

1.3 SCIENTIFIC NOTATION

Scientific notation is also known as exponential notation

Scientists frequently must deal with numbers that are very _____ or very _____.

Scientific notation was created to make a shorter way to write very long numbers.

This system uses a coefficient between 1-9 and powers of 10

General form: $N \times 10^n$

N is the coefficient and must be between 1-10

n represents how many times the coefficient is multiplied or divided by 10

Putting standard notation into scientific notation:

32,400,000,000

0.0000000567

Class Practice:

Write each of these numbers in scientific notation:

17 = _____

0.00000614 = _____

5134 = _____

0.0037004 = _____

215 = _____

0.00000038 = _____

7,000,631 = _____

0.01010 = _____

Putting scientific notation BACK into standard notation:

If the number ends with a positive exponent, you are multiplying by 10, therefore move the decimal point to the right. If the number ends with a negative exponent, you are dividing by 10, therefore move the decimal point to the left.

Write each of the following as ordinary numbers.

$4.29 \times 10^6 =$ _____

$4.92 \times 10^{-5} =$ _____

$3.286 \times 10^4 =$ _____

$8.429 \times 10^{-1} =$ _____

$5.92000 \times 10^2 =$ _____

$5.376 \times 10^{-2} =$ _____

Fix the incorrectly written scientific notation

$524 \times 10^3 =$ _____

$0.0026 \times 10^{-5} =$ _____

Scientific Notation in your Calculator

$$1.57 \times 10^{23}$$

1. Type in the coefficient
2. Press the button labeled "2nd"
3. Press the button with the comma, which is also the "EE" key.
4. Enter your exponent.
5. Press enter

This is what it should look like in your calculator before you press "enter":



Let's Practice

1. $(2.3 \times 10^5) \times (7.4 \times 10^8) =$ _____

2. $\frac{4.5 \times 10^{-5}}{1.6 \times 10^{-2}}$ _____

3. $\frac{2.7 \times 10^8}{5.2 \times 10^6 + 7.23 \times 10^4}$ _____

MEASUREMENTS

Measurement: Quantitative observation consisting of TWO parts.

- _____
- _____

Examples: 20 grams, 6.63×10^{-34} Joules •seconds, 12.5 km, 75 mph

The Fundamental Base SI Units

MEMORIZE!!!

<i>Physical Quantity</i>	<i>Name of Unit</i>	<i>Abbreviation</i>
Mass	kilogram	kg
Length	meter	m
Time	second	s
Volume	liter	L
Temperature	Kelvin	K
Amount of Substance	mole	mol

Common Prefixes Used in SI system

- Prefixes are used to change the size of the unit
- Please **MEMORIZE** the following common prefixes:

<i>Prefix</i>	<i>Symbol</i>	<i>Meaning</i>	<i>Power of 10 for Scientific Notation</i>
kilo-	k	1000	10^3
centi-	c	0.01	10^{-2}
milli-	m	0.001	10^{-3}

LENGTH:

- Measurement of distance
- Base SI unit for length is **meter (m)**.
- Common SI units of length:

<i>Unit</i>	<i>Symbol</i>	<i>Meter Equivalent</i>
kilometer	km	1000 m or 10^3 m
meter	m	1 m
centimeter	cm	0.01 m or 10^{-2} m
millimeter	mm	0.001 m or 10^{-3} m

VOLUME:

- Measurement of the amount of 3-D space occupied by a substance
- Base SI unit for volume is **cubic meter(m³)**
- Commonly measure solid volume in cm^3
- 1 mL = 1 cm^3 1 L = 1 dm^3

MASS:

- Measurement of the amount of matter present in an object
- Base SI unit for mass is **kilogram (kg)**.
- 1 kg = 2.2046 lbs 1 lb = 453.59 g

HOMEWORK: Scientific Notation & Measurements

Express each of the following numbers in scientific notation keeping the correct number of significant figures.

- | | |
|------------------------|---------------------|
| 1. 325 _____ | 5. 0.361 _____ |
| 2. 70 _____ | 6. 0.0428 _____ |
| 3. 96,400 _____ | 7. 0.00573 _____ |
| 4. 6,587,324,000 _____ | 8. 0.00005673 _____ |

Write each of the following as ordinary numbers keeping the correct number of significant figures.

- | | |
|--------------------------------|-----------------------------------|
| 9. 3.9734×10^5 _____ | 12. 3.88×10^{-2} _____ |
| 10. 6.285×10^3 _____ | 13. 5.65×10^{-1} _____ |
| 11. 6.7978×10^2 _____ | 14. 3.7283×10^{-4} _____ |

Using a calculator, calculate the following and report the answer in correct scientific notation (YOU DON'T HAVE TO WORRY ABOUT SIGNIFICANT FIGURES).

15. $4.4 \times 10^7 + 5.2 \times 10^2$ _____
16. $8.2 \times 10^{11} \times 1.4 \times 10^8$ _____
17. $\frac{5.7 \times 10^9}{5.2 \times 10^{10} + 5.93 \times 10^2}$ _____

Using your notes fill in the blank(s) for each question.

18. The base SI unit for MASS is _____, LENGTH is _____, and for VOLUME is _____.

19. How many meters are in 2 km?