Math 9 – Unit 2: Algebra One Name: ____________________

Lesson #4: More Distributive Property and Powers of Monomials Date: _____________________

Learning Goal: We are learning to expand and simplify more complicated expressions.

Let's start off by continuing our lesson on the Distributive Property. Take a look at the following questions:

Expand AND simplify (put your answers in descending order):

a) $3x\left(4x^2-7x+2\right)+4x^2\left(2x-3\right)$

b) $-4y^2\left(3y^2-5\right)-5y^3\left(6+y\right)$

c) $3mn\left(2m-7n\right)-5m^2\left(4n+8\right)+6n^2\left(3m-n\right)$

Now we are going to go back to discussing monomials. How do we simplify $\left(3x^2y^5\right)^3$? This is called a monomial raised to a power. How does the outside exponent affect the question? First, how does it work with just a number?

Simplify $\left(4^3\right)^2$

The initial exponents were *3* and *2*, with the final exponent a _____. So, 3 ____ 2 = ____! This leads to our second exponent law. When raising a power to a power, ________________ the exponents. Try it out!

a) $\left(x^4\right)^5$ b) $\left(y^2\right)^8$ c) $\left(m^3n^6\right)^4$

That's all well and good (hopefully), but how do you handle a question with a coefficient?

Consider the expression from before, $\left(3x^2y^5\right)^3$. Expand it without using the laws.

The coefficient was just raised to the power of 3! Awesome. Try out some more, this time following the laws.

a) $\left(2x^4y^2\right)^5$ b) $\left(-3m^7n\right)^2$ c) $\left(5a^2b^3c^4d^5\right)^6$

d) $\left(3x^2y^5\right)^2\left(2xy^3\right)$

e) $\left(-4m^3n^2\right)^3\left(3m^4n^3\right)^2$

f) $\left(5x^2y^4z^6\right)^0$ *Whoah!! Exponent of zero? How does that work?*

There are multiple explanations. We will look at a pattern, starting with 4^1 then moving up the ladder.

$4^4 =$

$4^3 =$

$4^2 =$

$4^1 =$

$4^0 =$

As you move up the ladder, you keep multiplying by 4. If you were to go down the ladder, you would ___________ by 4. Follow the pattern to determine what four to the power of zero is.

This leads to another exponent law: Anything to the power of zero is equal to ______.

$\left(5x^2y^4z^6\right)^0 =$

Success Criteria:

- I can use the distributive property to multiply a polynomial with a monomial
- I can use the distributive property to combine multiple variables into a single term
- I can simplify a monomial raised to a power by multiplying the exponents of each variable
- I can recognize that when a coefficient is raised to a power, it is NOT NOT NOT multiplied
- I can understand that raising to the power of zero equals one.