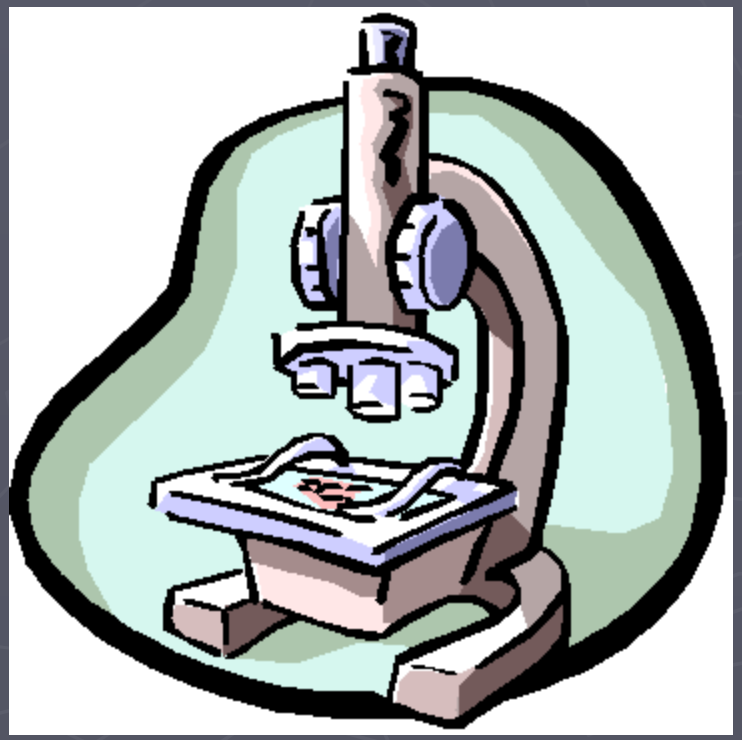
Microscopy and Measurement

Section 1.4

Microscopes

- Instruments that produce an enlarged image of an object
- First used in the 1600's



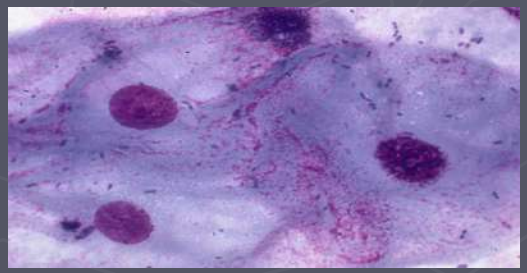
- Magnification: the increase in an object's apparent size

