**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per: \_\_\_\_\_\_**

**U11 CW #4** *Exponents pt. 4 – Multiply and Divide with Numbers and Exponents*

Today we will learn to work with more complex terms that include numbers and/or variables in each term, we call these monomials. Examples of monomials are: 5x, 3y2, 12, -4a7

|  |
| --- |
| Let’s identify all the parts of a monomial with an exponent. Use the word bank to fill in the boxes: |

Word Bank

* Base
* Coefficient
* Exponent

Let’s look at the following math problem: $^{}3x^{5}•4x^{2}$

What math operation are we doing? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What two terms are we combining? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

We can solve this problem two ways – Expand and Simplify OR Combine Using the Exponent Rule.

Method #1)

Expand and simplify (use your highlighters to code the steps in instruction and example)

1. Make all exponents positive then Expand out each term
2. List the numbers together then expand each like variable together
3. Numbers – multiply the coefficients
4. Variables – combine the like variables into one variable with an exponent
5. Rewrite as a single term – a monomial

 $ 3x^{5}•4x^{2}=3•x•x•x•x•x•4•x•x=3•4•x^{7}=12x^{7} $

Method #2)

 Simplify using the Exponent Rule (use your highlighters to code the steps)

1. List the numbers together and each like variable
2. Numbers – multiply the coefficients
3. Variables – keep the base and add the exponents
4. Rewrite as a single term – a number and variable with exponent – a monomial

$ 3x^{5}•4x^{2}=3•4•x^{5}•x^{4}=3•4•x^{5+2}=12x^{7} $

Now let’s try:

**Directions:** Simplify each expression. For Problem #1 we will try both methods. For #2 – 4, chose the method you like the best.

|  |
| --- |
| 1.  Method #1Method #2 |
| 2.  |
| 3.   |
| 4. $\left(4xy^{-2}\right)\left(-2xy^{2}z\right)$ |

Let’s look at the following math problem:

$$\frac{12x^{6}}{6x^{4}}$$

What math operation are we doing? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What two terms are we combining? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Just like when we multiply monomials, we can solve this problem two ways – Expand and Simplify OR Combine Using the Exponent Rule.

Method #1)

Expand and simplify (use your highlighters to code the steps in instruction and example)

1. Make all exponents positive and Expand out each term
2. List the numbers together then expand each like variable together
3. Numbers – divide the coefficients
4. Variables – simplify the like variables by canceling out each set
5. Rewrite as a single term – a number and variable with an exponent – a monomial

 $ \frac{12x^{6}}{6x^{4}}=\frac{12•x•x•x•x•x•x}{6•x•x•x•x}=\frac{12}{6}•\frac{x•x•x•x•x•x}{x•x•x•x}=2x^{2} $

Method #2)

 Simplify using the Exponent Rule (use your highlighters to code the steps)

1. List the numbers together and each like variable
2. Numbers – divide the coefficients
3. Variables – keep the base and subtract the exponents
4. Rewrite as a single term – a monomial

$ \frac{12x^{6}}{6x^{4}}=\frac{12}{6}•x^{6-4}=2x^{2} $

**Directions:** Simplify each expression. For Problem #5 we will try both methods. For #6-8, chose the method you like the best.

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| --- |
| 5. $\frac{24x^{8}}{6x^{5}}$ Method #1Method #2 |
| 6.  |
| 7.  |
| 8. $\frac{2x^{5}y^{-3}}{8x^{9}y}$ |

**Practice of negative and zero rules**

**Directions:** Let’s Practice! Simplify the following. Your final answer should have only positive exponents. Expand out then write in exponential form.

**\*\*Remember: the negative exponent only affects the exponent it is attached to.**

 **Don’t flip the whole problem, only the base with the negative exponent.**

|  |  |  |
| --- | --- | --- |
| 9. $\frac{(3x^{-3 })(4x^{-2})}{2x^{-4}y^{0}}$ | 10. $\frac{16r^{2}st^{0}}{4r^{-6}s^{2}}$ | 11. $\frac{a^{-2}• (bc)^{0}}{4b}$ |