8.1 Rational Expressions

$\frac{3}{4}, \frac{7}{10}, \frac{12}{5}$ ..... rational numbers

→ ratio of 2 polynomials

$\frac{a}{b}$ where $b \neq 0$

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

$\frac{x^2}{x-2}$

if $x=1$ $\frac{1^2}{1-2} = \frac{1}{-1} = -1$

if $x=0$ $\frac{0^2}{0-2} = \frac{0}{-2} = 0$

if $x=2$ $\frac{2^2}{2-2} = \frac{4}{0} =$ undefined

if $3x+1=0$

$3x=-1$

$x=-\frac{1}{3}$

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$\frac{5a+3}{a^2-10a+16}$

when is this expression undefined?

$a^2-10a+16=0$

$(a-8)(a-2)=0$

$a-8=0$ OR $a-2=0$

$a=8$ $a=2$

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$\frac{2a^3}{5b^4} \cdot \frac{4a^6}{7b} = \frac{8a^{3+6}}{35b^{4+1}} = \frac{8a^9}{35b^5}$

$-\frac{x+1}{x+5} \cdot \frac{2x-3}{3x+1} = -\frac{2x^2-3x+2x-3}{3x^2+x+15x+5}$

$= -\frac{2x^2-x-3}{3x^2+16x+5}$

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3. $\frac{b-7}{b+5}$

$\frac{3}{1} \cdot \frac{b-7}{b+5}$

$\frac{3b-21}{b+5}$

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

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

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

$\frac{2x^2-5x-12}{x-6}$

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p207 # 2, 12, 24

2) $\frac{5}{2x+10}$ $2x+10=0$ $-10 \quad -10$ $\frac{2x}{2} = \frac{-10}{2}$ $x=-5$

12) $\frac{7x^2}{3y^4} \cdot -\frac{4x^5}{5y^2} = -\frac{28x^7}{15y^6}$

24) $(m-5)\frac{2m+1}{m-6} = \frac{(m-5)}{1} \cdot \frac{(2m+1)}{m-6}$

$= \frac{2m^2+m-10m-5}{m-6} = \frac{2m^2-9m-5}{m-6}$

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8.2 Simplest Form

$\frac{6}{8} = \frac{2\cdot 3}{2\cdot 4} = \frac{2}{2}\cdot\frac{3}{4} = 1\cdot\frac{3}{4} = \frac{3}{4}$

$\frac{6}{8} = \frac{\cancel{2}\cdot 3}{\cancel{2}\cdot 4}$

$\frac{2+3}{2+4} \neq \frac{3}{4} = .75$

$\rightarrow = \frac{5}{6} = .83$

$\frac{12m}{18m} = \frac{\cancel{6}\cdot 2\cdot\cancel{m}}{\cancel{6}\cdot 3\cdot\cancel{m}} = \frac{2}{3}$

$\frac{12m}{18m} = \frac{2}{3}, m\neq 0$

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$\frac{x^2-9x+20}{2x^2-13x+15} = \frac{(x-5)(x-4)}{(2x-3)(x-5)}$

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

$x-5\neq 0$

$x\neq 5$

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$\frac{a-6}{3a-18} = \frac{(a-6)}{3(a-6)} = \frac{1}{3}\cdot\frac{(a-6)}{(a-6)}$

$= \frac{1}{3}, a\neq 6$

x^2-4^2

$-\frac{3x^3-48x}{2x^2-8x} = -\frac{3x(x^2-16)}{2x(x-4)}$

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

$= -\frac{3(x+4)}{2}$ $x\neq 0$ $x\neq 4$

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$\frac{a^2-7a+12}{2a^2-9a+9} = \frac{(a-4)\cancel{(a-3)}}{\cancel{(2a-3)}\cancel{(a-3)}}$

$= \frac{a-4}{2a-3}$

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8.3 The -1 Technique

$\frac{(x-5)}{25-x^2} = \frac{(x-5)}{(5+x)(5-x)}$

5^2-x^2

$(a-b) = -(b-a)$

$7-3=4$

$3-7=-4$

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$\frac{(x-5)}{(5+x)(5-x)} = \frac{(x-5)}{(5+x)(-(x-5))}$

