

Scientific Notation—Explanation & Practice

Scientific notation is used to express very large or very small numbers without all of the zeros.

Look at the following examples of a very large number and a very small number. The numbers are written first in standard form and then in scientific notation.

Standard Form

523,000,000
.000000641

Scientific Notation

5.23×10^8
 6.41×10^{-7}

The form of scientific notation is $N \times 10^{\text{power}}$

N represents a number that is greater than or equal to 1, but less than 10.

Converting numbers from standard form to scientific notation.

1. Find the appropriate place for the decimal. (Move it to a position, either left or right, so that there will be one non-zero digit in the units place.)
2. Use “x” for times.
3. Write 10 to a power. (The power is the number of places you move the decimal to its new position. If you move the decimal point to the right, give the exponent a negative sign. If you move the decimal to the left, give the exponent a positive sign.)

Example: Write 372,000,000 in scientific notation.

- Step 1: Choose the correct place for the decimal.
3.72 The number must be 1 or more and less than 10.
- Step 2: Insert the times sign and the base number 10
 3.72×10
- Step 3: The exponent will be the number of places you moved from the original position. Since the decimal moved to the left, the exponent is positive.
 3.72×10^8

Example: Write .00000000172 in scientific notation.

- Step 1: Choose the correct place for the decimal.
1.72 The number must be 1 or more and less than 10.
- Step 2: Insert the times sign and the base number 10
 1.72×10
- Step 3: Include the power. (Since the decimal moved 9 places to the right, the exponent will be – 9. 1.72×10^{-9})

Converting numbers from scientific notation to standard form.

To move from scientific notation into standard decimal notation, you need to move the decimal point either right or left. If the power is positive, move the decimal point to the right. If the power is negative, move the decimal point to the left.

Example: Convert 2.31×10^5 to standard form.

Move the decimal to the right 5 places because the exponent is positive 5.

231,000

Example: Convert 4.12×10^{-3} to standard form.

Move the decimal to the left 3 places because the exponent is negative 3.

.00412

Practice

Write each of the numbers in Scientific Notation.

1. 34.5
2. 123
3. 4000
4. 0.005
- 10.
5. 0.00066
6. 8.9

Write each of the numbers in Standard Form.

7. 7.04×10^4
8. 6.54×10^{-2}
9. 5.5×10^2
- 8.8×10^{-6}
11. 1.2×10^9

Complete the definition:

12. In scientific notation a number is written as the _____ of a whole number that is _____ or more and less than _____ times a power of _____ .

Answer Key:

1. 3.45×10^1
2. 1.23×10^2
3. 4.0×10^3
4. 5.0×10^{-3}
5. 6.6×10^{-4}
6. 8.9×10^0
7. 70,400
8. .0654
9. 550
10. .0000088
11. 1,200,000,000
12. product
1
10
10