Scientific Notation
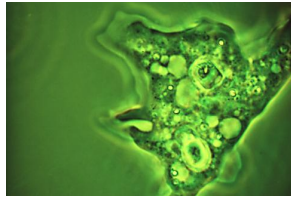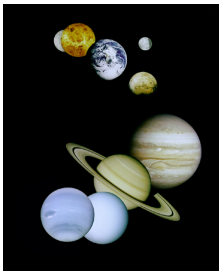
Beverly Austin

Scientific notation is used to write really big numbers.

convert standard form →←→ scientific notation

> Move the star to count the number of decimal places.
>
> The amount of moves will give you the exponent value.

123,000,000,000 ☆ 1.23×10^{11}

45,000,000 ☆ 4.5×10^{7}

67,800,000,000,000 ☆ 6.78×10^{13}

9,000 ☆

$$9.0 \times 10^{3} = 9 \times 1000 = 9000$$

Scientific notation is used to write really big numbers.

scientific notation → standard notation

$7.82 \times 1000 = 7820.0$

$7.82 \times 10^{3} = 7820.$

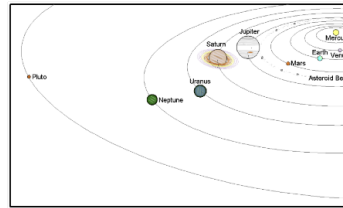$3.04 \times 10^{8} = 304\,000\,000$

$5 \times 10^{4} = 50000$

$6.2103 \times 10^{10} = 62103000000$

> The exponent tells you how many decimal places to move.

A positive exponent will make the decimal number larger

As the planets orbit the sun, the closest Pluto get to Earth is approximately 2,700,000,000 km.

$$2.7 \times 10^{9} \text{ km}$$

An example of a really big number.
Please write it in scientific notation.

The speed of light in a vacuum is approximately 360,000,000 metres per second

$$3.6 \times 10^{8} \text{ m/s}$$

☆

Sort the given values.

Written in proper scientific notation

2.1203×10^{-16}

2.35×10^{5}

5×10^{-9}

3.214×10^{1}

6.09×10^{7}

1.9×10^{-22}

-4.89×10^{8}

4.59×10^{-5}

1.03×10^{10}

45.9×10^{-6}

Not written in proper scientific notation

-78.3×10^{23}

10.3×10^{9}

Scientific notation is used to write really small numbers.

Standard *decimal notation* → scientific notation

0.000000034 3.4×10^{-8}

0.0000000005609 5.6×10^{-10}

−0.000000000064 6.4×10^{-11}

0.007

Move the star to count the number of decimal places.

The amount of moves will give you the exponent value.

Scientific notation is used to write really small numbers.

scientific notation → *standard notation*

$4.8 \times 10^{-6} \Rightarrow 0.0000048$

1.2×10^{-12} 0.0000000000012

$9 \times 10^{-2} = 0.09$

7.1034×10^{-5}
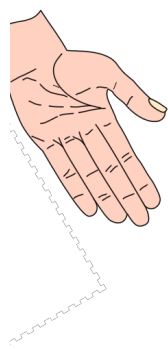
The exponent tells you how many decimal places you need to move.

A negative exponent will make the decimal number smaller

An example of a really small number. Please write it in scientific notation.

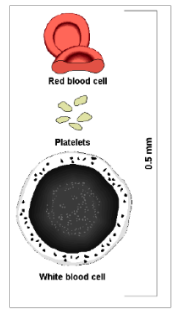Human fingernails grow at a rate of about 0.00562 cm per day.

5.62×10^{-3} cm/day

An example of a really small number. Please write it in scientific notation.

The thickness of a red blood cell is approximately 0.0003125 of an inch.

3.125×10^{-4}

3.13×10^{-4}

Red blood cell

Platelets

White blood cell

0.5 mm

Think of 5 objects (that have NOT been discussed already) where using scientific notation would be useful.

1.)

2.)

3.)

4.)

5.)

Back up! Let's Review!

a number between 1 and 10

$\times 10$

how many spots the decimal moved

decimal

If your original number was small, your exponent will be negative.

If your original number was large, your exponent will be positive.

Got it?

When do you write a negative exponent when converting from standard form to scientific notation?

If value is less than '1'

When do you write a positive exponent when converting from standard form to scientific notation?

If value is bigger than 10

When writing the following numbers in scientific notation, will the exponent have a positive or negative exponent?

positive exponent

negative exponent
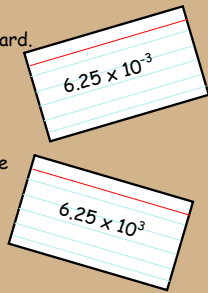
negative exponent

positive exponent

Do Now - Activity

Get into a group 5.

Assign each group member to an index card.

Order the index cards in your group from least to greatest.

Be sure to discuss a reason why you have ordered the numbers this way.

6.25×10^{-3}

6.25×10^3

Extra Practice

Rewrite the number represented in scientific notation in standard form.

1. 3.79×10^5

2. 2.5×10^{-2}

3. 8.44×10^1

5. 3.589×10^{-3}

Rewrite in scientific notation.

7,960,000,000

0.007485

45.668

998.653

0.0000056388

Using Calculators

2.53×10^7

[2.53] [EXP] [7] [=]

[EE]

Calculate

$(6.02 \times 10^{23}) \cdot (8.65 \times 10^4)$

$= 52.073 \times 10^{27}$

$= 5.21 \times 10^{28}$

$\dfrac{6.02m^{23} \times 8.65m^4}{52.073m^{27}}$

$\dfrac{(3.1 \times 10^{14})(4.4 \times 10^{-12})}{-6.6 \times 10^{-14}}$

$\dfrac{(6.1)(4.4)}{-6.6}$

$\dfrac{(3.1)(4.4)}{-6.6} \dfrac{10^{14}(10^{-12})}{10^{-14}}$

$= \dfrac{13.64 \times 10^2}{-6.6 \times 10^{-14}}$

$= -2.07 \times 10^{16}$