

## POWERS OF TEN NOTATION

The following is a brief review of the powers of ten notation or scientific notation.

$10^0 = 1$	one	$10^{-1} = .1$	tenth
$10^1 = 10$	ten	$10^{-2} = .01$	hundredth
$10^2 = 100$	hundred	$10^{-3} = .001$	thousandth
$10^3 = 1,000$	thousand	$10^{-6} = .000001$	millionth
$10^6 = 1,000,000$	million		
$10^9 = 1,000,000,000$	billion		
$10^{12} = 1,000,000,000,000$	trillion		

Shifting a decimal point:

$$5,000 = 5 \times 10^3 = \begin{cases} 500 \times 10^1 \\ 50 \times 10^2 \\ .5 \times 10^4 \\ .05 \times 10^5 \end{cases} \qquad .005 = 5 \times 10^{-3} = \begin{cases} 500 \times 10^{-5} \\ 50 \times 10^{-4} \\ .5 \times 10^{-2} \\ .05 \times 10^{-1} \end{cases}$$

Multiplication:

$$10^3 \times 10^2 = 10^5$$

$$(4 \times 10^3) \times (2 \times 10^2) = 8 \times 10^5$$

$$10^a \times 10^b = 10^{a+b}$$

To multiply powers of ten, add the exponents.

Division:

$$10^3 \div 10^2 = 10^1$$

$$(4 \times 10^3) \div (2 \times 10^2) = 2 \times 10^1$$

$$10^a \div 10^b = 10^{a-b}$$

To divide powers of ten, subtract the exponents.

Raising to a power:

$$(10^2)^3 = 10^2 \times 10^2 \times 10^2 = 10^6$$

$$(3 \times 10^2)^3 = (3 \times 10^2) \times (3 \times 10^2) \times (3 \times 10^2) = 27 \times 10^6$$

$$(10^a)^b = 10^{a \cdot b}$$

To raise a power of ten to a power, multiply the exponents.