Scientific Notation

Scientists often work with very large and very small numbers, however these can be _____to work with. To simplify matters we write these numbers using _____ or _____ _____.

In scientific notation, the numerical part of the measurement is a number from 1 to (and including) 9 multiplied by a whole-number power of 10.

For example: 6×10^3
The number 6 is between 1 and 9 and is followed by a whole number power of 10 (10^3).
6×10^3 is _____.

To use scientific notation:

1. Move the decimal to the left or right until it is behind the first digit
2. Write the new number x 10
3. Count the number of spaces you moved the decimal. This is the exponent (power) of 10.
4. Look at the direction you moved your decimal:
   - Left = positive exponent (e.g. 10^4)
   - Right = negative exponent (e.g. 10^{-4})
5. Write the proper value of the exponent by the 10.

Examples

1. _____ _____- 36000 written in scientific notation is_____. Count the number of decimal places you move to the left and this becomes the exponent.

2. _____ _____- 0.00015 written in scientific notation is _____. Notice that a negative exponent is used when moving the decimal to the right.

To change from scientific notation to standard form:

1. Move the decimal to the _____ for a positive exponent of 10.

2. Move the decimal to the _____ for a negative exponent of 10.

3. Write the value in standard form.

Examples

1. **Positive exponents** - 7.044×10^2 - move the decimal to the right two places to become 704.4

2. **Negative exponents** - 1.28×10^{-5} - move the decimal to the left 5 places to become 0.0000128

DATE: NAME: CLASS:

GENERAL
MATH-RELATED SCIENCE SKILLS

BLM G-25

Scientific Notation

Goal • Practise writing very small and very large numbers using scientific notation.

Background

Extremely large or small numbers are awkward to record in full. Scientists find it easier to report such numbers in a standard form referred to as scientific notation.

For scientific notation, one digit (other than 0) is placed before the decimal point. The other significant digits are placed after the decimal point.

What to Do

- Read page 587 in *SCIENCEPOWER™ 10.*
- Use the information from there to help you answer the questions below.

Questions

1. Using scientific notation, you can show the distance between Mercury and the Sun as 5.8×10^7 km rather than as 58 000 000 km. Explain what 10^7 means.

_____

_____

2. Describe the effect on the exponent of moving a decimal the following directions:

(a) to the left _____

(b) to the right _____

3. Rewrite the following measurements in scientific notation:

(a) 0.000045 km _____ (b) 456 000 000 g _____

(c) 90 200 s _____ (d) 0.0076 cm _____

(e) 290 000 N _____ (f) 0.00457 W _____

(g) 0.000042 km _____ (h) 456 L _____

(i) 20 s _____ (j) 0.0623 W _____

4. Rewrite the following in full.

(a) 9.6×10^4 m _____ (b) 0.56×10^{-4} cm _____

(c) 3.4×10^{-3} m _____ (d) 1.6×10^2 m _____

(e) 4.56×10^{-1} cm _____ (f) 3×10^0 m _____

SCIENTIFIC NOTATION

Name _____

Scientists very often deal with very small and very large numbers, which can lead to a lot of confusion when counting zeros! We have learned to express these numbers as powers of 10.

Scientific notation takes the form of $M \times 10^n$ where $1 \leq M < 10$ and n represents the number of decimal places to be moved. Positive n indicates the standard form is larger than zero, whereas negative n would indicate a number smaller than zero.

Example 1: Convert 1,500,000 to scientific notation.
Move the decimal point so that there is only one digit to its left, a total of 6 places.

$1{,}500{,}000 = 1.5 \times 10^6$

Example 2: Convert 0.00025 to scientific notation.
For this, move the decimal point 4 places to the right.

$0.00025 = 2.5 \times 10^{-4}$

(Note that when a number starts out less than one, the exponent is always negative.)

Convert the following to scientific notation.

1. 0.005 = _____
2. 5,050 = _____
3. 0.0008 = _____
4. 1,000 = _____
5. 1,000,000 = _____
6. 0.25 = _____
7. 0.025 = _____
8. 0.0025 = _____
9. 500 = _____
10. 5,000 = _____

Convert the following to standard notation.

1. 1.5×10^3 = _____
2. 1.5×10^{-3} = _____
3. 3.75×10^{-2} = _____
4. 3.75×10^2 = _____
5. 2.2×10^5 = _____
6. 3.35×10^{-1} = _____
7. 1.2×10^{-4} = _____
8. 1×10^4 = _____
9. 1×10^{-1} = _____
10. 4×10^0 = _____