$= -\frac{\cancel{x-5}}{(5+x)\cancel{(x-5)}}$

$= -\frac{1}{(5+x)}$

$-\frac{3}{2}$

$= \frac{3}{-2}$

$= -\frac{3}{2}$

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

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8.4 Quotient of Powers

$$\frac{x^3}{x^2} = \frac{xxx}{xx} = \frac{x}{1} = x$$

$$\frac{x^m}{x^n} = x^{m-n}$$

$$\frac{x^{20}}{x^{10}} = x^{20-10} = x^{10}$$

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$$\frac{18x^3y^7}{20xy^{10}}$$

$$\frac{2\cdot 9x^3y^7}{2\cdot 10xy^{10}} \rightarrow \frac{9x^{3-1}}{10y^{10-7}}$$

$$\frac{9x^2}{10y^3} \qquad \frac{xxxyyyyyyy}{x\ yyyyyyyyy}$$

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$$\frac{m^8p^6(y^2+9y+20)}{m^{11}p^5(-4-y)}$$

$$\frac{m^8p^6(y+5)(y+4)}{m^{11}p^5(-1)(4+y)} = \frac{p(y+5)}{-m^3}$$

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8.5 Simplifying Products

$$\frac{y^2-4y+3}{4y+16} \cdot \frac{2y+8}{y-3}$$

$$\frac{2\cdot 2\cdot 4}{2\cdot 8}\cdot\frac{8\cdot 4}{4\cdot 2} = 4$$

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

$$\frac{2(y-1)}{4\cdot 2} = \frac{y-1}{2}$$

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$$(x-4)\cdot\frac{6x-12}{4x^2-20x+16}$$

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

$$\frac{(x-4)}{1}\cdot\frac{3\,6(x-2)}{4(x-4)(x-1)\ 2} = \frac{3(x-2)}{2(x-1)}$$

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$\frac{m^2-7m+10}{5m^2p^3} \cdot \frac{20m^4p^2}{12-6m}$

$\frac{(m-2)(m-5)}{5m^2p^3} \cdot \frac{20m^4p^2}{6(2-m)}$

$\frac{(m-2)(m-5)(4)(5)\,m^4p^2}{(2-m)\quad 6\,5\,m^2p^3}$

$\frac{-(m-5)2}{3m^3p}$

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8.6 Multiplying and Dividing

$\frac{(x-6)}{(x+3)} \cdot \frac{4}{(x+1)} = \frac{4x-24}{x^2+x+3x+3}$

$= \frac{4x-24}{x^2+4x+3}$

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

$\frac{(x-6)}{(x+3)} \cdot \frac{(x+1)}{4} = \frac{x^2+x-6x-6}{4x+12}$

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8.7 Ratio and Proportion

$5:2$

$\frac{5}{2}$

5 to 2

Ratio

$\frac{5}{2} = \frac{x}{6}$

$\frac{5}{2} = \frac{10}{4}$

$5:2 = x:6$

means / extremes

Proportion

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$2\left(\frac{a}{2}\right) = \left(\frac{3}{5}\right)2$

$a = \frac{3 \cdot 2}{5}$

$a = \frac{6}{5}$

product of the means = product of the extremes

$a:2 = 3:5$

$\frac{a \cdot 5}{5} = \frac{2 \cdot 3}{5}$

$a = \frac{6}{5}$

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$\frac{a}{2} = \frac{3}{5}$

$a \cdot 5 = 2 \cdot 3$

$a = \frac{6}{5}$

$\frac{a}{2} \cdot \frac{3}{5} = \frac{3a}{10}$

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2) $\frac{2}{5} = \frac{x}{4}$ $\quad 2 \cdot 4 = 5 \cdot x$ $\quad 8 = 5x$ $\quad x = \frac{8}{5}$

17) $\frac{y-4}{1} = \frac{2}{y-3}$

$(y-4)(y-3) = 2$

$y^2-3y-4y+12 = 2$

$y^2-7y+12 = 2$

$-2 \quad -2$

$y^2-7y+10 = 0$

$(y-5)(y-2) = 0$

$y-5=0 \quad y-2=0$

$y=5 \quad y=2$

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$\frac{y-4}{1} = \frac{2}{y-3}$ $\frac{5-4}{1} = \frac{2}{5-3}$ $\frac{2-4}{1} = \frac{2}{2-3}$

$\frac{1}{1} = \frac{2}{2}$ $\frac{-2}{1} = \frac{2}{-1}$

$1 = 1$ ✓ $-2 = -2$ ✓

21) 2 of 5 in Union

x of 70,000

$\frac{2}{5} = \frac{x}{70,000}$

$140,000 = 5x$

$x = 28,000$

Jul 14-1:51 PM

Homework:
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