

4.2 - Using Scientific Notations to Describe Very Large Quantities

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Standard Form to Scientific Notation

Method 1
 384,000. → Move the decimal point to get a factor greater than or equal to 1 but less than 10.
 $384,000 = 3.84 \times 100,000$ → Write the number as a product of 2 factors.
 $384,000 = 3.84 \times 10^5$ → Write 100,000 as a power of 10.

Method 2
 384,000. → The decimal point moves 5 places to the left.
 $384,000 = 3.84 \times 10^5$ → Use 5 as the exponent of 10.

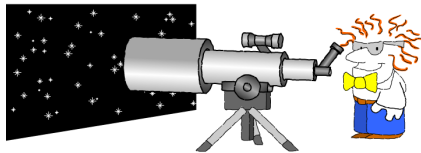
Scientific Notation to Standard Form

Method 1
 $7.32 \times 10^6 = 7.32 \times 1,000,000$ → Write as a product of 2 factors.
 $= 7,320,000$ → Multiply the factors.

Method 2
 $7.32 \times 10^6 = 7.3200000$ → The exponent is 6. Move the decimal 6 places to the right. Insert zeros as necessary.
 $= 7,320,000$

Example

The estimated age of the universe is 1.37×10^{10} years. Express this age in standard form.



1.37×10^{10}
 1.37
 13,700,000,000

Got It?

The moon is about 2.4×10^5 miles from Earth. Express this distance in standard form.

2.4×10^5
 2.4
 240,000

Example

One astronomical unit (AU) is the average distance between Earth and the sun. It is approximately 93 million miles. Express this distance in scientific notation.

93 million
 93,000,000
 9.3×10^7

Got It?

Light travels at a constant speed of 186,000 mi/s. Express the speed of light in scientific notation.

186,000
 1.86×10^5

Example

The table shows numbers of bacteria in four colonies in a microbiology lab. To complete the table, estimate each number in scientific notation using a single digit for the first factor. Then determine whether each statement is true or false.

- a. Colony A has about 40 times as many bacteria as Colony B. T F
- b. Colony C has about 30 times as many bacteria as Colony B. T F
- c. Colony B has about 5 times as many bacteria as Colony D. T F

Colony	Number of Bacteria	Scientific Notation
A	79,854,000	7.9854×10^7
B	2,124,000	2.124×10^6
C	6,180,000	6.18×10^6
D	397,000	3.97×10^5

79,854,000
 8×10^7
 2×10^6 40
 6×10^6 3
 4×10^5 .2

Got It?

A microbiologist observes two colonies of bacteria at the same time. The number of bacteria in each colony is shown. The number of bacteria in Colony A is how many times the number of bacteria in Colony B?

Colony A 4×10^6 ← Colony B 2×10^5

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