

## Scientific Notation What, Why, and How

Alicia Caruthers

This handout contains selected slides to use when reviewing this tutorial topic with or without the video. To access all slides, open thumbnail link on the tutorial interface.

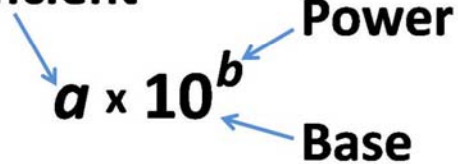
## What Is Scientific Notation?

Scientific notation is used to write very large or very small numbers.

## Scientific Notation

Coefficient

$a \times 10^b$

A diagram showing the components of scientific notation. The expression  $a \times 10^b$  is centered. Three blue arrows point from labels to parts of the expression: one from 'Coefficient' to 'a', one from 'Power' to 'b', and one from 'Base' to '10'.

A number is in scientific notation if it is in the form of

$$a \times 10^b$$

where  $1 \leq a < 10$   
and  $b$  is an integer.

### Standard $\Rightarrow$ Scientific Notation

0.000 000 000 000 000 000 000 000 000 000  
910 938 26 kg

0.000 000 000 000 000 000 000 000 000 000 910 938 26 kg

↓↓↓

1 2 3 4 5 6 7 8 9 ..... 31  $\rightarrow$

$$9.1093826 \times 10^{-31}$$

### Scientific Notation to Standard Form

$a \times 10^b$  If the power is **positive**, move the decimal to the **right**

$a \times 10^b$  If the power is **negative**, move the decimal to the **left**

### Powers of 10

$$10^{-3} = \frac{1}{1000} \text{ or } 0.001$$

$$10^{-2} = \frac{1}{100} \text{ or } 0.01$$

### Powers of 10

$$10^1 = 10$$

$$10^2 = 100$$

# Tutorials for High School Mathematics

## Slides from Scientific Notation: Basics (Tutorial 1)

Standard  $\rightarrow$  Scientific Notation

5,973,600,000,000,000,000,000,000

$$5.9736 \times 10^{24}$$

Standard  $\rightarrow$  Scientific Notation

0.00621

$$6.21 \times 10^{-3}$$

Standard  $\rightarrow$  Scientific Notation

0.00621

$$6.21 \times 10^{-3}$$

$$6.21 \times 0.001$$

0.00621

Scientific  $\rightarrow$  Standard Notation

$$4.327 \times 10^{-3}$$

0.004327

### Scientific $\rightarrow$ Standard Notation

$$2.31 \times 10^{-6}$$
$$0.00000231$$

### Scientific $\rightarrow$ Standard Notation

$$2.36 \times 10^5$$
$$2.36 \times 100,000$$
$$236,000$$

### Scientific $\rightarrow$ Standard Notation

$$2.36 \times 100,000$$
$$236,000$$

$$2.36 \times 10^5$$
$$236,000$$

### Summary

Scientific notation is used to write very large or very small numbers as the product of two factors

$$a \times 10^b$$

where  $1 \leq a < 10$  and  $b$  is an integer.