8.4 Exploration Name: _____

NO calculators are needed for this.

Review:

Think about $(4x)^3$

You could write $(4x) \bullet (4x) \bullet (4x)$

But that is the same thing as $4 \bullet x \bullet 4 \bullet x \bullet 4 \bullet x$

But THAT is the same thing as $4 \bullet 4 \bullet 4 \bullet x \bullet x \bullet x$

And we know THAT is the same thing as $4^3 \bullet x^3$

So $(4x)^3 = 4^3 \bullet x^3$

1. What does $(2h)^6$ simplify to? _____

2. What does $(mp)^5$ simplify to? _____

3. What does $(7wp)^3$ simplify to? _____

Remember what you wrote in the 8.1 closer?

You have the knowledge to fill in the following 3 properties now:

$(ab)^n =$ _____

New (6):

What does your *gut* instinct tell you about $\left(\frac{a}{b}\right)^n =$ _____

Let's investigate it on the next page!

Think about $\left(\frac{3}{4}\right)^6$

You could write $\left(\frac{3}{4}\right)\bullet\left(\frac{3}{4}\right)\bullet\left(\frac{3}{4}\right)\bullet\left(\frac{3}{4}\right)\bullet\left(\frac{3}{4}\right)\bullet\left(\frac{3}{4}\right)$

But that is the same thing as $\frac{3\bullet 3\bullet 3\bullet 3\bullet 3\bullet 3}{4\bullet 4\bullet 4\bullet 4\bullet 4\bullet 4}$

And we know THAT is the same thing as $\frac{3^6}{4^6}$

So $\left(\frac{3}{4}\right)^6 = \frac{3^6}{4^6}$

4. What does $\left(\frac{2}{5}\right)^4$ simplify to? _____

Work it out if you need to!!! Sometimes working it out the long way helps you see the faster way!

5. What does $\left(\frac{x}{3}\right)^7$ simplify to? _____

6. (Careful) What does $\left(\frac{-2}{y}\right)^6$ simplify to? _____ but $y \neq$ ____

7. What does $\left(\frac{a}{b}\right)^n$ simplify to? _____ but $b \neq$ ____

New (7):

I can cancel something that looks like $\left(\frac{3}{3}\right)$ since it is just equal to 1.

In this particular problem: $\frac{3 \bullet 3 \bullet 3 \bullet 3 \bullet 3}{3 \bullet 3 \bullet 3 \bullet 3 \bullet 3 \bullet 3 \bullet 3}$ how many sets of $\left(\frac{3}{3}\right)$ cancel?

Yep, you're right =) $\frac{\cancel{3} \bullet \cancel{3} \bullet \cancel{3} \bullet \cancel{3} \bullet \cancel{3}}{\cancel{3} \bullet \cancel{3} \bullet \cancel{3} \bullet \cancel{3} \bullet \cancel{3} \bullet 3 \bullet 3}$

The final answer would be $\frac{1}{3 \bullet 3}$ or $\frac{1}{3^2}$ or that's just $\frac{1}{9}$

So $\frac{3^5}{3^7} = \frac{1}{3^2}$

ANOTHER WAY TO LOOK AT IT….

Who has more 3's? The numerator or the denominator?

$$\frac{3 \bullet 3 \bullet 3 \bullet 3 \bullet 3}{3 \bullet 3 \bullet 3 \bullet 3 \bullet 3 \bullet 3 \bullet 3}$$

The denominator wins by TWO 3's *(Kind of like tug of war to me!)*

$$\frac{1}{3 \bullet 3}$$

So $\frac{3^5}{3^7} = \frac{1}{3^2}$

<u>IMPORTANT</u>: We need to figure out how to simplify the following: $\frac{a^m}{a^n}$

Try some of these on the back and see what you can figure out

8. What does $\frac{5^9}{5^4}$ simplify to? _____

9. What does $\frac{b^2}{b^9}$ simplify to? _____ but $b \neq$ ____

10. What does $\frac{x^{44}}{x^{41}}$ simplify to? _____ but $x \neq$ ____

11. (Careful) What does $\frac{(-4)^3}{(-4)^{10}}$ simplify to? _____

Do you know all of the properties?

$a^m \bullet a^n =$ _____

$\left(a^m\right)^n =$ _____

$(ab)^n =$ _____

$a^0 =$ _____ provided that $a \neq$ ____

$a^{-n} =$ _____ provided that $a \neq$ ____

$\left(\frac{a}{b}\right)^n =$ _____ provided that $b \neq$ ____

$\frac{a^m}{a^n} =$ _____ provided that $a \neq$ ____