Scientific Notation

**Provides a compact way of expressing
very large and very small numbers**

Large numbers	Small numbers

$2.0 \times 10^{6} = 2{,}000{,}000$

Move the decimal point 6 places to the <u>right</u>

$2.0 \times 10^{6} = 2000000$

$7.0 \times 10^{-5} = 0.00007$

Move the decimal point 5 places to the <u>left</u>

$7.0 \times 10^{-5} = 0.00007$

Length scales in Nature

1 mm

Grain of sugar, small insects, etc

1 km

Brooklyn bridge

10^{-3} m   1 m 10^{3} m

1 micron (1μm)

Particles in smoke, milk, etc
(1-20 μm)
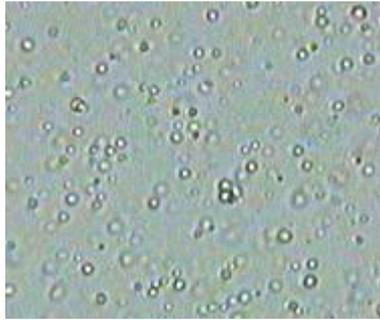
Bacteria
(1-10 μm)
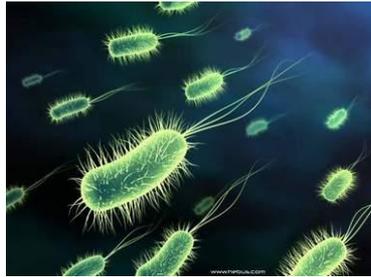
Human Chromosome
(2 -10 μm)
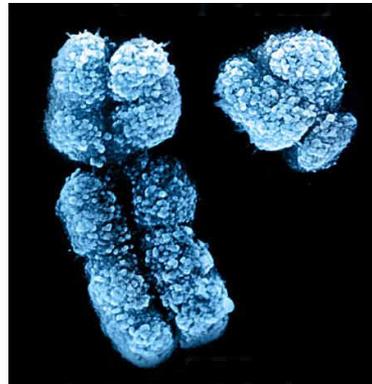
1000 km

10^{-6} 10^{-3} 1 m 10^{3} 10^{6}

Homework 1

Problem 0.
Watch the documentary called "Cosmic Voyage" at
https://www.youtube.com/watch?v=GTiDfxATYa4
paying particular attention to the length scales displayed.
Now, it is time for you to explore the different scales of the universe by going to
http://htwins.net/scale2/

Problem 1. Write the following quantities using scientific notation:

$1{,}340{,}000{,}000 \text{ kg} = $ _____

$540{,}000{,}000 \frac{m}{s} = $ _____

$0.000{,}000{,}000{,}000{,}0015 \text{ in} = $ _____

$0.000{,}000{,}025 \text{ s} = $ _____

Homework 1

Problem 2. Express the following quantities in decimal notation:

$1.87 \times 10^7 \, \text{lb} =$ _____ $7.681 \times 10^6 \, \text{Å} =$ _____

$6.8 \times 10^{-4} \, \text{g} =$ _____ $9.979 \times 10^{-2} \, \text{N} =$ _____

Problem 3. Carry out the following operations and express the result in scientific notation:

$(2.1 \times 10^4) \times (5.6 \times 10^2) =$

$(7 \times 10^5) \times (2 \times 10^{-4}) =$

$$\frac{4.4 \times 10^4}{2 \times 10^4} =$$

$$\frac{5 \times 10^5}{5 \times 10^{-5}} =$$