Name: Answers Date: ______ Class: ______

common misconceptions exponents

Sometimes it is difficult to tell what the exponent is attached to. One thing to remember is that if there is no exponent, you can insert an imaginary 1 as the exponent. Look at these examples.

$4x^2$ In this example, the x is raised to the power of 2. It is equivalent to 4^1 times x^2.

$(4x)^2$ In this example, both the 4 and the x are raised to the power of 2. Think of it like the distributive property. The exponent of 2 gets "distributed" to everything in parentheses. It is equivalent to 4^2 times x^2.

$(4x^3)^2$ This example has a power being raised to a power. In our investigation last week, we learned that you can multiply the exponents. First, let's make sure we understand what the exponents are. The 4 has no exponent, so it is raised to the power of 1. The x is raised to a power of 3. Since there is also an exponent on the outside of the parentheses, both of these are also being raised to the power of 2. So, it is equivalent to (4^1 times x^3) all raised to the power of 2. You could write this as $4^1 \cdot x \cdot x \cdot x \cdot 4^1 \cdot x \cdot x \cdot x$ or $4^{1x2} \cdot x^{3x2}$ or 4^2x^6 which would be simplified to $16x^6$

Now let's look at this same idea when the power is 0. In our investigation last week, we learned that anything raised to the power of zero is one. But, it is often confusing when you aren't sure what is raised to the power of zero.

Just like above, $4x^0$ is 4 times x^0. Since x^0 is one, this would be $4 \cdot 1$ which is 4. If we raised the whole thing to the power of zero, $(4x)^0$ then both 4 and x are raised to the power of zero, so the answer is 1.

There are some cases where the negative can be confusing. Let's look at some of those.

$(-3)^2$ would mean that -3 is the base and it is being multiplied times itself twice. So, $-3 \cdot -3 = 9$. Remember that multiplying two negatives makes a positive, so the answer would be 9.

If the negative is not in parentheses, think of it like –x. –x is $-1 \cdot x$. So, -3^2 would be $-1 \cdot 3^2$ which would be -9.

Simplify. Write results with positive exponents only.

1. $5^3(5^{12}) = 5^{15}$
2. $7^8(7^4)(7^5) = 7^{17}$
3. $6^2 \cdot 6^5 \cdot 6^9 = 6^{16}$
4. $x^5(x^8) = x^{13}$
5. $y^6(y^3)(y^7) = y^{16}$
6. $m^4 \cdot m \cdot m^{10} = m^{15}$
7. $a^2b^3(a^5b^8) = a^7b^{11}$
8. $7x^5(6x^3) = 42x^8$
9. $4a^7b(-3a^2b^5) = -12a^9b^6$
10. $(4^3)^5 = 4^{15}$
11. $(x^2yz^6)^7 = x^{14}y^7z^{42}$
12. $(2a^4b^5)^8 = 2^8a^{32}b^{40}$
13. $(x^4)^6(x^3)^5 = x^{39}$
14. $(a^3b^4)^5(ab^6)^3 = a^{18}b^{38}$
15. $(2x^4)^3(3x^5)^2 = 72x^{22}$
16. $\frac{5^{11}}{5^2} = 5^9$
17. $\frac{2^3}{2^{10}} = \frac{1}{2^7}$
18. $\frac{8^4}{8^4} = 1$
19. $\frac{x^5y^2}{x^9y^5} = \frac{1}{x^4y^3}$
20. $\frac{18a^3b^{10}}{22a^6b^7} = \frac{9b^3}{11a^3}$
21. $\frac{-12a^2b^6c^4d^8e^3}{20a^3b^4cd^8e^7} = \frac{-3b^2c^3}{5ae^4}$