

Scientific Notation (Pages 352–356)

Very large or very small numbers can be written in **scientific notation**.

Scientific Notation	A number is expressed in scientific notation when it is in the form $a \times 10^n$, where $1 \leq a < 10$ and n is an integer.
Multiplying by Powers of 10	<ul style="list-style-type: none"> If the exponent is <i>positive</i>, you move the decimal point to the <i>right</i>. If the exponent is <i>negative</i>, you move the decimal point to the <i>left</i>.

Follow these steps to write a number in scientific notation.

- First, place the decimal point after the first nonzero digit.
- Then, find the power of ten by counting the decimal places. When the number is greater than 1, the exponent is positive. When the number is between 0 and 1, the exponent is negative.

EXAMPLES

Express each measurement in standard form.

A 4 gigabytes

$$4 \text{ gigabytes} = 4 \times 10^9 \\ = 4,000,000,000 \text{ bytes}$$

B 1.5 milliamperes

$$1.5 \text{ milliamperes} = 1.5 \times 10^{-3} \\ = 0.0015 \text{ ampere}$$

Express each number in scientific notation.

C 34,000,000

$$34,000,000 = 3.4 \times 10^7$$

D 0.0000028

$$0.0000028 = 2.8 \times 10^{-6}$$

PRACTICE

Express each measure in standard form.

1. 3 milliseconds

2. 2.5 gigabytes

3. 5 kilowatts

Express each number in scientific notation.

4. 3500

5. 0.0015

6. 43.8

7. 0.0000000485

Evaluate each expression. Express each result in scientific notation and standard form.

8. $(5 \times 10^1)(1.5 \times 10^4)$

9. $(6 \times 10^{-3})(0.4 \times 10^{-1})$

10. $(2 \times 10^6)(3.7 \times 10^{-4})$

11. $\frac{26 \times 10^3}{6.5 \times 10^9}$

12. $\frac{9.5 \times 10^8}{1.9 \times 10^2}$

13. $\frac{3.51 \times 10^{-7}}{2.7 \times 10^2}$



14. Standardized Test Practice Evaluate $(1.4 \times 10^8) \div (0.7 \times 10^{-3})$.

A 2×10^4

B 2×10^5

C 2×10^{10}

D 2×10^{11}

Answers: 1. 0.003 second 2. 2,500,000,000 bytes 3. 5000 watts 4. 3.5×10^5 5. 1.5×10^{-3} 6. 4.38×10^1 7. 4.85×10^{-8} 8. $7.5 \times 10^5 = 750,000$ 9. $2.4 \times 10^{-4} = 0.00024$ 10. $7.4 \times 10^2 = 740$ 11. $4 \times 10^{-6} = 0.000004$ 12. $5 \times 10^6 = 5,000,000$ 13. $1.3 \times 10^{-9} = 0.0000000013$ 14. D