

c)

$$\frac{v^2 - 7v - 30}{v^2 - 5v - 24}$$

$\begin{matrix} \text{m+n} & \text{m} \times \text{n} \\ \text{---} & \text{---} \\ -10, 3 \end{matrix}$
 $\begin{matrix} \text{m} \times \text{n} \\ \text{---} \\ -8, 3 \end{matrix}$
 $\begin{matrix} \text{m+n} \\ \text{---} \end{matrix}$

$\frac{(v-10)(\cancel{v+3})}{(v-8)(\cancel{v+3})}$

$v-8=0$
 $v=8$
 $v+3=0$
 $v=-3$

$\frac{v-10}{v-8}, v \neq \{-3, 8\}$

d)

$$\frac{6m^3 + 42m^2}{2m^2 + 26m + 84}$$

$\frac{6m^2(m+7)}{2(m^2 + 13m + 42)}$

$\textcircled{1} m+6=0$
 $\textcircled{2} m+7=0$

$\frac{6m^2(m+7)}{2(m+6)(m+7)}, m \neq \{-7, -6\}$

$\frac{3m^2}{m+6}, m \neq \{-7, -6\}$

Work Book: Page 25, Question 2

Rational Expressions and Arithmetic

To add, subtract, multiply & divide rational expressions, we are going to use the rules of arithmetic for fractions as well as our methods for factoring and simplifying.

1. Multiplication $\rightarrow 3(a-b)$

Example: $\left(\frac{3a-3b}{a}\right)\left(\frac{a^2}{a-b}\right)$

* factor each polynomial, if possible

$$\left(\frac{3(a-b)}{a}\right)\left(\frac{a^2}{a-b}\right)$$

$$\begin{array}{l} \textcircled{1} a=0 \quad \textcircled{2} a-b=0 \\ \quad \quad \quad \backslash \quad / \\ \quad \quad \quad a \neq \{0, b\} \end{array}$$

* state the restrictions, then multiply the expressions (canceling any common factors on top and bottom).

$$\frac{a^2}{a} = a \quad \frac{3(a-b)\cancel{a^2}}{\cancel{a}(a-b)} \quad , \quad a \neq \{0, b\}$$

$$3a \quad \text{where } a \neq \{0, b\}$$

Example: $\left(\frac{y^2+y}{y-2}\right)\left(\frac{1}{y+1}\right)$

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

$$\frac{y(y+1)}{(y-2)(y+1)} \rightarrow y \neq \{-1, 2\}$$

$$\frac{y}{y-2}, y \neq \{-1, 2\}$$

① $y-2=0$
 $y=2$

② $y+1=0$
 $\therefore y \neq \{-1, 2\}$

Example: $\frac{x^2-1}{x+3} \times \frac{x-3}{\underbrace{x^2-4x+3}_{m+n} \underbrace{}_{m \times n}}$

① $x+3=0$

② $x-1=0$

③ $x-3=0$

$$\frac{(x+1)(x-1)}{x+3} \times \frac{x-3}{(x-1)(x-3)} \quad , \quad x \neq \{-3, 1, 3\}$$

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

$$\frac{x+1}{x+3} \quad , \quad x \neq \{-3, 1, 3\}$$

2. Division

Example:

$$\frac{2x-4}{x^2+6x+9} \div \frac{x^2-4}{x^2-9} \rightarrow \frac{2(x-2)}{(x+3)(x+3)} \cdot \frac{(x+2)(x-2)}{(x+3)(x-3)}$$

Handwritten annotations: $2(x-2)$ above $2x-4$; $(x+2)(x-2)$ above x^2-4 ; $(x+3)(x+3)$ to the left of x^2+6x+9 ; $(x+3)(x-3)$ to the right of x^2-9 .

* Factor each polynomial, if possible

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

$$\begin{cases} \textcircled{1} x+3=0 \\ \textcircled{2} x-3=0 \end{cases}$$

$$x \neq \{-3, 3\}$$

* State the restrictions.

(keep/switch/flip) * Change divide to multiply and flip over the second fraction. State any new restriction(s) this creates.

$$\begin{cases} \textcircled{3} x+2=0 \\ \textcircled{4} x-2=0 \end{cases} \left. \vphantom{\begin{cases} \textcircled{3} \\ \textcircled{4} \end{cases}} \right\} x \neq \{-2, 2\}$$

$$\frac{2(x-2)}{(x+3)(x+3)} \times \frac{(x+3)(x-3)}{(x+2)(x-2)}, \quad x \neq \{-3, -2, 2, 3\}$$

- * multiply, canceling any common factors on top and bottom.

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

$$\frac{2(x-3)}{(x+3)(x+2)}, \text{ where } x \neq \{-3, -2, 2, 3\}$$

or

$$\frac{2x-6}{x^2+5x+6}, \text{ where } x \neq \{-3, -2, 2, 3\}$$

Example: Divide $\frac{x^2-1}{x+2} \div \frac{x-1}{3x+6}$

$$\frac{(x+1)(x-1)}{x+2} \div \frac{x-1}{3(x+2)} \quad , \quad x \neq -2$$

$$\frac{(x+1)(x-1)}{x+2} \cdot \frac{3(x+2)}{x-1} \quad , \quad x \neq \{-2, 1\}$$

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

$$3(x+1) \text{ or } 3x+3 \quad , \quad x \neq \{-2, 1\}$$