Examples
Scientific Notation

Based on power point presentations by Pearson Education, Inc.
Revised by Ingrid Stewart, Ph.D.

Learning Objectives

1. Write numbers as powers of 10.
2. Define scientific notation.
3. Change from standard notation to scientific notation.
4. Change from scientific notation to standard notation.

Example 1: Powers of 10

Write the following numbers as powers of ten.

10

$= 10^1$

NOTE: We have 1 zero, and the power is 1.

100

$= 10^2$

NOTE: We have 2 zeros, and the power is 2.

1,000

$= 10^3$

NOTE: We have 3 zeros, and the power is 3.

10,000

$= 10^4$

NOTE: We have 4 zeros, and the power is 4.

Example 2: Powers of 10

Write the following numbers as powers of ten.

0.1

$= 10^{-1}$

NOTE: The 1 is 1 place to the right of the decimal point, and the power is – 1.

0.01

$= 10^{-2}$

NOTE: The 1 is 2 places to the right of the decimal point, and the power is – 2.

0.001

$= 10^{-3}$

NOTE: The 1 is 3 places to the right of the decimal point, and the power is – 3.

0.0001

$= 10^{-4}$

NOTE: The 1 is 4 places to the right of the decimal point, and the power is – 4.

Example 3: Change from Standard Notation to Scientific Notation (1 of 2)

Change **154000** to scientific notation using all non-zero digits.

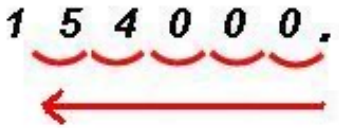
Step 1:

We need to write the number as a value between 1 and 10.

We get 1.54 using all non-zero digits.

Step 2:

Now we count the number of places the decimal point has shifted after writing 154000 as a value between 1 and 10.



We moved the decimal point 5 places to the **left**.

Example 3: Change from Standard Notation to Scientific Notation (2 of 2)

Step 2 continued:

Since the decimal point has shifted 5 places to the **left**, the exponent of the base 10 is **positive 5**.

We use 10^5 .

Step 3:

We multiply the number found in Step 1 with the exponential expression found in Step 2 using the multiplication symbol $\times$.

The number **154000** is written as 1.54×10^5 in scientific notation.

Example 4: Change from Standard Notation to Scientific Notation (1 of 2)

Change **0.0279** to scientific notation using all non-zero digits.

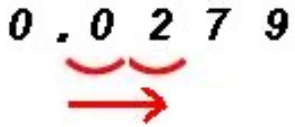
Step 1:

We need to write the number as a value between 1 and 10.

We get 2.79 using all non-zero digits.

Step 2:

Now we count the number of places the decimal point has shifted after writing 0.0279 as a value between 1 and 10.



We moved the decimal point 2 places to the **right**.

Example 4: Change from Standard Notation to Scientific Notation (2 of 2)

Step 2 continued:

Since the decimal point has shifted 2 places to the **right**, the exponent of the base 10 is **negative 2**.

We use 10^{-2} .

Step 3:

We multiply the number found in Step 1 with the exponential expression found in Step 2 using the multiplication symbol $\times$.

The number **0.0279** is written as 2.79×10^{-2} in scientific notation.

Example 5: Change from Standard Notation to Scientific Notation (1 of 2)

Change **0.0005467** to scientific notation using all non-zero digits.

Step 1:

We need to write the number as a value between 1 and 10.

We get 5.467 using all non-zero digits.

Step 2:

Now we count the number of places the decimal point has shifted after writing 0.0005467 as a value between 1 and 10.

We moved the decimal point 4 places to the **right**.

Example 5: Change from Standard Notation to Scientific Notation (2 of 2)

Step 2 continued:

Since the decimal point has shifted 4 places to the **right**, the exponent of the base 10 is **negative 4**.

We use 10^{-4} .

Step 3:

We multiply the number found in Step 1 with the exponential expression found in Step 2 using the multiplication symbol $\times$.

The number **0.0005467** is written as 5.467×10^{-4} in scientific notation.

Example 6: Change from Scientific Notation to Standard Notation

a. Change 5.67×10^{3} to standard notation.

Using the calculator, we get ***5670***.

b. Change 7.4×10^{-3} to standard notation.

Using the calculator, we get ***0.0074***.