

Chapter 7.1 Rational Expressions

Defin fraction -
rational expression -

Method finding excluded values

1.

2.

3.

Eg. $\frac{17}{x-19}$

① $\frac{3r}{r^2+6r+8}$

② $\frac{9}{x^2-7x+12}$

Signs of a rational expression

1.

2.

3.

Notes

1.

2.

3.

Factoring a "-1"

① Eg $\frac{x+7}{-x-6}$

① $\frac{y-6}{-y^2+3y-19}$

Defin fundamental Property of fractions -

Ⓔg $\frac{15}{45}$

① $\frac{6p^3}{2p^2}$

Method Reducing a fraction

1.

a.

b.

2.

3.

Defin Fundamental property of rational expressions -

Ⓔg $\frac{a^2 - b^2}{a^2 + 2ab + b^2}$

Method Reducing Rational Expressions

1.

2.

a.

b.

① $\frac{3x^2 + 12x^3 - 6x^4}{3x}$

② $\frac{x^2 + 6x + 9}{x^2 - 9}$

$$\textcircled{3} \frac{4x^2 - 12x - 40}{2x^2 - 16x + 30}$$

$\textcircled{\text{Eg}}$ Write $\frac{z^2 - 5}{5 - z^2}$ in lowest terms

$$\textcircled{1} \frac{6x^2 - 13x + 6}{2 - 3x}$$

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

$$\textcircled{3} \frac{27 - x^3}{x^2 + 3x + 9}$$

Note $\frac{a - k}{a + k}$

Method Multiplication of fractions

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd} \Rightarrow \begin{matrix} b \neq 0 \\ d \neq 0 \end{matrix}$$

1.

2.

3.

$$\text{(Eg)} \quad \frac{2}{7} \cdot \frac{5}{10}$$

Method Multiplication of Rational Expressions

(same as for fractions)

$$\frac{A}{B} \cdot \frac{C}{D} = \frac{AC}{BD} \Rightarrow B \neq 0, D \neq 0$$

$$\text{(Eg)} \quad \frac{3(p-q)}{p} \cdot \frac{q}{2(p-q)}$$

Method Reducing Rational expressions

1.

2.

3.

$$\text{(1)} \quad \frac{15x^3y^2}{z} \cdot \frac{z}{5xy^3}$$

$$\text{(Eg)} \quad \frac{x^2+7x+10}{3x+6} \cdot \frac{6x-6}{x^2+2x-15}$$

$$\textcircled{1} \frac{x^2+3x-10}{2x} \cdot \frac{x^2-3x}{x^2-5x+6}$$

$$\textcircled{2} \frac{x^2-y^2}{8x^2-16xy+8y^2} \cdot \frac{4x-4y}{4x+4y}$$

Method

Method Division of fractions

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc} \Rightarrow b, c, d \neq 0$$

1.

2.

3.

$$\textcircled{\text{Ex}} \frac{3}{4} \div \frac{5}{16}$$

Method Division of Rational Expressions

(similar as for fractions)

$$\frac{A}{B} \div \frac{C}{D} = \frac{A}{B} \cdot \frac{D}{C} = \frac{AD}{BC} \Rightarrow B, C, D \neq 0$$

$$\textcircled{\text{Ex}} \frac{9p^2}{3p+4} \div \frac{6p^3}{3p+4}$$

$$\textcircled{1} \frac{3x^2-2x}{4} \div \frac{3x}{16y}$$

$$\textcircled{1} \frac{9x^3}{4} \div \frac{3x}{16y^2}$$

③

$$\textcircled{2} \frac{a-b}{9a+9b} \div \frac{a^2-b^2}{a^2+2ab+b^2}$$

$$\textcircled{3} \frac{x^2-9x+14}{x^2-5x+6} \div \frac{x^2-5x-14}{x+2}$$

$$\textcircled{4} \frac{x^2}{x^2-4} \cdot \frac{x^2-5x+6}{x^2-3x} \div \frac{x^2}{x+2}$$

Chapter 7.3 LCD

Defin Least Common Denominator (LCD) -

(Eg) Find LCD of $\frac{1}{4}, \frac{1}{9}, 8\frac{1}{18}$

Defin LCD for Rational Expressions -

(Eg) $\frac{9}{8m^4}, \frac{11}{12m^6}$

Method Finding the LCD

1.

