Length scales in Nature

1 mm

1 km

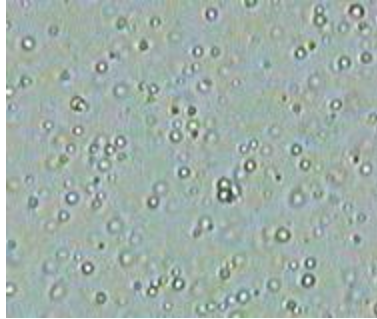Grain of sugar, small insects, etc

Brooklyn bridge

10^{-3} m   1 m 10^{3} m
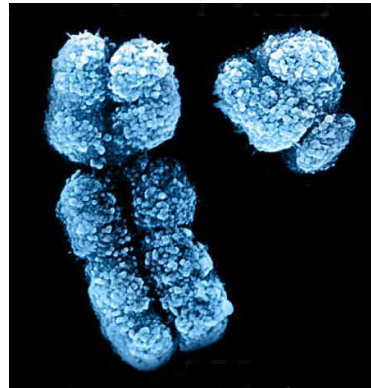
1 micron (1μm)

Particles in smoke, milk, etc (1-20 μm)

Bacteria (1-10 μm)

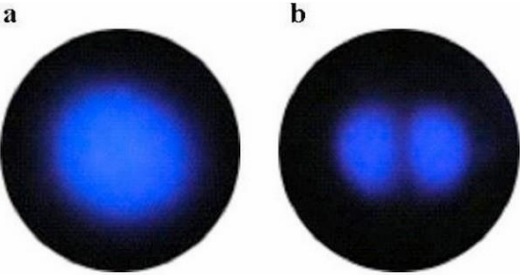**Human Chromosome (2 -10 μm)**

1000 km

10^{-6} 10^{-3} 1 m 10^{3} 10^{6}
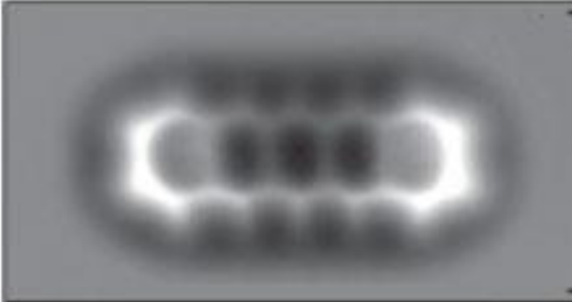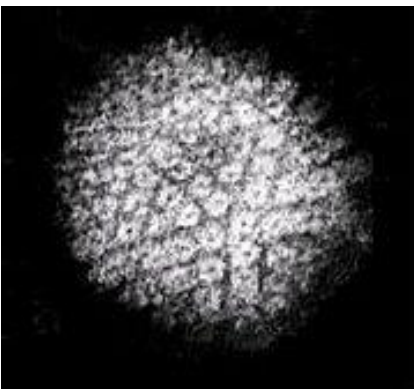
1 nanometer = 10 Angstrom
(1 nm =10 Å)

1,000,000 km
(3 light seconds)

Atom (1 Å)

Molecule
(1nm)

Virus (>10 nm)

10^{-9} 10^{-6} 10^{-3} 1 m 10^{3} 10^{6} 10^{9}
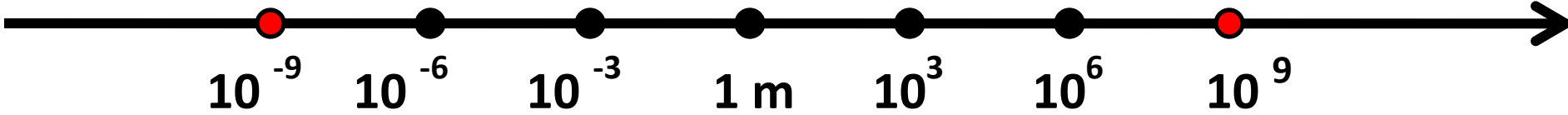
Homework 1

Problem 0.

Watch the video about the Scales of Universe:
https://www.youtube.com/watch?v=44cv416bKP4&t=575s
This is a modern remake of a classical documentary called "Powers of Ten" (you can google and watch that one as well or instead). Please go through length scales of various objects. In addition to the classroom presentation, you might want to use this website:
http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/

Problem 1.

Estimate the number of atom in a grain of salt. Assume the grain to be a cube 1x1x1 mm, and each atom to be a cubic brick.

Problem 2.

When an oil spill happens in ocean, the oil layer on top of the water can be as thin as 1 micron ($1\mu m$).
a) Estimate the area to be covered by oil if a big oil carrier ship containing $100,000m^3$ of oil, sinks and spills all of it to the ocean surface.
b) If that oil spot has a circular shape, how big is its radius in km?