Algebra 2– Unit 5

Because we will be using exponents extensively in Unit 5, I would like for you to know some of the more common ones <u>without</u> using your calculator. You should know each of the problems on this page by memory.

Problems 1 – 20 have a pattern. Fill in the answers and figure out the pattern.

1. $0^1 =$ 　　　　 2. $1^1 =$ 　　　　 3. $2^1 =$ 　　　　 4. $3^1 =$ 　　　　 5. $4^1 =$

• The problems above illustrate that any number raised to the first power is _____.

6. $0^1 =$ 　　　　 7. $0^2 =$ 　　　　 8. $0^3 =$ 　　　　 9. $0^4 =$ 　　　　 10. $0^5 =$

• The problems above illustrate that 0 raised to any power is _____.

11. $1^1 =$ 　　　　 12. $1^2 =$ 　　　　 13. $1^3 =$ 　　　　 14. $1^4 =$ 　　　　 15. $1^5 =$

• The problems above illustrate that 1 raised to any power is _____.

16. $10^1 =$ 　　　　 17. $10^2 =$ 　　　　 18. $10^3 =$ 　　　　 19. $10^4 =$ 　　　　 20. $10^5 =$

• The problems above illustrate that 10 raised to any power is _____.

Problems 20 – 35 need to be memorized if you do not know them already.

20. $2^2 =$ 　　　　 21. $3^2 =$ 　　　　 22. $4^2 =$ 　　　　 23. $5^2 =$ 　　　　 24. $6^2 =$

25. $7^2 =$ 　　　　 26. $8^2 =$ 　　　　 27. $9^2 =$ 　　　　 28. $11^2 =$ 　　　　 29. $12^2 =$

30. $2^3 =$ 　　　　 31. $3^3 =$ 　　　　 32. $4^3 =$ 　　　　 33. $5^3 =$ 　　　　 34. $2^4 =$

35. $2^5 =$

EXPONENT RULES

Remember that an exponent means "repeated multiplication". You can do any problem in this chapter by writing it out as repeated multiplication and then simplifying. However, the rules below are shortcuts that will save you lots of time. Commit these rules to memory!!

Multiplying Powers

Example: $x^4 \cdot x^3 =$ Rule:

Problems: 1. $y^9 \cdot y^7$ 2. $x^3 y^4 \cdot xy^3$ 3. $\left(3x^2\right)\left(2x^6\right)$ 4. $\left(-2a^6 b^4\right)\left(8ab\right)$

Raising a Power to a Power

Example: $(x^2)^3 =$ Rule:

Problems: 1. $(r^4)^5$ 2. $(a^n)^5$ 3. $(2^5)^2$ 4. $(3^2)^4$

Raising a Product to a Power

Example: $(xy^2)^3 =$ Rule:

Problems: 1. $(xy)^2$ 2. $(4xyz)^2$ 3. $(2x^2 y^3)^4$ 4. $(2 \cdot 4)^3$

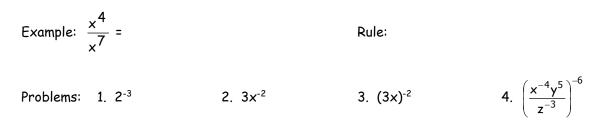## Division of Powers

Example: $\dfrac{x^5}{x^2} =$ Rule:

Problems: 1. $\dfrac{x^{10}}{x}$ 2. $\dfrac{2^7}{2^3}$ 3. $\dfrac{a^4 b^7}{a^2 b^3}$ 4. $\dfrac{8x^5 y^n}{2x^4 y^2}$

A Fraction to a Power

Example: $\left(\dfrac{x}{y}\right)^3 =$ Rule:

Problems: 1. $\left(\dfrac{3}{4}\right)^2$ 2. $\left(\dfrac{x^2 y}{a^3 b^8}\right)^4$ 3. $\left(\dfrac{2x^5}{3y^9}\right)^3$ 4. $\dfrac{12^4}{6^4}$

Negative Exponents

Example: $\dfrac{x^4}{x^7} =$ Rule:

Problems: 1. 2^{-3} 2. $3x^{-2}$ 3. $(3x)^{-2}$ 4. $\left(\dfrac{x^{-4} y^5}{z^{-3}}\right)^{-6}$

Zero as an Exponent

Example: $\dfrac{x^4}{x^4} =$ Rule:

Problems: 1. $c^{-4} \cdot c^4$ 2. $(2x^3 y^7 z^5)^0$ 3. $\dfrac{x^{-5}}{x^{-5}}$ 4. $(3x^0)(-2x^2 y)^0$