

Multiply & Divide Rational Expressions

Old Example : $\frac{2}{9} \times \frac{3}{10} = \frac{6 \div 3}{90 \div 3} = \frac{2 \div 2}{30 \div 2} = \boxed{\frac{1}{15}}$

Steps for X

- ① Factor when needed
- ② multiply straight across
- ③ Simplify

Ex 1

$$\frac{X^2 + 7X + 12}{X + 5}$$

$$\frac{X + 3}{X^2 + 5X + 4}$$

① $\frac{(X+4)(X+3)}{X+5}$

$$\frac{X+3}{(X+1)(X+4)}$$

② $\frac{(X+4)(X+3)^2}{(X+5)(X+1)(X+4)}$
 ~~$\div (X+4)$~~
 ~~$\div (X+4)$~~

$$= \boxed{\frac{(X+3)^2}{(X+5)(X+1)}}$$

Ex 2

$$\frac{X^2 - 4}{X^2 - 1}$$

$$\frac{X + 1}{X^2 + 2X}$$

$$= \frac{(X+2)(X-2)}{(X-1)(X+1)} \cdot \frac{X+1}{X(X+2)}$$

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

$$= \boxed{\frac{X-2}{X(X-1)}}$$

Steps for \div

- ① Keep change Flip
- ② Follow steps of Multiplication

Ex 1

$$\frac{(x-4)}{(3x+2)(x-2)} \div \frac{5(x-4)}{(x-2)(7x-5)}$$

①

$$\frac{(x-4)}{(3x+2)(x-2)} \cdot \frac{(x-2)(7x-5)}{5(x-4)}$$

②

$$\frac{\cancel{(x-4)}\cancel{(x-2)}(7x-5)}{(3x+2)\cancel{(x-2)}5\cancel{(x-4)}} = \boxed{\frac{7x-5}{5(3x+2)}}$$

Ex 2

$$\frac{x+3}{3x^2-12} \div \frac{3x^2+6x-9}{x^2-3x+2}$$

$$\frac{\cancel{x+3}}{\cancel{3x^2-12}} \cdot \frac{\cancel{x^2-3x+2}}{\cancel{3x^2+6x-9}} = \frac{x+3}{3(x+2)(x-2)} \cdot \frac{(x-2)(x-1)}{3(x-1)(x+3)}$$

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

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

$$= \boxed{\frac{1}{9(x+2)}}$$