- Resolution: the power to show details clearly

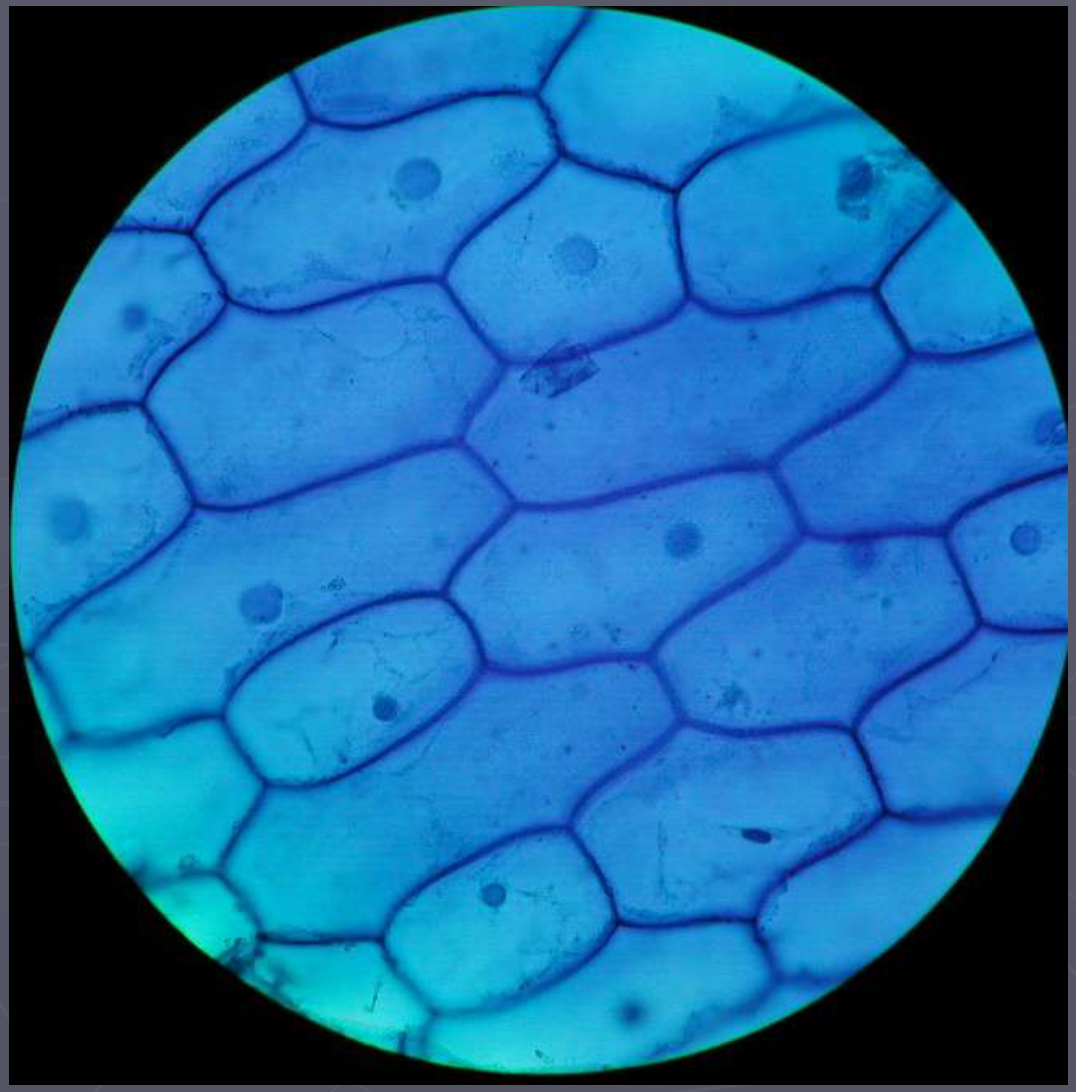
Light Microscopes

- Compound light microscope (LM): produces images by focusing light rays through a specimen mounted on a glass slide

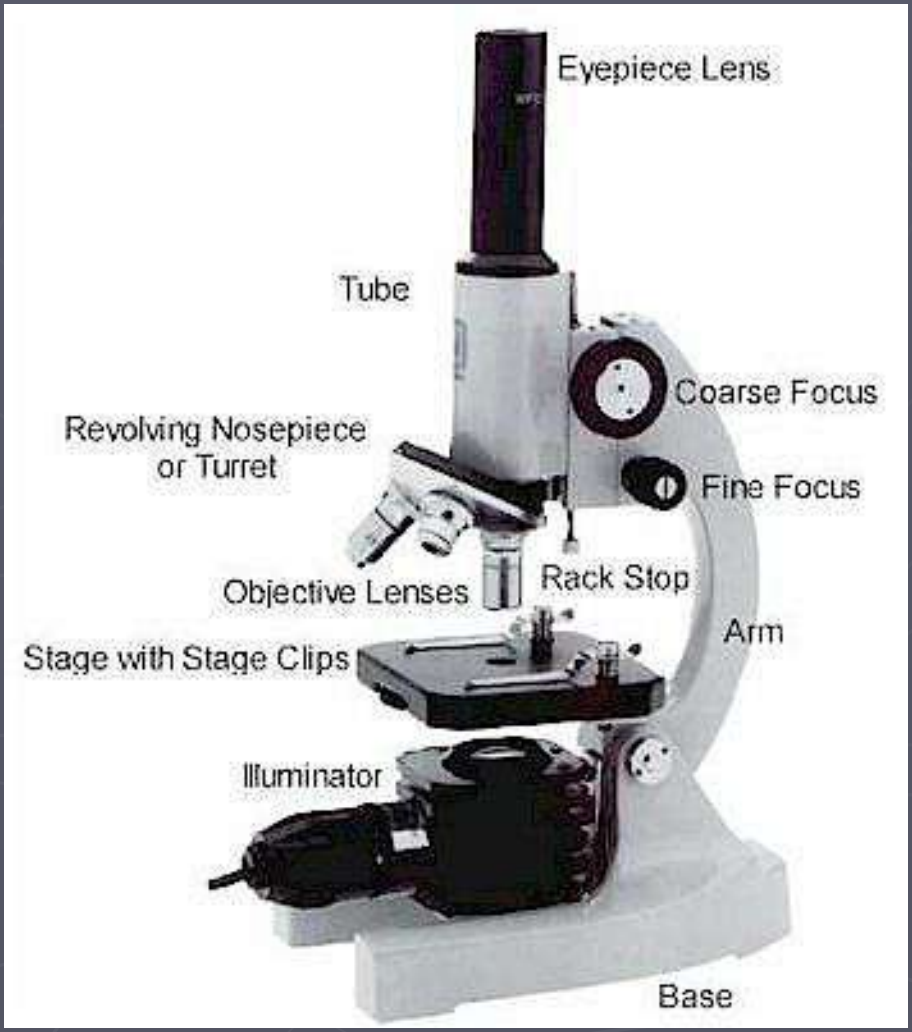
- Specimen must either be very small or be sliced thin enough to be transparent



