

Warm-Up:

Factor.

1) $x^2 - 16$

$$(x + 4)(x - 4)$$

2) $x^2 + 4x - 21$

$$(x + 7)(x - 3)$$

Simplify.

3) $\frac{\cancel{x-8}}{(\cancel{x-8})(x+2)} = \frac{1}{x+2}$

Section 8-1: Multiplying and Dividing Rational Expressions

A fraction of two polynomial expressions is called a rational expression.

To simplify, factor the polynomial, then cancel.

Recall that a variable is undefined if it makes the denominator of a fraction equal 0.

Examples:

Simplify.

$$1) \frac{3y(y+7)}{(y+7)(y^2-9)}$$

$$\frac{3y}{y^2-9}$$

$$\frac{3y(y+7)}{(y+7)(y+3)(y-3)}$$

2) Under what conditions is this expression undefined?

$$y \neq 3, -7$$

Examples:

3) For what values of p would make this expression undefined?

$$\frac{p^2 + 2p - 3}{p^2 - 2p - 15}$$
$$(p-5)(p+3)$$

- A) 5 B) -3, 5 C) 3, -5 D) 5, 1, -3

Examples:

4) Simplify.

$$\frac{a^4b - 2a^4}{2a^3 - a^3b}$$

$$\frac{a^4 \cancel{(b-2)}}{a^3 \cancel{(2-b)}} \quad \begin{matrix} (2-b) \\ -1(-b+2) \end{matrix}$$

$$\frac{-a}{1}$$

Examples:

5) Simplify.

$$\frac{\cancel{8}x^{\cancel{1}} \cdot \cancel{7}y^{\cancel{2}}}{\cancel{21}y^{\cancel{3}} \cdot \cancel{10}x^{\cancel{2}}} \quad \begin{matrix} 1 & 1 & 1 \\ 3 & 2 & 2 \end{matrix}$$

$$\frac{1}{6x^2y}$$

Examples:

6) Simplify.

$$\frac{10ps^2}{3c^2d} \div \frac{5ps}{6c^2d^2}$$

$$\frac{\cancel{10}^2 \cancel{p}^1 \cancel{s}^2}{\cancel{3}^1 \cancel{c}^2 \cancel{d}^1} \cdot \frac{\cancel{6}^2 \cancel{c}^2 \cancel{d}^2}{\cancel{5}^1 \cancel{p}^1 \cancel{s}^1}$$

$4sd$

Examples:

7) Simplify.

$$\frac{\cancel{k}^1 - 3}{\cancel{k}^1 + 1} \cdot \frac{\cancel{(1-k)}^1 \cancel{(1+k)}^1}{\cancel{k^2}^2 - 4k + 3}$$

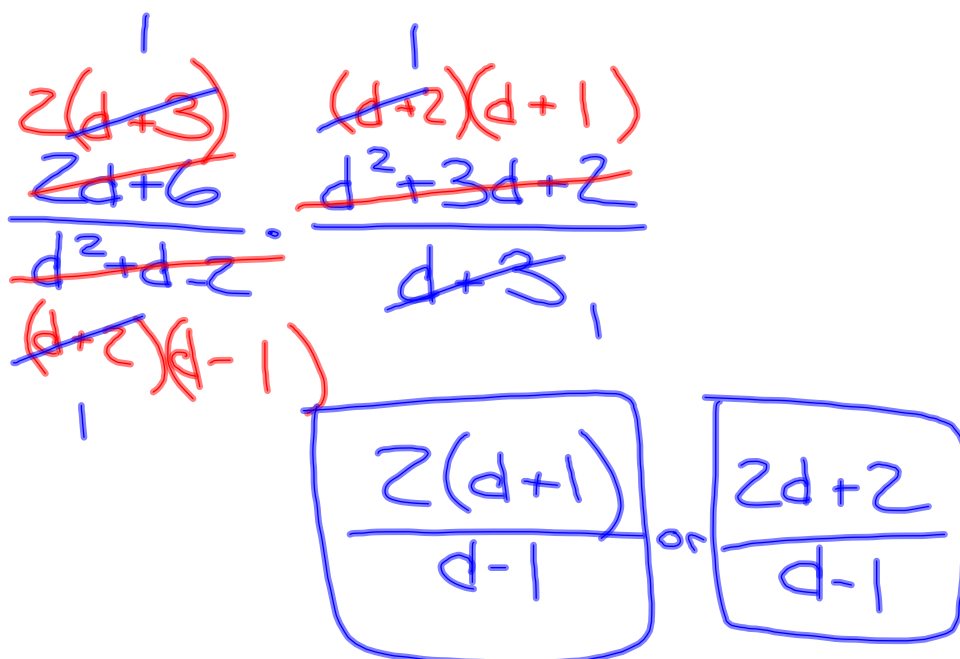
$(k-1)(k-3)$

$$\frac{-1(\cancel{1+k})}{\cancel{k-1}}$$

-1

Examples:
8) Simplify.

$$\frac{2d+6}{d^2+d-2} \div \frac{d+3}{d^2+3d+2}$$


$$\frac{2(d+3)}{d^2+d-2} \cdot \frac{(d+2)(d+1)}{d^2+3d+2}$$
$$\frac{2(d+1)}{d-1} \text{ or } \frac{2d+2}{d-1}$$

Examples:

A complex fraction is a fraction within a fraction.

To simplify, rewrite as a division problem and use the rules for division.

Examples:

9)

$$\frac{\frac{x^2}{9x^2 - 4y^2}}{\frac{x^3}{2y - 3x}} \leftarrow \text{divided by}$$

$$\frac{\cancel{x^2}}{9\cancel{x^2} - 4y^2} \cdot \frac{-1(-2y + 3x)}{\cancel{x^3}}$$

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

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

Homework: pg. 447-449 #16-52 even, 66, 68

Section 8-1 Vocab