# Class Notes on The Exponent Rules

*What is a **POWER**?*

When it comes to mathematics, we refer to a **power** as an **exponential expression** used for indicating the numbers of factors involved in multiplication.

There are special rules for **powers** that will make solving questions in this course easier if we apply them correctly. You may have been exposed to these rules way back in the day....

REMEMBER: "ben" FOR EXPONENTS

$$b^e = n$$

exponent (number of times to multiply the base)

$$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$$

base                                  number

What is a **BASE**?

*The base is the number that gets multiplied.*

What is an **EXPONENT**?

*The exponent is the number that tells you the number of times to multiply the base.*

**The Exponent Rules**

# Rule #1: Multiplying Powers with the Same Base

*When multiplying powers with the same base you ADD the exponents.*

$$\text{Example: } a^3 \times a^2 = a^{3+2} = a^5$$

# Rule #2: Dividing Powers with the Same Base

*When dividing powers with the same base you SUBTRACT the exponents.*

$$\text{Example: } a^5 \div a^3 = a^{5-3} = a^2$$

# Rule #3: When Raising Powers to Another Power

*When raising a power to another power you MULTIPLY the exponents.*

$$\text{Example: } (a^4)^2 = a^{4 \times 2} = a^8$$

# Rule #4: Powers with a Negative Exponent

*Powers with a negative exponent can be written as a FRACTION with a POSITIVE exponent.*

$$\text{Example: } a^{-5} = \frac{1}{a^5}$$

*Conversely, a fraction whose denominator has an exponent can be written as a power with a NEGATIVE exponent.*

$$\text{Example: } \frac{1}{a^9} = a^{-9}$$

## **Rule #5:** A Power with an Exponent of One

*When evaluating a power with an exponent of one, the answer will be the base.*

$$Example: a^1 = a$$

## **Rule #6:** A Power with an Exponent of Zero

*When evaluating a power with an exponent of zero, the answer will be one.*

$$Example: a^0 = 1$$