Name: _____ Core: _____ Unit 4 – Scientific Notation Review

Part 1: Converting in Scientific Notation – Write each number in scientific notation

1) 230	2) 5601	3) 14,100,000	4) 56 million
5) $\frac{2}{10}$	6) 0.00450	7) 0.089	8) 0.00026
9) 0.000000698	10) $\frac{4}{5}$	11) $\frac{3}{1000}$	12) 12 thousandths
12) Speed of light in a vacuum is 299,792,458 m/s	13) Number of seconds in a day is 86,400 s	14) Mean radius of Earth 6,378 km	15) Density of oxygen gas at 0^0C and pressure of 101kPa is 0.00142 g/mL

Convert the following to scientific notation.

1. 0.005 = _____
2. 5,050 = _____
3. 0.0008 = _____
4. 1,000 = _____
5. 1,000,000 = _____
6. 0.25 = _____
7. 0.025 = _____
8. 0.0025 = _____
9. 500 = _____
10. 5,000 = _____

Convert the following to standard notation.

1. 1.5×10^3 = _____
2. 1.5×10^{-3} = _____
3. 3.75×10^{-2} = _____
4. 3.75×10^2 = _____
5. 2.2×10^5 = _____
6. 3.35×10^{-1} = _____
7. 1.2×10^{-4} = _____
8. 1×10^4 = _____
9. 1×10^{-1} = _____
10. 4×10^0 = _____

Part 2: Operations with Scientific Notation – Use the directions in the box to answer each question.

Addition and Subtraction

Before numbers in scientific notation can be added or subtracted, the exponents must be equal.

Not equal — Equal

$$(3.4 \times 10^2) + (4.57 \times 10^3) = (0.34 \times 10^3) + (4.57 \times 10^3)$$

The decimal is moved to the left to increase the exponent.

$$= (0.34 + 4.57) \times 10^3$$

$$= 4.91 \times 10^3$$

1) $(1.2 \times 10^5) + (5.35 \times 10^6)$	2) $(6.91 \times 10^{-2}) + (2.4 \times 10^{-3})$
3) $(9.70 \times 10^6) + (8.3 \times 10^5)$	4) $(3.67 \times 10^2) - (1.6 \times 10^1)$
5) $(8.41 \times 10^{-5}) - (7.9 \times 10^{-6})$	6) $(1.33 \times 10^5) - (4.9 \times 10^4)$
7) What is the difference between 8×10^8 and 2×10^5.	8) The distance between Howard's house and the school is 521.0469 meters. The distance between Howard's house and his friend, Mya's house, is 837.3346 meters. If Mya walked to Howard's house, and then they both walked to school, how many meters did they walk?
9) $(4 \times 10^3) + (3 \times 10^2)$	10) $(9 \times 10^2) + (1 \times 10^4)$

Multiplication

When numbers in scientific notation are multiplied, only the number is multiplied. The exponents are added.

$$(2.00 \times 10^3)(4.00 \times 10^4) = (2.00)(4.00) \times 10^{3+4}$$

$$= 8.00 \times 10^7$$

Division

When numbers in scientific notation are divided, only the number is divided. The exponents are subtracted.

$$\frac{9.60 \times 10^7}{1.60 \times 10^4} = \frac{9.60}{1.60} \times 10^{7-4}$$

$$= 6.00 \times 10^3$$

1) $(4.3 \times 10^8) \times (2.0 \times 10^6)$	2) $(6.0 \times 10^3) \times (1.5 \times 10^{-2})$
3) $(1.5 \times 10^{-2}) \times (8.0 \times 10^{-1})$	4) $\frac{7.8 \times 10^3}{1.2 \times 10^4}$

5) $\frac{8.1 \times 10^{-2}}{9.0 \times 10^{2}}$	6) $\frac{6.48 \times 10^{5}}{(2.4 \times 10^{4})(1.8 \times 10^{-2})}$
7) Number of nuclear particles in the sun: 2.0×10^{33} grams / 1.7×10^{-24} grams/particle	8) Number of stars in the visible universe: 2.0×10^{11} stars/galaxy x 8.0×10^{10} galaxies
9) Age of the universe in seconds: 1.4×10^{10} years x 3.156×10^{7} seconds/year	10) Number of electron orbits in one year: (3.1×10^{7} seconds/year) / (2.4×10^{-24} seconds/orbit)
11) Energy carried by visible light: (6.6×10^{-27} ergs/cycle) x 5×10^{14} cycles	12) Lengthening of Earth day in 1 billion years: (1.0×10^{9} years) x 1.5×10^{-5} sec/year
13) Tons of TNT needed to make a crater 100 km across $4.0 \times 10^{13} \times (1.0 \times 10^{15})/(4.2 \times 10^{16})$	14) Average density of the sun: 1.9×10^{33} grams / 1.4×10^{33} cm^3
15) Number of sun-like stars within 300 light years (2.0×10^{-3} stars) x 4.0×10^{6} cubic light-yrs	16) Density of the Orion Nebula: ($3.0 \times 10^{2} \times 2.0 \times 10^{33}$ grams) / (5.4×10^{56} cm^3)

Part 3: Review of Operations with Exponents

1) Simplify the expression: $3x^3(xy)^4$	2) What is the greatest factor that both expressions have in common: $4(xy)^2 \; and \; 3(x)^3y$	3) What is the greatest common factor from both expressions: $8x^4y^4 \; and \; -12x^3z^2$
4) Evaluate the expression: $3x(x-2)$	5) Simplify the expression: $\frac{(ab^2c^3(bc)^{-2})}{a^2}$	6) Simplify the expression: $\frac{3x^2(xy)^3}{2x^3y^2}$