

SM 3H

DATE: 10/17/23

SECTION: 3.1

OBJECTIVE: I can simplify, multiply, and divide rational expressions.

Review

Rational Number: any # that can be written as a fraction ex. -1, 4, 1/2, -6, 27/4 not pi, sqrt(2), cube root of 4

Expression: math phrase, no =

Rational Expression: math phrase that is a fraction with variables in denominator.

Simplify: 6/8

WAY 1: 6/8 : 2/2 = 3/4 divide both top + bottom by GCF

WAY 2: prime factorization of num + denom, then makes "ones", mult. what's left

6/8 = (2*3)/(2*2*2) = 3/4

Steps for simplifying rational expressions

1. FACTOR!!!!!!

- Types: 1 GCF !!!, 2 dif of sq, 3 sum/dif of cubes, 4 ac/b, 5 grouping

2. Make ones.

3. Write what is left. DO NOT MULTYPLY!

EXAMPLES: Simplify.

$$1. \frac{4x^3y^4}{6xy^6z}$$

$$\frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{y} \cdot \cancel{y} \cdot \cancel{y} \cdot \cancel{y}}{\cancel{2} \cdot \cancel{3} \cdot \cancel{x} \cdot \cancel{y} \cdot \cancel{y} \cdot \cancel{y} \cdot \cancel{y} \cdot \cancel{y} \cdot z}$$

$$\frac{2x^2}{3y^2z}$$

$$2. \frac{x^2+x-12}{x^2-2x-24}$$

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

$$\frac{x-3}{x-6}$$

$$3. \frac{4x^2+2x+1}{8x^3-1}$$

$$\frac{\cancel{(4x^2+2x+1)}}{(2x-1)\cancel{(4x^2+2x+1)}}$$

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

$$4. \frac{5x^2-5x}{1-x} \quad -x+1$$

$$\frac{5x\cancel{(x-1)}}{-1\cancel{(x-1)}}$$

$$-5x$$

$$5. \frac{4x^2-5x-6}{3x^2+2x-16}$$

$$6. \frac{3b^2-20b-32}{7b-56}$$

$$7. \frac{4x^2+25x-21}{16x^2-9}$$

$$\frac{\cancel{(4x-3)}(x+7)}{\cancel{(4x+3)}(4x-3)}$$

$$\frac{x+7}{4x+3}$$

REVIEW

$$1. \frac{14}{27} \div \frac{7}{9} = \frac{14}{27} \cdot \frac{9}{7} = \frac{\cancel{2} \cdot \cancel{7} \cdot \cancel{2} \cdot \cancel{3}}{\cancel{3} \cdot \cancel{3} \cdot \cancel{7}} = \frac{2}{3}$$

STEPS FOR MULTIPLYING AND DIVIDING RATIONAL EXPRESSIONS

1. FACTOR!!!!!!!!!!!!

2. IF divide, do stay change filp.

3. Make ones.

4. Write what is left. DO NOT MULTIPLY!

EXAPMLES: Simplify.

1. $\frac{x}{2} \div \frac{3x}{5}$

~~$\frac{x}{2} \cdot \frac{5}{3x}$~~
 $\frac{5}{6}$

2. $\frac{9x}{25y^2} \cdot \frac{5y^5}{18x^3}$

~~$\frac{8 \cdot 8 \cdot x \cdot 5 \cdot y \cdot y \cdot y \cdot y \cdot y}{8 \cdot 5 \cdot y \cdot y \cdot 2 \cdot 7 \cdot 7 \cdot x \cdot x \cdot x}$~~
 $\frac{y^3}{10x^2}$

3. $\frac{2x-10}{x^2-x-12} \cdot \frac{x-3}{x-5}$

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

4. $\frac{5x-10}{3x^2-5x-2} \div \frac{10}{9x^2-1}$

$\frac{5(x-2)}{(3x+1)(x-2)} \cdot \frac{(3x+1)(3x-1)}{5 \cdot 2}$
 $\frac{3x-1}{2}$

5. $\frac{8x^3-27}{8x^2-10x-3} \cdot \frac{12x+3}{20x^2+30x+45}$

$3x^2-6x+x-2$
 $3x(x-2)+1(x-2)$

$7(x^2+5x+4)$

6. $\frac{7x^2+35x+28}{x+1} \div \frac{x^2-16}{x^2+6x-7}$

~~$\frac{7(x+4)(x+1)}{(x+1)} \cdot \frac{(x+7)(x-1)}{(x-4)(x+1)}$~~
 $\frac{7(x+7)(x-1)}{x-4}$