

Lesson 4-8

Example 1 Express Numbers in Standard Form

Express each number in standard form.

a. 2.54×10^{-6}

$$2.54 \times 10^{-6} = 2.54 \times 0.000001 \\ = 0.00000254$$

$$10^{-6} = 0.000001$$

Move the decimal point 6 places to the left.

b. 1.8×10^4

$$1.8 \times 10^4 = 1.8 \times 10,000 \\ = 18,000$$

$$10^4 = 10,000$$

Move the decimal point 4 places to the right.

Example 2 Express Numbers in Scientific Notation

Express each number in scientific notation.

a. 520,000

$$520,000 = 5.2 \times 100,000 \\ = 5.2 \times 10^5$$

The decimal point moves 5 places.

The exponent is positive.

b. 0.0006

$$0.0006 = 6.0 \times 0.0001 \\ = 6.0 \times 10^{-4}$$

The decimal point moves 4 places.

The exponent is negative.

c. 321,000,000,000

$$321,000,000,000 = 3.21 \times 100,000,000,000 \\ = 3.21 \times 10^{11}$$

The decimal point moves 11 places.

The exponent is positive.

Example 3 Use Scientific Notation to Solve a Problem

SPACE Light travels 300,000 kilometers per second. Estimate how long it takes light to travel 9.3×10^7 kilometers in space.

Explore You know the distance and the speed of light.

Plan To find the time, solve the equation $d = rt$. Write the speed of light as 3.0×10^5 .

Solve

$$d = rt$$

Write the formula

$$9.3 \times 10^7 = (3.0 \times 10^5)t$$
 Replace d with 9.3×10^7 and r with 3.0×10^5 .

$$\frac{9.3 \times 10^7}{3.0 \times 10^5} = \frac{(3.0 \times 10^5)t}{3.0 \times 10^5}$$
 Divide each side by 3.0×10^5 .

$$3.1 \times 10^2 = t$$
 Divide 9.3 by 3.0 and 10^7 by 10^5 .

So, it would take about 3.1×10^2 seconds or about 5 minutes.

Examine Use estimation to check the reasonableness of these results.