Onion Cells



Parts of a Compound Light Microscope



- Stage: the place where the slide rests
- Stage clips: hold the slide in place

- Objective lens: enlarges the image
- Ocular lens: projects image through eyepiece

Power of Magnification

- Refers to how much a specimen is magnified

- Example: 40X means the image is enlarged 40 times the actual size of the specimen

Electron Microscope

- A beam of electrons produces an enlarged image of the specimen
- Much more powerful than light microscopes

Scanning Electron Microscope (SEM)

- 3-D images

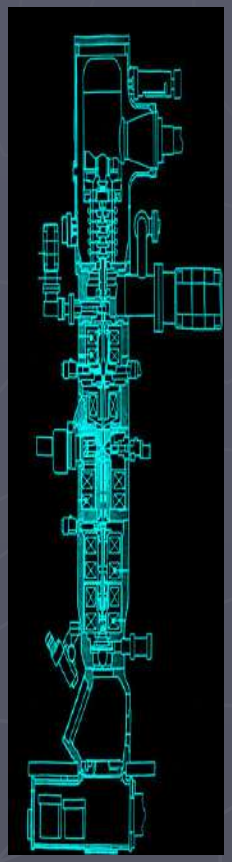
- Specimen is sprayed with a fine metal coating then a beam of electrons is passed over the surface

