Name:

Section 2: Exponents – Notes and Re-Test Prep

Multiply a Common Base: **Add** the Exponents

$$3^2 \cdot 3^5 = 3^{2+5} = 3^7$$

$$x^{-2} \cdot x^4 = x^{-2+4} = x^2$$

Divide a Common Base: **Subtract** the Exponents

$$3^{12} \div 3^5 = 3^{12-5} = 3^7$$

$$x^{-2} \div x^{-4} = x^{-2-(-4)} = x^{-2+4} = x^2$$

Power to a Power: **Multiply** the Exponents

$$(3^2)^5 = 3^{2\cdot 5} = 3^{10}$$

$$(x^{-2})^{-4} = x^{(-2)\cdot(-4)} = x^8$$

Zero Power: Equals 1

$$3^0 = 1 \qquad (-2)^0 = 1$$

$$x^0 = 1 \qquad -2^0 = (-1)\cdot 2^0 = -1$$

Forever Positive vs Forever Negative

Brackets – Odd and Even Powers make the difference

$(-2)^3$ is FOREVER NEGATIVE because the Exponent is ODD $\quad (-2)^3 = -2^3 = (-1)2^3$

$(-2)^4$ is FOREVER POSITIVE because the Exponent is EVEN $\quad (-2)^4 = 2^4$

No Brackets – ALWAYS NEGATIVE

$$-2^3 = (-1)2^3$$

$$-2^4 = (-1)2^4$$

Remember: Once you have asked FP vs FN the BRACKETS NEVER COME BACK

Power to a Power FP/FN

Outermost Exponent Matter

EVEN – FOREVER POSITIVE

$\left(-2^3\right)^2$ **is FP, inside to an EVEN POWER so** 2^6

ODD – Depends on the Inside

$\left(-2^2\right)^3$ **is FN, inside is FN to an ODD POWER so** -2^6

$\left((-2)^4\right)^3$ **is FP, inside is FP so the ODD POWER DOESN'T MATTER**

$$\left((-2)^4\right)^3 = 2^{12}$$

ADD and SUBTRACT – NO EXPONENT LAWS

$$-3^3 + 3^4$$

$$-27 + 81$$

$$54$$

Exponent Laws where you can.

$$2^3 \cdot 2^2 - (-2)^3 \div (-2)^2$$

$$2^{3+2} - (-2)^{3-2}$$

$$2^5 - (-2)$$

$$32 + 2 = 34$$

Write the following out as repeated multiplication

Emerging

1. 6^3

2. $(-2)^3$

3. -4^5

4. $-(-m)^6$

Will the following be negative or positive answers, why?

Emerging

5. $(-2)^3$

6. -1^5

Proficient

7. $-(-3)^5$

8. $((-t)^2)^3$

Simplify the following, **leave answers as a base to an exponent**.

Emerging

9. $2^3 \cdot 2^{-4} \cdot 2^3$

10. $(-3)^3 \cdot (-3)^7 \cdot (-3)^4$

11. $4^7 \cdot 4^3 \div 4^6$

12. $w^{-3} \cdot w^7 \cdot w^6$

Proficient

13. $(-a)^4 \cdot a^5 \cdot -a^2 \cdot (-a)^2$

14. $(-6)^3 \div 6^5 \cdot 6^7$

15. $-5^0 \cdot -4^0 \cdot (-2)^0$

16. $(-2^3)^4 \cdot (2^2)^3 \cdot -2^4$

17. $-3^2 \div -3^{-5} \cdot -3^0$

18. $-2^4 \cdot 2^{-5} \cdot (-2)^3$

19. $((-2)^4 \cdot -2^7 \div (-2)^4)^0$

20. $p^3 \div (-p)^4 \div -p^{-2}$

Extending

21. $2^3 + (-2)^2$

22. $(-3)^{-3} \cdot (-3)^5 - (-3)^6 \div 3^3$

23. $-2^4 \div (-2)^2 + 2^4$

24. $(2^2 - 2^3 + 2^4)^2$

Answering These Correctly Guarantee Demonstrate Extending Proficiency

25. $$\frac{(2xy^2)(4x^2y^3)^2}{(12x^2y^2)}$$

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26. $$\frac{(3^{-1}x^{-2}y)^{-1}(5^{-2}x^2y)^{-2}}{(4x^{-2}y^{-3})^2}$$