

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

$$b^e = n$$

What is a **BASE**?

The base is the number that gets multiplied.

3⁴ = 3 · 3 · 3 · 3 = 81

base

exponent
(number of times to multiply the base)

number

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.

$$\text{Example: } a^1 = a$$

Rule #6: A Power with an Exponent of Zero

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

$$\text{Example: } a^0 = 1$$