- The electrons are projected onto a photographic plate producing an image

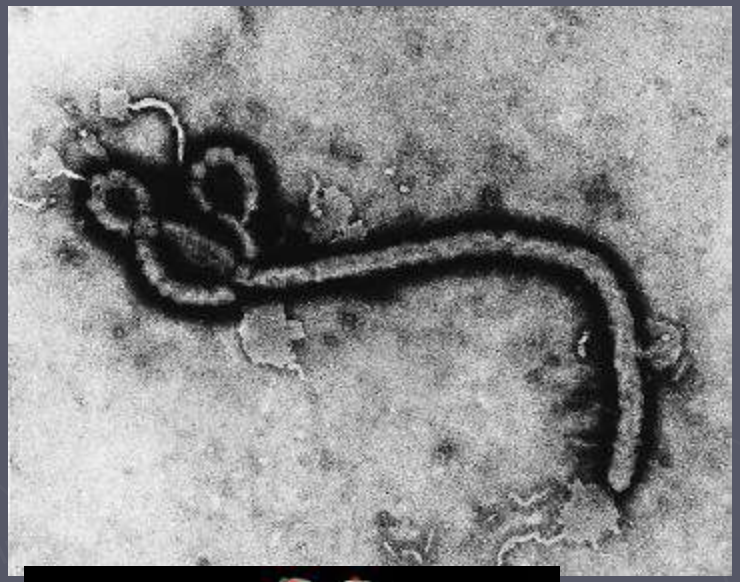
SEM Images

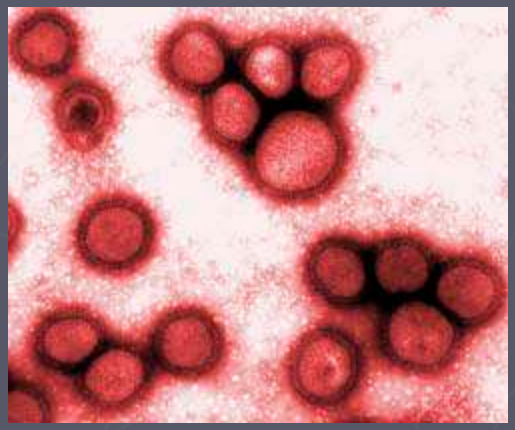
Transmission Electron Microscope (TEM)

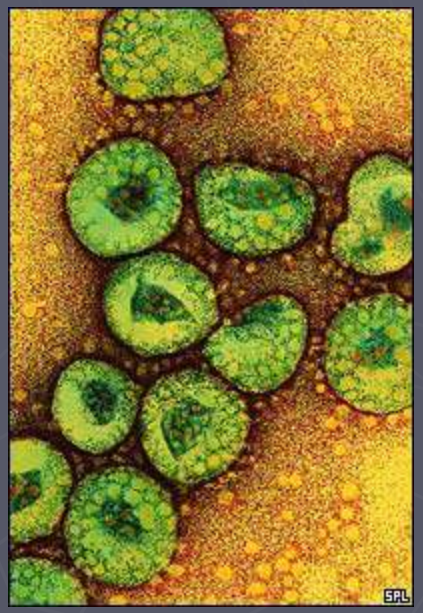
- Transmits a beam of electrons through a very thinly sliced specimen
- Magnetic lenses enlarge the image and focus it on a photographic plate
- Can magnify objects up to 200,000X

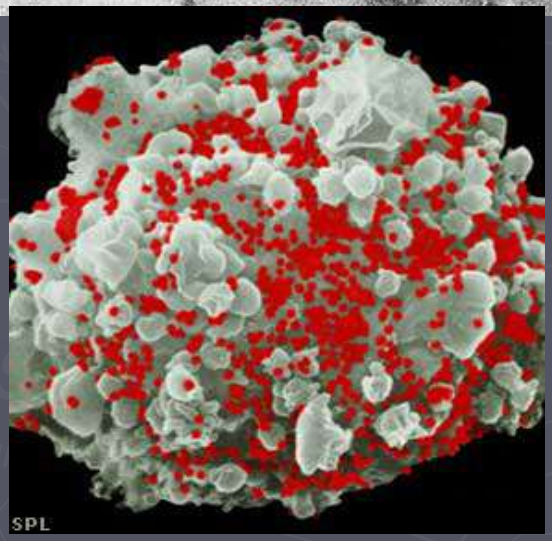


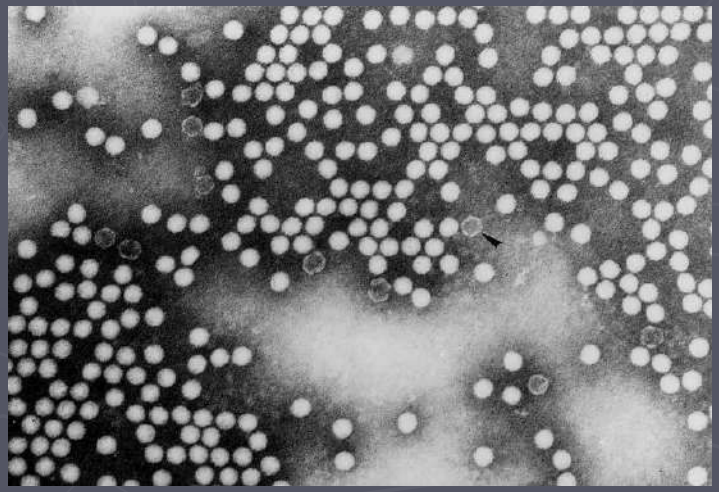
TEM Images











Measurement

- SI: international System of Measurements
- SI units are universally understood and accepted by scientists
- Seven base units

SI Base Units

Quantity	Unit	Symbol
Length	meter	m
Mass	kilogram	kg
Temperature	kelvin	K
Time	second	s
Amount of Substance	mole	mol
Electric Current	ampere	A
Luminous Intensity	candela	cd

