ASSIGNMENT # 3-1

Name _____

Class _____ Date _____

Numbers Large and Small

A. Scientific Notation

In science, numbers are typically expressed as the product of a number between 1 and 10 and 10 raised to a power. For example, the number $1350 = 1.350 \times 10^3$; $0.002 = 2 \times 10^{-3}$. Such a way of expressing numbers is much more efficient and also simplifies calculations.

When numbers written in such notation are multiplied, the first factors are multiplied and the exponents of 10 are added. For example, $(2 \times 10^4)(3 \times 10^5) = 6 \times 10^9$. When such numbers are divided, the first factors are divided and the exponent of the 10 in the denominator is subtracted from the exponent of the 10 in the numerator.

For example, $\frac{8 \times 10^7}{2 \times 10^3} = 4 \times 10^4$.

1. Convert the following measured quantities from ordinary notation to scientific notation.

	ORDINARY NOTATION	SCIENTIFIC NOTATION
Mean wavelength of sodium light	0.000 000 5893 meters	
Speed of light in a vacuum	299 793 000 meters/second	
Half-life of uranium-235	710 000 000 years	
Atomic mass unit	0.000 000 000 000 000 000 000 001 660 531 grams	
Avogadro's number	602 300 000 000 000 000 000 000	
Melting point of tungsten	3410 °C	

2. Convert each of the following measured quantities from scientific notation to ordinary notation.

	SCIENTIFIC NOTATION	ORDINARY NOTATION
Mass of an electron	9.109×10^{-31} kg	
Temperature at which atomic fusion occurs	1.5×10^7 °C	
Lowest possible temperature	-2.73×10^2 °C	
Diameter of the Andromeda galaxy	1.9×10^{18} km	
Radius of a hydrogen energy level	5.3×10^{-11} m	
Charge of a proton	1.6×10^{-19} coulomb	

3. Express each of the following numbers in scientific notation.

2370 _____

0.03 _____

0.000 000 000 000 274 _____

985 000 000 000 000 000 000 _____

15.045 _____

6003 _____

0.000 045 _____

0.000 000 007 07 _____

4. Express each of the following numbers in ordinary notation.

5.63×10^{-3} _____

6.7×10^{5} _____

1.01×10^{3} _____

9.899×10^{-6} _____

2×10^{6} _____

7.85×10^{-2} _____

3.444×10^{10} _____

2.0002×10^{-4} _____

5. Perform the indicated operations.

$10^{3} \times 10^{6} =$ _____

$\frac{10^{2}}{10^{8}} =$ _____

$10^{-2} \times 10^{5} =$ _____

$10^{-1} \times 10^{10} =$ _____

$\frac{10^{7}}{10^{3}} =$ _____

$\frac{10^{2}}{10^{-5}} =$ _____

6. Perform the indicated operations. Convert all answers to scientific notation, showing the correct number of significant digits.

$(5.4 \times 10^{2})\ (2.5 \times 10^{9}) =$ _____

$(1.2 \times 10^{-5})\ (5.4 \times 10^{6}) =$ _____

$(3.3 \times 10^{-7})\ (6.6 \times 10^{-7}) =$ _____

$(2.56 \times 10^{3})\ (1.00 \times 10^{-1}) =$ _____

$7.25\ \ (5.5 \times 10^{12}) =$ _____

$\frac{(1.5 \times 10^{7})}{(4.5 \times 10^{5})} =$ _____

$\frac{(9.6 \times 10^{2})}{(3.2 \times 10^{8})} =$ _____