

$\frac{x+9}{6-x} \div \frac{x^2-81}{x-6}$

$\frac{x+9}{6-x} \cdot \frac{x-6}{x^2-81}$

$\frac{x+9}{-(x-6)} \cdot \frac{x-6}{(x+9)(x-9)}$

$\frac{1}{-(x-9)}$

$\frac{c+3}{5-c} \div \frac{c^2-9}{c-5}$

$\frac{c+3}{-(c-5)} \cdot \frac{c-5}{c^2-9}$

$\frac{c+3}{-(c-5)} \cdot \frac{(c-5)}{(c+3)(c-3)}$

$\frac{1}{-(c-3)}$

$\frac{2-d}{d-4} \div \frac{4-d^2}{d-4}$

$\frac{2-d}{d-4} \cdot \frac{d-4}{4-d^2}$

$\frac{2-d}{d-4} \cdot \frac{d-4}{(2-d)(2+d)}$

$\frac{1}{d+2}$

$\frac{3n^2}{n^2-4n} \div \frac{9n^2-45n}{n^2-7n+10}$

$\frac{3n^2}{n(n-4)} \cdot \frac{(n-5)(n-2)}{9n(n-5)}$

$\frac{n-2}{3(n-4)}$

$\frac{2m^2}{m^2-8m} \div \frac{8m^2-24m}{m^2+m-6}$

$\frac{2m^2}{m(m-8)} \cdot \frac{(m+3)(m-2)}{8m(m-3)}$

$\frac{(m+3)(m-2)}{4(m-8)(m-3)}$

$\frac{15n^2}{3n^2+33n} \div \frac{5n-n}{n^2+9n-22}$

$\frac{15n^2}{3n(n+11)} \cdot \frac{(n+11)(n-2)}{n(5n-1)}$

$\frac{5(n-2)}{5n-1}$

$\frac{2x^2+5x-12}{x^2-16} \div \frac{2x^2-13x+15}{x^2-8x+16}$

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

$\frac{x-4}{x-5}$

$\frac{3a^2-8a-3}{a^2-25} \div \frac{3a^2-14x-5}{a^2+10a+25}$

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

$\frac{(a-3)(a+5)}{(a-5)(a-5)}$

$\frac{4b^2+7b-2}{1-b^2} \div \frac{4b^2+15b-4}{b^2-2b+1}$

$\frac{p^3-q^3}{2p^2+2pq+2q^2} \div \frac{p^2-q^2}{6}$

$\frac{x^3-8}{3x^2-6x+12} \div \frac{x^2-4}{6}$

$\frac{2z^2}{z^2-1} \div \frac{z^2-z^2+z}{z^3-1}$

-9

$-9 \cdot 1$

$(3a^2-9a)+(a-3)$

$2x^2-13x+15$ $\quad 30$ $\quad -3 \cdot -10$

$(2x^2-3x)(-10x+15)$

$x(2x-3)-5(2x-3)$

$(2x-3)(x-5)$