

### Objective 38-42

Represent a quantity using scientific notation

Vocab:

**Scientific Notation:** a number written as two factors. The first factor is a number *greater than or equal to 1 and less than 10*. The second factor is an integer power of 10. Ex:  $3 \times 10^4$ , which is equal to 3 times 10,000 or 30,000

Example 1: Write 20,000,000 as a number in scientific notation

Step 1: Write 20,000,000 as a decimal number

20,000,000.0

Step 2: Move the decimal point until the resulting number is *greater than or equal to 1 and less than 10*. The resulting number is the first factor.

20,000,000.0  $\rightarrow$  20000000.0  $\rightarrow$  2.0

First factor is 2.0

Step 3: Count the number of spaces the decimal point was moved. The **direction and number of spaces the decimal point moved determines the exponent of the power of 10**. The decimal moved to the *left*, so the exponent is *positive*.

20000000.0  
7 6 5 4 3 2 1

Exponent is positive 7

Step 4: Use the first factor and the power of 10 (exponent) to write 20,000,000 in scientific notation

$2.0 \times 10^7$

Final answer in scientific notation

Guided Practice: Write each quantity in scientific notation

36000

.0005

40,000,000,000

.000000039

Example 2: Write 0.00009 as a number in scientific notation

Step 1: The number 0.00009 is already written as a decimal number, so go directly to step 2.

0.000009 is already a decimal number

Step 2: Move the decimal point until the resulting number is *greater than or equal to 1 and less than 10*. The resulting number is the first factor.

0.00009  $\rightarrow$  0.00009  $\rightarrow$  9.0

First factor is 9 or 9.0

Step 3: Count the number of spaces the decimal point was moved. The **direction and number of spaces the decimal point moved determines the exponent of the power of 10**. The decimal moved to the *right*, so the exponent is *negative*.

0.00009  
1 2 3 4 5

Exponent is negative 5

\*\*\*Notice that the decimal had to move until there was 1 integer in front of the decimal\*\*\*

Step 4: Use the first factor and the power of 10 (exponent) to write .00009 in scientific notation

$9.0 \times 10^{-5}$  ← Final answer in scientific notation

**Practice:** Write each quantity in scientific notation or convert to standard form. *Remember your first factor must be equal or greater than one and less than 10.*

- |                  |                           |
|------------------|---------------------------|
| 1. 100,000,000   | 9.3 × 10 <sup>-2</sup>    |
| 2. 0.002         | 10.256 × 10 <sup>7</sup>  |
| 3. 50,000,000    | 11.6 × 10 <sup>-6</sup>   |
| 4. 0.00076       | 12.5 × 10 <sup>-3</sup>   |
| 5. 4,000,000,000 | 13.859 × 10 <sup>9</sup>  |
| 6. 0.0000005     | 14.644 × 10 <sup>-5</sup> |
| 7. 9,500,000,000 | 15.37 × 10 <sup>4</sup>   |
| 8. .0000000008   | 16.17 × 10 <sup>3</sup>   |

**Additional Help:**

[www.khanacademy.org/math/pre-algebra/exponents-radicals/scientific-notation/v/scientific-notation](http://www.khanacademy.org/math/pre-algebra/exponents-radicals/scientific-notation/v/scientific-notation)  
<http://www.purplemath.com/modules/exponent3.htm>