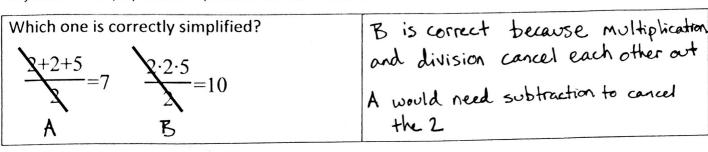
Unit 4

Unit 4.1 Notes: Simplifying Rational Expressions

Objective: To simplify rational expressions and state excluded values in the domain



A Rational Expression is: "Algebra fraction"

* The answer will not exist when the denominator is 0

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

Up to this point with a domain (all possible x's) of all real numbers. Rational Does not exist

functions are the first time we will deal with a domain other than this. 1. For the example above, is there any value of x that we could plug in to make it so the

X \$5 since phygging in 5 would make the bottom equal 0 & you equation not exist? Why or why not? **E** can't divide a number by O

As with all other expressions we have dealt with, you will be required to simply rational expressions.

The big idea to simplifying rational expressions is to: Factor 3 Cancel

- 1) Factor top & bottom
- 3) Cancel factors
- 2) Look at domain
- 2. Example: Simplify the following rational expressions. State any values that are not included in the domain.

in the domain.

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

which cancel it $\frac{21a^2}{7a^3} = \frac{3a^2}{a^3} = \frac{3}{3}$
 $\frac{x \neq 1}{5(x-1)} = \frac{3}{5(x-1)}$
 $\frac{x \neq 1}{5(x+1)} = \frac{3}{5}$

interphasing in $\frac{3x \neq 0}{5(x+1)} = \frac{3}{5}$

bettern 0

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

e) $\frac{3x-6}{x^2+x+6} = \frac{3(x-2)}{(x-2)(x+3)}$

f) $\frac{x-3}{3-x}$

Put in standard form before factoring $\frac{3x-6}{x^2+x+6} = \frac{3(x-2)}{(x-2)(x+3)}$
 $\frac{x+3}{3-x} = \frac{x-3}{-x+3} = \frac{1}{-(x-3)}$
 $\frac{3x}{x+3} = \frac{3}{x+3} = \frac{1}{x+3}$
 $\frac{3x}{x+3} = \frac{3}{x+3} = \frac{1}{x+3}$

g)
$$\frac{4-x^2}{7x-14}$$

h)
$$\frac{y^2 - 16}{4 - y}$$

i)
$$\frac{4-w}{w^2-8w+16}$$

*Use this process for word problems * There are 4 major things to consider when trying to tackle a word problem. 4) Does my answer 1) What is the 3) What do I already 2) What information make sense? problem asking? is given? know that I can use? ex: Sharida't have a regative answer for length processes, etc.

Example: You are choosing between two wastebaskets. One is cylindrical with a height of (2a+8) and a radius of a. The other one is a rectangular prism with a square base area of $4a^2$ and a height of h. If both wastebaskets have the same volume, what is the height of the rectangular wastebasket? Give your height in terms of h.

3 Rectangular: V= l:w·h

Cylindrical: V=752h h=2a+8

 $h = \frac{\pi a^{\frac{1}{2}}(2a+8)}{4a^{\frac{1}{2}}}$

low h = $\pi r^2 h$ Haz

Haz

Haz

Haz

The question wants us
to solve for h, get h

hy itself $h = \frac{\pi a^2(2a+8)}{4a^2} = \frac{2a\pi + 8\pi}{4}$ $h = \frac{a\pi + 4\pi}{2}$ A square has side length 6x + 2. A rectangle with width 3x + 1 has the same area as the square. What is the length of the rectangle?

The length of a rectangular prism is 5 more than twice the width. The volume is $2w^3 + 7w^2 + 5w$. What is a simplified expression for the height of the problem?

(x2)

$$\frac{2w^{3} + 7w^{2} + 5w = (2w + 5)wh}{(2w + 5)w} = \frac{(2w + 5)wh}{(2w + 5)w}$$

$$\frac{2w^3 + 7w^2 + 5w}{(2w+5)w} = h$$

$$\frac{2\omega^{3}+7\omega^{2}+5\omega}{(2\omega+5)\omega} = h$$

$$10\omega^{2} \frac{\omega(2\omega^{2}+7\omega+5)}{(2\omega+5)\omega} = \frac{\omega(2\omega+5)(\omega+1)}{(2\omega+5)\omega}$$

$$5^{2} \frac{(2\omega+5)\omega}{(2\omega+5)\omega} = \frac{\omega(2\omega+5)(\omega+1)}{(2\omega+5)\omega}$$