





Scientific Notation


Scientific Notation is used when writing a very large number or a number with lots of decimal places, using powers of 10.

Example: $34,000,000,000 = 3.4 \times 10^{10}$.

Converting Standard Form to Scientific Notation

- 1) Move the decimal point in the original number to the right  (or left ) so that the new number is between 1 & 10.
- 2) Count the number of places you moved the decimal.
 - a. If moved to the right , the exponent of the 10 is negative (-).
 - b. If moved to the left , the exponent of the 10 is positive (+).
- 3) Write the new number & double check.

1)


4700


Have to move the decimal 3 places to the left, so that the new number has a value between 1 and 10.

Since we moved the decimal 3 places, and the original number was > 10 , our count is positive 3.

$$4700 = 4.7 \times 10^3$$

2)

0.00047


Have to move the decimal 4 places to the right, so that the new number has a value between 1 and 10.

Since we moved the decimal 4 places, and the original number was < 1 , our count is negative 4.

$$0.00047 = 4.7 \times 10^{-4}$$

Converting Scientific Notation to Standard Form

1) Move the decimal point the number of places in the exponent.

a. If it is positive, move to the right \rightarrow

b. If it is negative, move to the left \leftarrow

1) 5.2738×10^3

Since the exponent is a positive 3, we move the decimal 3 places to the right.

$$5.2738 \times 10^3 = 5273.8$$

2) 6.45×10^{-5}

Since the exponent is a negative 5, we move the decimal 5 places to the left.

$$00006.45 \times 10^{-5} = 0.0000645$$

Operations with Scientific Notation

Multiplying and dividing with numbers written in scientific notation involves using properties of exponents.

Perform the following operations.

$$\begin{aligned} 1) \quad (7.3 \times 10^{-2})(8.1 \times 10^5) &= (7.3 \cdot 8.1) \times (10^{-2} \cdot 10^5) \\ &= 59.13 \times 10^3 \\ &= 59,130 \end{aligned}$$

$$2) \quad \frac{1.2 \times 10^4}{4 \times 10^9} = \frac{1.2}{4} \times \frac{10^4}{10^9} = 0.3 \times 10^{-5} = 0.000003$$