

1.1

Scientific Notation with Big Numbers

Fill out the following table.

Exponent Form	Standard Form
10^2	100
10^3	
10^4	
10^6	

What is the relationship between

these exponents...

and these zeros?

Fill in the blanks below. (Look above for reference)

$$3,000 = 3 * 1,000 = 3 * 10 \text{ —}$$

$$50,000 = 5 * 10,000 = 5 * 10 \text{ —}$$

$$710,000 = 7.1 * \text{ — } = \text{ — } * 10 \text{ —}$$

1.2

3,200 divided by 1,000 is 3.2

So... (fill in the blank)

$$3,200 = \text{ — } * 10^3$$

This expression is written in **scientific notation**. Scientists use a lot of big numbers, and writing them this way is easier.

The **format of scientific notation** is

$$c * 10^n$$

Where "c" must be greater than or equal to 1, and less than 10.

Check off which of the following are NOT in scientific notation and write why:

- $2 * 10^3$ _____
- $0.3 * 10^2$ _____
- $3 * 100^8$ _____
- $4.5 * 10^{-8}$ _____
- $12.3 * 10^6$ _____

1.3

Write the following in scientific notation

149,598,000,000 miles (approximate distance between earth and sun)

\$10,802,000,000,000 (current United States debt)

2.1

Scientific Notation with Small Numbers

Scientists also use a lot of small numbers. Scientific notation is useful for that too.

$$0.01 = 1/100 = 1/(1 * 10 \text{ —}) = 1 * 10 \text{ —}$$

Convert decimal to fraction

Convert 100 to an exponential expression

Convert the fraction to a non-fraction (use a negative exponent) for scientific notation.

2.2

Fill out the following table using the method from 2.1.

Standard Form	Scientific Notation
0.01	$1 * 10^{-2}$
0.001	
0.0001	
0.000001	

What is the relationship between...

the placement of the decimal point in this column...

and the absolute value of the exponent in this column?

Fill in the blanks below. (Look above for reference)

$$0.003 = 3 * 0.001 = 3 * 10 \text{ —}$$

$$0.0005 = 5 * \text{ — } = 5 * 10 \text{ —}$$

$$0.00071 = 7.1 * \text{ — } = \text{ — } * 10 \text{ —}$$

2.3

Write the following in scientific notation

0.003 centimeters (width of human hair)

0.0001 grams (mass of grain of salt)

See page 512 in your textbook for a shortcut for converting to scientific notation.

3.1

How to compute with scientific notation

$$(8.5 * 10^2)(1.7 * 10^6)$$

Simplify this in scientific notation.

$$8.5 * 10^2 * 1.7 * 10^6$$

The commutative property lets you get rid of the parentheses.

$$(8.5 * 1.7)(10^2 * 10^6)$$

Regroup, making sure to group 10^n expressions together.

$$\text{ — } * \text{ — }$$

Simplify within the parentheses.

3.2

$$14.45 * 10^8$$

You should have ended up with this in 3.1.

$$(1.445 * \text{ — }) * 10^8$$

Write 14.45 in scientific notation.

3.3

$$(1.445 * 10^1) * 10^8$$

You should have ended up with this in 3.2.

$$1.445 * (10^1 * 10^8)$$

Group 10^n expressions together again.

$$\text{ — }$$

Simplify within the parentheses for final answer.