MATH HANDBOOK TRANSPARENCY MASTER 1

Scientific Notation

Use with Appendix B, Scientific Notation

Scientists need to express small measurements, such as the mass of the proton at the center of a hydrogen atom (0.000 000 000 000 000 000 000 000 001 673 kg), and large measurements, such as the temperature at the center of the Sun (15 000 000 K). To do this conveniently, they express the numerical values of small and large measurements in scientific notation, which has two parts.

A number in which only one digit is placed to the left of the decimal → $N \times 10^n$ ← An exponent of 10 by which the number is multiplied

Thus, the temperature of the Sun, 15 million kelvins, is written as 1.5×10^7 K in scientific notation.

Positive Exponents Express 1234.56 in scientific notation.

1234.56

$1234.56 \times 10^0 = 123.456 \times 10^1$

$123.456 \times 10^1 = 12.3456 \times 10^2$

$12.3456 \times 10^2 = 1.234\,56 \times 10^3$

$1.234\,56 \times 10^3$

Each time the decimal place is moved one place to the left, the exponent is increased by one.

Negative Exponents Express 0.006 57 in scientific notation.

$0.006\,57$

$0.006\,57 \times 10^0 = 0.0657 \times 10^{-1}$

$0.0657 \times 10^{-1} = 0.657 \times 10^{-2}$

$0.657 \times 10^{-2} = 6.57 \times 10^{-3}$

6.57×10^{-3}

Each time the decimal place is moved one place to the right, the exponent is decreased by one.

Name _____ Date _____ Class _____

MATH HANDBOOK TRANSPARENCY WORKSHEET 1

Scientific Notation

Use with Appendix B, Scientific Notation

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

a. 230

b. 5601

c. 14 100 000

d. 56 million

e. 2/10

f. 0.450 13

g. 0.089

h. 0.000 26

i. 0.000 000 698

j. 12 thousandth

2. Express each of the following measurements in scientific notation.

a. speed of light in a vacuum, 299 792 458 m/s

b. number of seconds in a day, 86 400 s

c. mean radius of Earth, 6378 km

d. density of oxygen gas at 0°C and pressure of 101 kPa, 0.001 42 g/mL

e. radius of an argon atom, 0.000 000 000 098 m

Chemistry: *Scientific Notation*

***Part A*: Express each of the following in standard form.**

1. 5.2×10^{3}
2. 9.65×10^{-4}
3. 8.5×10^{-2}
4. 2.71×10^{4}
5. 3.6×10^{1}
6. 6.452×10^{2}
7. 8.77×10^{-1}
8. 6.4×10^{-3}

***Part B*: Express each of the following in scientific notation.**

1. 78,000
2. 0.00053
3. 250
4. 2,687
5. 16
6. 0.0043
7. 0.875
8. 0.012654

***Part C*: Use the exponent function on your calculator (EE or EXP) to compute the following.**

1. $(6.02 \times 10^{23})(8.65 \times 10^{4})$
2. $(6.02 \times 10^{23})(9.63 \times 10^{-2})$
3. $\dfrac{5.6 \times 10^{-18}}{8.9 \times 10^{8}}$
4. $(-4.12 \times 10^{-4})(7.33 \times 10^{12})$
5. $\dfrac{1.0 \times 10^{-14}}{4.2 \times 10^{-6}}$
6. $\dfrac{7.85 \times 10^{26}}{6.02 \times 10^{23}}$
7. $(-3.2 \times 10^{-7})(-8.6 \times 10^{-9})$
8. $\dfrac{(5.4 \times 10^{4})(2.2 \times 10^{7})}{4.5 \times 10^{5}}$
9. $\dfrac{(6.02 \times 10^{23})(-1.42 \times 10^{-15})}{6.54 \times 10^{-6}}$
10. $\dfrac{(6.02 \times 10^{23})(-5.11 \times 10^{-27})}{-8.23 \times 10^{5}}$
11. $\dfrac{(3.1 \times 10^{14})(4.4 \times 10^{-12})}{-6.6 \times 10^{-14}}$
12. $\dfrac{(8.2 \times 10^{-3})(-7.9 \times 10^{7})}{7.3 \times 10^{-16}}$
13. $\dfrac{(-1.6 \times 10^{5})(-2.4 \times 10^{15})}{8.9 \times 10^{3}}$
14. $(7.0 \times 10^{28})(-3.2 \times 10^{-20})(-6.4 \times 10^{35})$