Mathematics9 Date _____

Unit 3: Powers & Exponents

3.2 Exponent Laws

Exponent laws are used to **simplify** operations involving powers of the **same base**.

1. Multiplying Powers

Ex. Simplify (express as a single power): $2^3 \times 2^2$

Rule: $\boldsymbol{b^m \cdot b^n =}$

Ex. Simplify:

a) $3^6 \cdot 3^5$ b) $(-5)^7 \times (-5)^3$ c) $\left(\frac{1}{2}\right)^4 \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right)$

2. Dividing Powers

Ex. Simplify (express as a single power): $2^5 \div 2^3$

Rule: $\boldsymbol{\frac{b^m}{b^n} =}$

Ex. Simplify:

a) $5^6 \div 5^2$ b) $\frac{(-6)^8}{(-6)^4}$ c) $\frac{10^{20}}{10}$

3. Zero Exponent

Ex. $\frac{2^3}{2^3}$

Rule: $\boldsymbol{b^0 =}$

Ex. Simplify:

a) $999{,}999{,}999^0$ b) -3^0 c) $(-3)^0$

4. Power of a Product

Ex. Simplify: $(2 \times 3)^3$

Rule: $\boldsymbol{(ab)^n =}$

Ex. Simplify:

a) $(5 \times 4)^6$

b) $(3 \cdot 5 \cdot 7)^4$

***NOTE: Not for adding or subtracting!**

5. <u>Power of a Quotient</u>

Ex. Simplify: $\left(\frac{2}{3}\right)^4$

Rule: $\left(\frac{a}{b}\right)^n =$

Ex. Simplify: $\left(\frac{5}{2}\right)^7$

6. <u>Power of a Power</u>

Ex. Simplify: $(2^2)^3$

Rule: $(b^m)^n =$

Ex. Simplify:

a) $(3^4)^5$

b) $((6^2)^3)^4$

***NOTE: Be careful not to confuse rule # 1 and rule #6!**

Combinations:

Ex. Simplify, then evaluate:

a) $\frac{(2^3)^2 \times 2^5}{2^4 \times 2}$

b) $(2^3 \times 3)^4$