

Name: \_\_\_\_\_

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Chemistry 11

**Scientific Notation Key**

Assignment

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

a. 1 240 000 =  $1.24 \times 10^6$

b. 1 280 =  $1.28 \times 10^3$

c. 1 000 000 000 000 000 000 000 =  $1 \times 10^{18}$

d. 0.000 124 =  $1.24 \times 10^{-4}$

e. 0.000 000 000 210 =  $2.10 \times 10^{-10}$

2. The following numbers are written in scientific notation. Write them in the customary decimal form.

a.  $1.32 \times 10^5 = 132\,000$

b.  $2.06 \times 10^3 = 2060$

c.  $6.02 \times 10^{23} = 602\,000\,000\,000\,000\,000\,000\,000$

d.  $1.32 \times 10^{-3} = 0.00132$

e.  $3.45 \times 10^{-6} = 0.000\,00345$

3. Using the rule for multiplying exponential numbers, write the answer to the following as ten raised to the appropriate exponent.

a.  $10^3 \times 10^5 = 10^8$

b.  $10^{-5} \times 10^8 = 10^3$

c.  $10^{-3} \times 10^{-4} = 10^{-7}$

d.  $10^{21} \times 10^{-18} = 10^3$

e.  $10^{14} \times 10^{-6} = 10^8$

4. Using the rule for dividing exponential numbers, write the answer to the following as ten raised to the appropriate exponent.

a.  $10^3 \div 10^5 = 10^{-2}$

b.  $10^{-5} \div 10^8 = 10^{-13}$

c.  $10^{-3} \div 10^{-4} = 10^1$

d.  $10^{-21} \div 10^{-18} = 10^{-3}$

e.  $10^{14} \div 10^{-6} = 10^{20}$

5. Using the rules for multiplying and dividing numbers in scientific notation, calculate the following and place the final answer in proper scientific notation. Don't forget about significant figures.

a.  $(2.1 \times 10^3)(1.86 \times 10^{-2}) = 3.9 \times 10^1$

b.  $(4.5 \times 10^{-4})(6.44 \times 10^{15}) = 2.9 \times 10^{12}$

c.  $(1.11 \times 10^{23})(5.68 \times 10^{-20}) = 6.30 \times 10^3$

d.  $(5.5 \times 10^{-8})(2.99 \times 10^3) = 1.6 \times 10^{-4}$

e.  $\frac{2.1 \times 10^3}{1.86 \times 10^{-2}} = 1.1 \times 10^5$

$1.86 \times 10^{-2}$

f.  $\frac{4.5 \times 10^{-4}}{6.44 \times 10^{15}} = 7.0 \times 10^{-20}$

$6.44 \times 10^{15}$

g.  $\frac{1.11 \times 10^{23}}{5.68 \times 10^{-20}} = 1.95 \times 10^{42}$

$5.68 \times 10^{-20}$

h.  $\frac{5.5 \times 10^{-8}}{3 \times 10^{-10}} = 1.83 \times 10^2$

$3 \times 10^{-10}$

6. Do the indicated additions and subtractions with numbers in scientific notation. Remember that scientific notation numbers must be expressed to the same power of ten before they can be combined. Place all final answers in proper scientific notation.

a.  $(2 \times 10^3) + (4 \times 10^3) = 6 \times 10^3$

b.  $(3 \times 10^2) + (2 \times 10^2) = 5 \times 10^2$

c.  $(5 \times 10^{-3}) + (4.0 \times 10^{-3}) = 9 \times 10^{-3}$

d.  $(6 \times 10^3) + (2.5 \times 10^4) = (0.6 \times 10^4) + (2.5 \times 10^4) = 3 \times 10^4$

e.  $(2.2 \times 10^{-3}) + (1.1 \times 10^{-4}) = (2.2 \times 10^{-3}) + (0.11 \times 10^{-3}) = 2.3 \times 10^{-3}$

f.  $(6 \times 10^3) - (2.5 \times 10^4) = (0.6 \times 10^4) - (2.5 \times 10^4) = -1.9 \times 10^4$