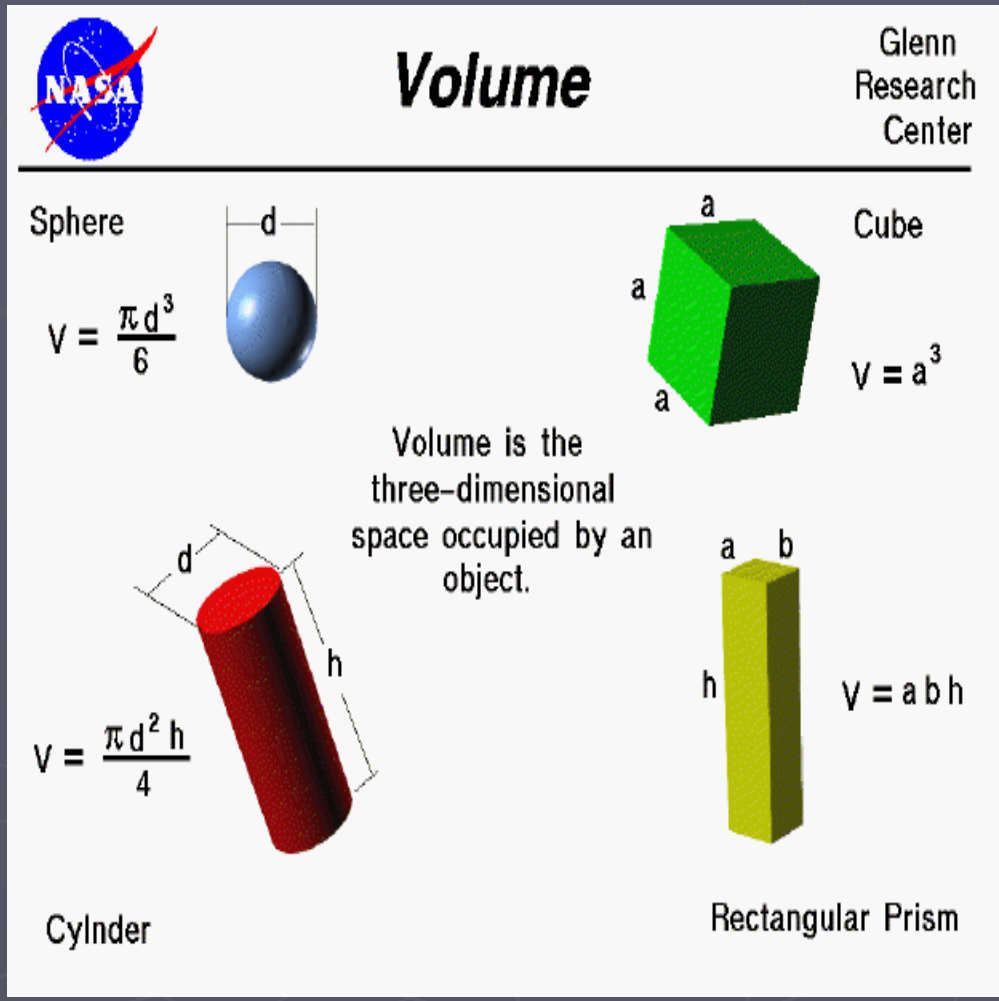
Some SI Prefixes

Prefix	abbreviation	factor of base unit
giga	G	1,000,000,000
mega	M	1,000,000
kilo	k	1,000
hecto	h	100
deka	da	10

Prefix	abbreviation	factor of base unit
deci	d	0.1
centi	c	0.01
milli	m	0.001
micro	Л	0.000001
nano	n	0.000000001
pico	p	0.000000000001

Derived Units

- Produced by the mathematical relationship between two base units
- Examples: area, volume, mass density, specific volume, Celsius temperature



Density

- Density = mass/volume

D = m/v

Study for Test!

- Make sure to:

1. Read the chapter
2. Make flashcards of the vocab
3. Learn the vocab terms and definitions
4. Take good notes
5. Do section and chapter review questions
6. Spend at least 15 minutes a night studying