

Dividing Rational Expressions

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

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

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

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

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

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

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

Step 3 - Multiply the numerator and denominators

Step 4 – Simplify by dividing out common factors

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

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

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

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

$$1-b^2$$

$$-b^2+1$$

$$-(b^2-1)$$

$$\frac{\cancel{(4b-1)}(b+2)}{-(b+1)\cancel{(b-1)}} \cdot \frac{\cancel{(b-1)}(b-1)}{\cancel{(4b-1)}(b+4)}$$

$$\frac{(b+2)(b-1)}{-(b+1)(b+4)}$$

$$\frac{\cancel{(p-q)}(p^2+pq+q^2)}{\cancel{2}(p^2+pq+q^2)} \cdot \frac{3}{\cancel{(p-q)}(p+q)}$$

$$\frac{3}{p+q}$$

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

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

$$\frac{\cancel{(x-2)}(x^2+2x+4)}{\cancel{2}(x^2-2x+4)} \cdot \frac{6}{\cancel{(x+2)}(x-2)}$$

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

$$\frac{2z^2}{\cancel{(z+1)}(z-1)} \cdot \frac{\cancel{(z-1)}(z^2+z+1)}{\cancel{z}(z^2-z+1)}$$

$$\frac{2z(z^2+z+1)}{(z+1)(z^2-z+1)}$$

$$\frac{a^2-b^2}{3ab} \div (a^2+2ab+b^2)$$

$$\frac{(a-b)\cancel{(a+b)}}{3ab} \cdot \frac{1}{\cancel{(a+b)}(a+b)}$$

$$\frac{a-b}{3ab(a+b)}$$

$$\frac{y^2-6y+8}{y^2-4y} \div (3y^2-12y)$$

$$\frac{2x^2-14x-16}{4} \div (x^2+2x+1)$$

$$\frac{6x^2-7x+2}{4x-8} \cdot \frac{2x^2-7x+3}{x^2-5x+6}$$

$$\frac{6x^2-7x+2}{4x-8} \cdot \frac{2x^2-7x+3}{x^2-5x+6}$$

$$\frac{(3x-2)\cancel{(2x-1)}}{4\cancel{(x-2)}} \cdot \frac{\cancel{(x-5)}(x-2)}{(2x-1)\cancel{(x-5)}}$$

$$\frac{3x-2}{4}$$

$$\frac{y^2-36}{2y^2+11y-6} \cdot \frac{2y^2-2y-60}{8y-4}$$

$$\frac{3x^2-7x+2}{4x+24} \cdot \frac{3x^2-14x-5}{x^2+x-30}$$

$$\frac{3x^2-7x+2}{4x+24} \cdot \frac{3x^2-14x-5}{x^2+x-30}$$

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

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

$$\frac{3x-6}{4x-4} \cdot \frac{x^2+2x-3}{x^2-3x-10} \cdot \frac{2x+12}{8x+16}$$

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

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

$$\frac{4m+4}{3m-15} \cdot \frac{m^2-3m-10}{m^2-4m-32} \div \frac{12m-36}{6m-48}$$

$$\frac{2n^2+10n}{n-1} \div \frac{n^2+10n+24}{n^2+8n-9} \cdot \frac{n+4}{8n^2+12n}$$

$$\frac{\cancel{2}n(n+5)}{\cancel{n-1}} \cdot \frac{(n+4)\cancel{(n+1)}}{(n+6)(n+4)} \cdot \frac{\cancel{n+4}}{4\cancel{(2n+3)}}$$

$$\frac{(n+5)(n+4)}{2(n+6)(2n+3)}$$