

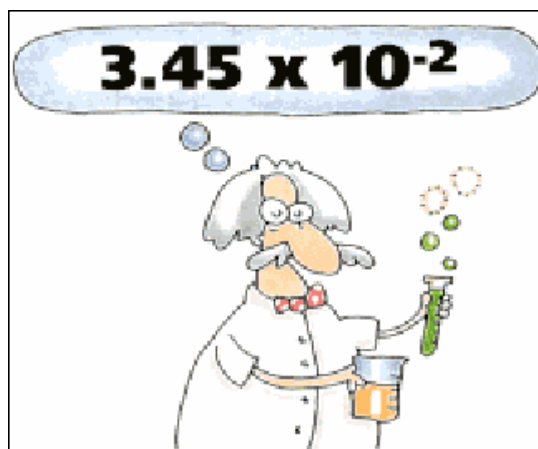


 <http://www.youtube.com/watch?v=AWof6knvQwE>

# Converting Scientific Notation

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Kimberley Thomas



# SCIENTIFIC NOTATION

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A number is written in **scientific notation** if it is of the form

$$c \times 10^n$$

where  $1 \leq c < 10$  and  $n$  is an integer.\*

\* an integer is a positive or negative whole number including zero

$\{\dots -3, -2, -1, 0, 1, 2, 3 \dots\}$

Sort the given values.

Written in proper  
scientific notation

$$1.9 \times 10^{-22}$$

$$2.1203 \times 10^{-16}$$

$$2.35 \times 10^5$$

$$6.09 \times 10^7$$

$$3.214 \times 10^1$$

$$5 \times 10^{-9}$$



$$45.9 \times 10^{-6}$$

$$10.3 \times 10^9$$

$$12 \times 10^0$$

*Not* written in proper  
scientific notation

Scientific notation is used to write really big numbers.

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*standard notation*       $\longrightarrow$       *scientific notation*

123,000,000,000       $1.23 \times 10^{11}$

45,000,000       $4.5 \times 10^7$

*currently here*      *# of place values we moved*

67,800,000,000,000       $6.78 \times 10^{13}$

9,000       $9 \times 10^3$

Scientific notation is used to write really big numbers.

scientific notation



standard notation

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

$$7.82 \times 10^3 = 7820$$

*Handwritten: 7.820*

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

*Handwritten: 3.04000000*

$$5. \times 10^4 = 50,000$$

*Handwritten: 5.0000*

Decimal point before

Decimal point after

$$6.2103 \times 10^{10} = 62,103,000,000$$

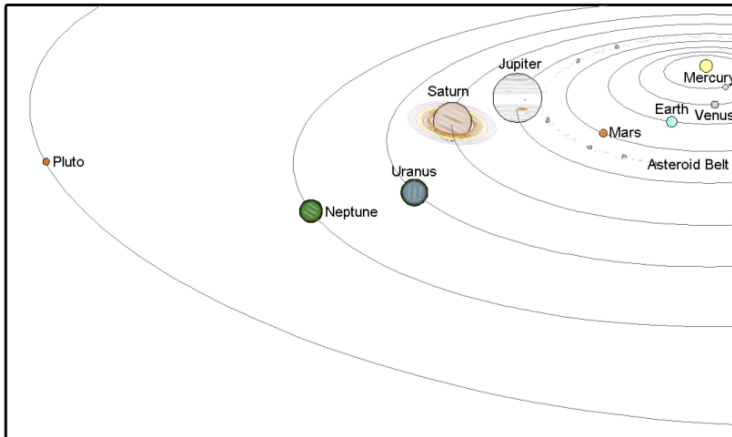
*Handwritten: 6.2103000000*

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

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

$$2.7 \times 10^9$$



Scientific notation is used to write really small numbers.

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*standard notation*       $\longrightarrow$       *scientific notation*

$$0.\underbrace{00000000}34 \qquad 3.4 \times 10^{-8}$$

$$0.\underbrace{0000000000}5609 \qquad 5.609 \times 10^{-10}$$

$$0.\underbrace{000000000000}64 \qquad 6.4 \times 10^{-11}$$

$$0.\underbrace{000}7 \qquad 7 \times 10^{-3}$$

Scientific notation is used to write really small numbers.

scientific notation



standard notation

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

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

*(Handwritten red wavy lines under the first five zeros in the standard notation.)*

$$1.2 \times 10^{-12} = 0.0000000000012$$

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

*(Handwritten green wavy lines under the first ten zeros in the standard notation, and a blue wavy line under the '09'.)*

$$7.1034 \times 10^{-5} = 0.000071034$$

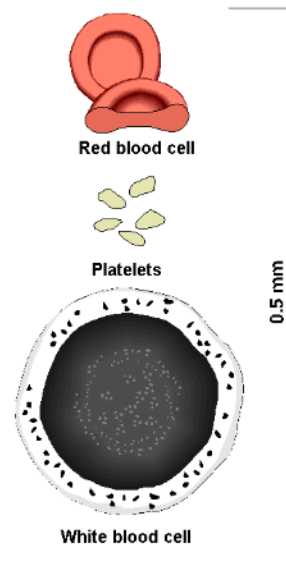
*(Handwritten purple wavy lines under the first four zeros in the standard notation.)*

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

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

$$3.125 \times 10^{-4}$$



How do you know that a number written in scientific notation will be really big or really small ?



negative exponent



positive  
exponent

Write in proper Scientific Notation Form

$$347.8 \times 10^3 = 3.478 \times 10^5$$

347.800

$$.0045 \times 10^8$$

$$4.5 \times 10^5$$

00450000

450,000

$$.023 \times 10^{-2}$$

$$850 \times 10^{-5}$$

Until you understand the pattern,  
it helps to expand out to standard  
form and then put back into  
proper SN form.

Extra Practice

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**Rewrite in decimal form.**

**1.**  $3.79 \times 10^5$

**2.**  $2.5 \times 10^{-2}$

**3.**  $8.44 \times 10^1$

**4.**  $6.5393 \times 10^4$

**5.**  $3.589 \times 10^{-3}$

**6.**  $9.1187 \times 10^0$

**7.**  $1.0056 \times 10^{-5}$

**8.**  $7.2658746 \times 10^8$

Extra Practice

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**Rewrite in scientific notation.**

7,960,000,000

0.007485

45.668

998.653

0.0000056388

63,000,000

0.0602

22,078,600

0.000070005

64.3

# Homework

Worksheet - due Friday