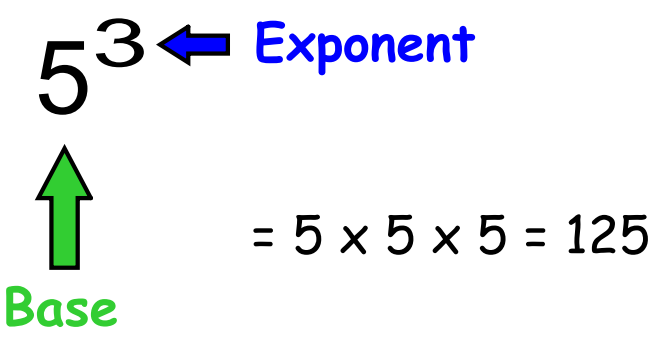
Exponents

Factor—a number multiplied by another number to get a product

Exponent—number that tells you how many times to use the base as a factor

When a number is raised to a power, the number that is used as a factor is the **Base**

A number produced by raising a base to an exponent is the **Power**



Examples:

1.) $4^3 = 4 \cdot 4 \cdot 4$
$16 \cdot 4 = 64$

2.) $2^4 = 2 \cdot 2 \cdot 2 \cdot 2$
$4 \cdot 4 = 16$

3.) $5^2 = 5 \cdot 5 = 25$

Exponential Notation - simplify expression using an exponent.

EX: $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^5$

$x \cdot x \cdot y \cdot y \cdot y = x^2 \cdot y^3$

Expanded Form - write out (using multiplication)

EX: $3^4 = 3 \cdot 3 \cdot 3 \cdot 3$

$a^3b = a \cdot a \cdot a \cdot b$

How do you read exponents?

When you read an exponent, read the base first raised to the power or exponent.

Examples:

2^4 - **Two to the fourth power**

5^2 - **Five to the second power or five** squared

4^3 - **Four to the third power or four** cubed

Power of Zero

When any number (other than zero) has an exponent of zero, the answer is always one.

Examples:

$5^0 = 1$

$60{,}597^0 = 1$

Pattern:

$4^3 = 4 \times 4 \times 4 = 64$
$4^2 = 4 \times 4 = 16$
$4^1 = 4$
$4^0 = 1$

Exponent Rules

Multiplying

- Base numbers must be the same!
- Add the exponents

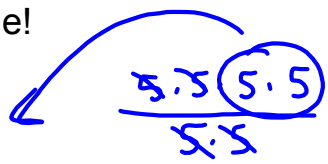
Examples

1.) $10^2 \times 10^4 =$ 10^6

2.) $b^3 \times b^5 =$ b^8

Dividing

- Base numbers must be the same!
- Subtract the exponents



Examples

1.) $5^4 \div 5^2 =$ 5^2

2.) $a^3 \div a^2 =$ a

Powers

- When an exponent is raised to another exponent.
- Multiply the exponents

Examples:

1.) $(10^3)^4$ = 10^{12}

2.) $(b^2)^5$ = b^{10}

Challenge!!

$\frac{5^2 \cdot 5^8}{5^3} = \frac{5^{10}}{5^3} = 5^7$ $\frac{(12^8)}{(12^4)} = 12^4$

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