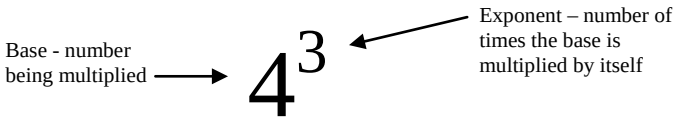
Exponents

Introduction

Whole number exponents stand for repeated multiplication.

For example, 4^3 or "four to the third power," means 4 times *itself* 3 times, or 4 x 4 x 4, or $4 \cdot 4 \cdot 4$
The example, 4^3, equals 64 because $4 \cdot 4 = 16$, which, multiplied by 4 a third time, equals 64.

In the example above, 4 is called the **base**, and 3 is called the **exponent**.



Another example:

$8^4 = 8 \cdot 8 \cdot 8 \cdot 8$

$8 \cdot 8 = 64$
$64 \cdot 8 = 512$
$512 \cdot 8 = 4096$
So, $8^4 = 4096$

In general, b^n is b times itself n times.

The term "squared" means raised to the second power. Three squared is 3^2 or $3 \cdot 3$
The term "cubed" means raised to the third power. Four cubed is 4^3 or $4 \cdot 4 \cdot 4$

Special Exponents

Any number to the power of 1 is the number you started with. For example:

$9^1 = 9$ $\quad 4^1 = 4$ $\quad 1^1 = 1$ $\quad 1000^1 = 1{,}000$ $\quad b^1 = b$

Any number to the 0 power is 1. For example:

$9^0 = 1$ $\quad 4^0 = 1$ $\quad 1^0 = 1$ $\quad 1000^0 = 1$ $\quad b^0 = 1$

Multiplying Exponential Expressions

When multiplying exponential expressions with the same base, keep the base the same and add the exponents. For example:

$4^3 \cdot 4^5 = (4 \cdot 4 \cdot 4) \cdot (4 \cdot 4 \cdot 4 \cdot 4 \cdot 4) = 4^8$ $\quad 7^2 \cdot 7^3 = (7 \cdot 7) \cdot (7 \cdot 7 \cdot 7) = 7^5$ $\quad b^m \cdot b^n = b^{m+n}$

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$$\frac{5 \cdot 5 \cdot 5 \cdot 5}{5 \cdot 5} = 5^2 \qquad \frac{b^m}{b^n} = b^{m-n}$$