

SUMMARY OF EXPONENT RULES

- LET a be ANY NUMBER (the base), EXCEPT 0 .
- M AND N ARE INTEGERS

$$a^N \cdot a^M = a^{N+M}$$

MULTIPLICATION RULE

FOR EXPONENTS (EX) $3^2 \cdot 3^3 = 3^5$

$$\frac{a^N}{a^M} = a^{N-M}$$

DIVISION RULE FOR

EXPONENTS (EX) $\frac{3^2}{3^3} = 3^{2-3} = 3^{-1}$

$$(a^N)^M = a^{N \cdot M}$$

RAISE POWER TO A POWER RULE

(EX) $(3^2)^3 = 3^6$

$$(ab)^N = a^N b^N$$

RAISE PRODUCT (EX) $(3 \cdot 4)^2 = 3^2 \cdot 4^2$

OR QUOTIENT TO A POWER RULE (EX) $\left(\frac{3}{4}\right)^2 = \frac{3^2}{4^2}$

SPECIAL CASES \Rightarrow CONSEQUENCES OF DIVISION RULE

$$a^0 = 1$$

ZERO EXPONENT RULE

SINCE $\frac{4^3}{4^3}$ MUST = 1, $4^{3-3} = 1$

(EX) $3^0 = 1$

NOTE: $0^0 = \text{UNDEFINED}$

$$a^{-N} = \frac{1}{a^N}$$

NEGATIVE EXPONENT RULE

(EX) $3^{-4} = \frac{1}{3^4}$

*** KEY POINT:** THESE RULES ONLY WORK IF THE BASES

ARE THE SAME. (EX) $5^2 \cdot 5^4 = 5^6$

(EX) $5^2 \cdot 7^4 = \text{CAN'T COMBINE, BASES ARE NOT EQUAL.}$