*

2.

3.

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

Determine the LCD of each

① $\frac{4}{x+2} + \frac{3}{7}$

② $\frac{7}{3x^2} + \frac{8}{19x^5}$

③ $\frac{9}{(x-4)(x+2)} + \frac{x}{(x+2)^2}$

④ $\frac{9}{x^2-5x+6} + \frac{x}{x^2-6x+9}$

$$\textcircled{5} \frac{2x-7}{2x^2+5x+2} - \frac{x^2}{3x^2+4x-4}$$

Defin Equivalent Rational Numbers -

$$\textcircled{\text{Eg}} \frac{8}{25} =$$

Defin Equivalent Rational Expressions -

$$\textcircled{\text{Eg}} \frac{9x^2}{(x+2)^2} =$$

Method Conversion Process

- 1.
- 2.
- 3.
- 4.

Method Add/Subtract fractions with different denominators

$$\frac{a}{b} + \frac{c}{d} =$$

$$\frac{a}{b} - \frac{c}{d} =$$

$$\textcircled{\text{Eg}} \frac{6}{11} = \frac{\quad}{121}$$

Method Adding or Subtracting Rational Expressions

1.

2.

3.

4.

$$\textcircled{\text{Eg}} \frac{2x}{5x-5} = \frac{\quad}{15x-15}$$

$$\textcircled{1} \frac{36x}{x^2-x-6} = \frac{\quad}{(x-3)(x+2)(x+1)}$$

$$\textcircled{2} \frac{3x-1}{x^2+2x+4} = \frac{\quad}{x^3-8}$$

$$\textcircled{3} \frac{15}{x^2-9x} = \frac{\quad}{x(x^2-x-72)}$$

Chapter 7.4 +/- Rational Expr.

Method Adding & Subtracting Fractions w/ Same Den.

- 1.
- 2.
- 3.

$$\frac{a}{b} + \frac{c}{b} =$$

$$\frac{a}{b} - \frac{c}{b} =$$

(Eg) $\frac{7}{15} + \frac{3}{15} =$

Method Adding & Subt. Rational Expressions w/ Same Den.
(same as with fractions)

$$\frac{A}{B} + \frac{C}{B} =$$

$$\frac{A}{B} - \frac{C}{B} =$$

(Eg) $\frac{2x}{x+y} + \frac{2y}{x+y} =$

① $\frac{3x+4}{x+1} + \frac{6x+5}{x+1}$

② $\frac{3x+4}{x+1} - \frac{2x+5}{x+1}$

$$\textcircled{3} \frac{4x^2+5}{9x^2-64} - \frac{x^2-9x+29}{9x^2-64}$$

$$\textcircled{1} \frac{4}{2x+3} + \frac{6x+5}{2x+3}$$

$$\textcircled{2} \frac{3x^2+15x}{x^3+2x^2-8x} + \frac{2x^2+5x}{x^3+2x^2-8x}$$

$$\textcircled{3} \frac{20x^2+5x+1}{6x^2+x-2} - \frac{8x^2-12x-5}{6x^2+x-2}$$

$$\textcircled{4} \frac{x^2-2x+19}{x^2+3x-4} - \frac{2x^2-5x+29}{x^2+3x-4} + \frac{x^2-2x+6}{x^2+3x-4}$$

Method Add/Subt Fractions w/ Differ Denominators

- 1.
- 2.
- 3.
- 4.

$$\frac{a}{b} + \frac{c}{d} =$$

$$\frac{a}{b} - \frac{c}{d} =$$

(Eg) $\frac{1}{10} + \frac{1}{15}$

Method Add/Subt Rational Expr w/ Differ Den.
(similar as with fractions)

$$\frac{A}{B} + \frac{C}{D} =$$

$$\frac{A}{B} - \frac{C}{D} =$$

(Eg) $\frac{m}{3n} + \frac{2}{7n}$

① $\frac{5}{by} + \frac{3}{4y^2}$

② $\frac{-2}{p+1} + \frac{4p}{p^2-1}$

③ $\frac{2k}{k^2-5k+4} + \frac{3}{k^2-1}$

④ $\frac{m}{2m-3n} + \frac{n}{3n-2m}$