10/8/2012 - Sec 7.1 Math 1010

Natural #'s: $\{1, 2, 3, \ldots\}$

Whole #'s: $\{0, 1, 2, \ldots\}$

Integers #'s: $\{\ldots -3, -2, -1, 0, 1, 2, 3, \ldots\}$

Rational #'s: $\left\{\frac{p}{q} \mid p, q \text{ were both integers}\right\}$

↑ means fractions

Expression: doesnt have an Equal Sign

Sec 7.1 Rational Expressions and Functions
Multiplying and dividing

Rational Expression: is a function defined by a quotient of polynomials

Ex: $f(x) = \frac{2}{x-5}$, $\frac{4x+1}{x^2+3x+2}$

The Domain of a Rational Function is all Real Numbers except those that make the denominator equal zero

Ex: $f(x) = \frac{2}{x-5}$ D: $\{x \mid x \neq 5\}$ $x-5=0$, $+5 \quad +5$, $x=5$

$$\frac{4x+1}{x^2+3x+2}$$

$D: \{x \mid x \neq -2, -1\}$

$x^2+3x+2=0$

$(x+2)(x+1)=0$

$x+2=0 \quad x+1=0$

$-2 \quad -2 \quad -1 \quad -1$

$x=-2 \quad x=-1$

Find Domain for $h(x)=\frac{8x+2}{3}$

$D: \{x \mid x \text{ is a Real Number}\}$

or $(-\infty, \infty)$

Lowest terms

$\frac{10}{15}=\frac{2}{3}$ ✓

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

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

So to write an expression in Lowest terms factor the Numerator and denominator then divide out common factors

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

(x+5) is a term; (x-3) is a term

Remember you can only divide out common factors Not common terms.

$$\frac{(8+k)}{16}$$ ← simplified

(8+k) is a factor

$$\frac{10+2k}{16} = \frac{2(5+k)}{16\ 8} = \frac{5+k}{8}$$

Watch for -1

$$\frac{a-10}{10-a} = \frac{(a-10)}{-1(-10+a)} = \frac{(a-10)}{-1(a+-10)}$$

$$= \frac{(a-10)}{-1(a-10)}$$

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

$$= \boxed{-1}$$

Multiplying Rational Expressions

Recall: $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$

$$\frac{1}{3} \cdot \frac{6}{7} = \frac{6}{3 \cdot 7} = \frac{2 \cdot \cancel{3}}{\cancel{3} \cdot 7} = \frac{2}{7}$$

Ex: $\frac{(5p-5)}{p} \cdot \frac{3p^2}{(10p-10)} = \frac{(5p-5)3p^2}{p(10p-10)}$ ✓

$$= \frac{\cancel{5}(p-1)3p^{\not 2 1}}{p \cdot \cancel{10}_{2}(p-1)}$$

$$= \boxed{\frac{3p}{2}}$$

Ex: $\frac{c^2+2c}{c^2-4} \cdot \frac{c^2-4c+4}{c^2-c}$

$$\frac{\not c(c+2) \cdot (c-2)^{\not 2 1}}{(c-2)(c+2) \cdot \not c(c-1)}$$

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

Ex: $\frac{x^2+2x}{x+1} \cdot \frac{x^2-1}{x^3+x^2} = \frac{(x+2)(x-1)}{x(x+1)}$

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

$= \frac{(x+2)(x-1)}{x(x+1)}$ ✓

Reciprocals: $\frac{3}{2}, \frac{2}{3}$

$4, \frac{1}{4}$

two expressions are reciprocals if their product is 1

$\frac{3}{2} \div \frac{4}{5} = \frac{3}{2} \cdot \frac{5}{4} = \frac{3 \cdot 5}{2 \cdot 4} = \boxed{\frac{15}{8}}$

Ex: $\frac{5p+2}{6} \div \frac{15p+6}{5}$

$\frac{5p+2}{6} \cdot \frac{5}{15p+6} = \frac{(5p+2) \cdot 5}{6 \cdot 3(5p+2)} = \boxed{\frac{5}{18}}$

#78 $(y^2-4) \div \frac{2-y}{8y}$

$\frac{(y^2-4)}{1} \cdot \frac{8y}{(2-y)}$ $\uparrow$ $-(-2+y)$

$\frac{(y+2)(y-2)}{1} \cdot \frac{8y}{-(y-2)}$

$= \frac{8y(y+2)}{-1}$

$= \boxed{-8y(y+2)}$