

Scientific Notation

SWBAT write numbers in scientific and standard notation. SWBAT to compare and order numbers using scientific notation.

Introduction to Scientific Notation:

- You can use powers of 10 to write and compare very large or very small numbers more easily.
- Scientific Notation is a shorthand way to write numbers using powers of 10

Key Concept: A number in scientific notation is written as the product of two factors in the form $a \times 10^n$, where n is an integer and $1 \leq a < 10$

Examples:

Recognizing Scientific Notation:

Writing a number in Scientific Notation:

- Use nonnegative exponents to write numbers greater than 1.
1,430,000,000
- Use negative exponents to write numbers between 0 and 1
.0000000001

What is each number written in scientific notation?

a. 678,000

b. 0.000032

c. 51,400,000

d. 0.0000007

Writing a Number in Standard Notation:

Weight of an Asian elephant: 5.5×10^6 gram

Weight of an ant: 3.1×10^{-3}

What is each number in parts (a)–(d) written in standard notation?

a. 5.23×10^7

b. 4.6×10^{-5}

c. 2.09×10^{-4}

d. 3.8×10^{12}

Comparing Numbers in Scientific Notation:

Indian Ocean: 7.49×10^7



Atlantic Ocean: 1.06×10^8

Arctic Ocean: 1.41×10^7

Pacific Ocean: 1.8×10^8

Using Scientific Notation to Order Numbers

What is order of 49.7×10 , 4.17×10^7 , 0.047×10^9 , and 495 from least to greatest?

Scientific Calculator: You can use a scientific calculator to work with numbers in scientific notation. The E on a calculator readout stands for exponentiation. The readout 1.35E8 means 1.35×10^8 , or 135,000,000. The  key lets you input an exponent for a power of 10. So to enter 4×10^6 , you enter 4  6.

Practice: enter the following into your calculator

8.3×10^5

4.12×10^{22}

7.1×10^{-5}

Addition and Subtraction: Before numbers in scientific notation can be added or subtracted, the exponents must be equal.

$$(3.4 \times 10^2) + (4.57 \times 10^3) =$$
$$(3.67 \times 10^2) - (1.6 \times 10^1) =$$

$$(9.70 \times 10^6) + (8.3 \times 10^5) =$$

Multiplication: When numbers in scientific notation are multiplied, only the number is multiplied. The exponents are added.

$$(2.00 \times 10^3) (4.00 \times 10^4) =$$
$$(1.5 \times 10^{-2}) \times (8.0 \times 10^{-1}) =$$

$$(6.0 \times 10^3) \times (1.5 \times 10^{-2}) =$$

Division: When numbers in scientific notation are divided, only the number is divided. The exponents are subtracted.

$$\frac{9.6 \times 10^7}{1.60 \times 10^4}$$

Word Problems

In July 2010 there were approximately 500 million facebook users. In July 2011 there were approximately 750 million facebook users. How many more users were there in 2011? Write your answer in scientific notation

A state government has 5.7×10^7 dollars invested in a pension fund for retired employees. It expects the investment to double in value every 8 years. What is the investment after 8 years, 16 years and 24 years. Write your response in scientific notation.

The mass of one oxygen atom is 2.66×10^{-26} kg. A cylinder contains 5.97×10^{23} oxygen atoms. What is the mass of the oxygen?

The average distance from Earth to the sun is 1.5×10^{11} m. The speed of light is 3×10^8 m/s. Approximately how long does it take for light to travel from the sun to Earth?

In a vacuum, light travels at the speed of 3×10^8 . In air, light travels at a speed of 2.3×10^8 . How many times faster does light travel in a vacuum than air?

The distance between Mars and Earth varies over time. The greatest distance between the two planets is about 4.01×10^8 km. The shortest distance is 5.45×10^7 km. What is the difference in km between these distances written in scientific notation?

In the year 2006 there were 8.512×10^8 one dollar bills printed. In the year 2007 there were 8.32×10^7 one dollar bills printed. How many more dollar bills were printed in 2006 than 2007?

