

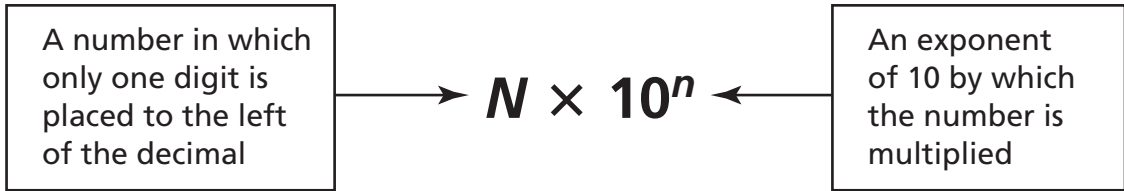
MATH HANDBOOK TRANSPARENCY MASTER



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 (0.000 000 000 000 000 000 000 001 673 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.



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	
Each time the decimal place is moved one place to the left,	$1234.56 \times 10^0 = 123.456 \times 10^1$ $123.456 \times 10^1 = 12.3456 \times 10^2$ $12.3456 \times 10^2 = 1.234\ 56 \times 10^3$ $1.234\ 56 \times 10^3$	the exponent is increased by one.

Negative Exponents Express 0.006 57 in scientific notation.

	0.006 57	
Each time the decimal place is moved one place to the right,	$0.006\ 57 \times 10^0 = 0.0657 \times 10^{-1}$ $0.0657 \times 10^{-1} = 0.657 \times 10^{-2}$ $0.657 \times 10^{-2} = 6.57 \times 10^{-3}$ 6.57×10^{-3}	the exponent is decreased by one.

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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

5. 3.6×10^1

2. 9.65×10^{-4}

6. 6.452×10^2

3. 8.5×10^{-2}

7. 8.77×10^{-1}

4. 2.71×10^4

8. 6.4×10^{-3}

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

1. 78,000

5. 16

2. 0.00053

6. 0.0043

3. 250

7. 0.875

4. 2,687

8. 0.012654

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

1. $(6.02 \times 10^{23})(8.65 \times 10^4)$

8. $\frac{(5.4 \times 10^4)(2.2 \times 10^7)}{4.5 \times 10^5}$

2. $(6.02 \times 10^{23})(9.63 \times 10^{-2})$

9. $\frac{(6.02 \times 10^{23})(-1.42 \times 10^{-15})}{6.54 \times 10^{-6}}$

3. $\frac{5.6 \times 10^{-18}}{8.9 \times 10^8}$

10. $\frac{(6.02 \times 10^{23})(-5.11 \times 10^{-27})}{-8.23 \times 10^5}$

4. $(-4.12 \times 10^{-4})(7.33 \times 10^{12})$

11. $\frac{(3.1 \times 10^{14})(4.4 \times 10^{-12})}{-6.6 \times 10^{-14}}$

5. $\frac{1.0 \times 10^{-14}}{4.2 \times 10^{-6}}$

12. $\frac{(8.2 \times 10^{-3})(-7.9 \times 10^7)}{7.3 \times 10^{-16}}$

6. $\frac{7.85 \times 10^{26}}{6.02 \times 10^{23}}$

13. $\frac{(-1.6 \times 10^5)(-2.4 \times 10^{15})}{8.9 \times 10^3}$

7. $(-3.2 \times 10^{-7})(-8.6 \times 10^{-9})$

14. $(7.0 \times 10^{28})(-3.2 \times 10^{-20})(-6.4 \times 10^{35})$