

3.4  
 (3)(4)  
 3x4

# 6-1a Integer Exponents Introduction

3<sup>4</sup>

base: the number that gets multiplied.

exponent: tells us how many times to multiply the base

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

exponent form

expanded form

standard form

## Negative and Zero Exponents

Power	5 <sup>5</sup>	5 <sup>4</sup>	5 <sup>3</sup>	5 <sup>2</sup>	5 <sup>1</sup>	5 <sup>0</sup>	5 <sup>-1</sup>	5 <sup>-2</sup>
Value	3,125	625	125	25	5	1	1/5	1/25

÷5   ÷5   ÷5

Zero Exponent: any nonzero number raised to the zero power is 1.

Examples:  $3^0 = 1$        $123^0 = 1$        $x^0 = 1$

Negative Exponent: a nonzero number raised to a negative exponent is equal to 1 divided by that number, raised to the positive exponent.

\* a negative exponent means its on the wrong side of the fraction

Examples:  $4^{-3} = \frac{4^{-3}}{1} = \frac{1}{4^3} = \frac{1}{64}$      $15^{-2} = \frac{15^{-2}}{1} = \frac{1}{15^2} = \frac{1}{225}$      $x^{-7} = \frac{x^{-7}}{1} = \frac{1}{x^7}$

**\*CAUTION\***

In  $(-3)^{-4}$ , the base is negative because the negative sign is inside the parentheses. In  $-(3)^{-4}$  the base (3) is positive.

Examples:  $(-2)^{-4} = \frac{1}{(-2)^4} = \frac{1}{16}$

~~$-2^{-4} = \frac{1}{2^4} = \frac{1}{16}$~~   
 $-2^{-4} = -\frac{1}{2^4} = -\frac{1}{16}$

**MORE EXAMPLES:**

Simplify.

1.  $2^{-6} = \frac{1}{64}$

2.  $(-7)^{-3} = -\frac{1}{343}$

3.  $6^0 = 1$

4.  $-11^2 = -121$

5. A square foot is  $3^{-2}$  yards. Simplify this expression.

$$\frac{1}{9}$$

Evaluate each expression for the given values of the variables.

6.  $(x)^4$  for  $x = 10$   
 $10^{-4} = \frac{1}{10^4} = \frac{1}{10,000}$

7.  $\frac{2a^{-1}b^{-3}}{1}$  for  $a = 6$  and  $b = 3$

$$\frac{2}{a^1 b^3} = \frac{2}{(6)(3)^3} = \frac{2}{6 \cdot 27} = \frac{2}{162} = \boxed{\frac{1}{81}}$$