

The Microscope

Ranks as one of the most important tools of science. . . . WHY????

→ Reveals an entire world of organisms too small to be seen with the unaided eye

☺ **Physicians/Scientists use it to examine bacteria, blood cells, cancer cells, etc.**

☺ **Biology students use it to learn about algae and protozoa**

☺ **Chemists use it to study crystals in metal**

Main Function:

→ Magnification of very small objects

A microscope aids us in our observation of things that we cannot see with the unaided eye

Terms we use when talking about microscopes

Resolving Power (a.k.a—resolution)

The ability of a microscope to distinguish two objects as being separate.

Magnification

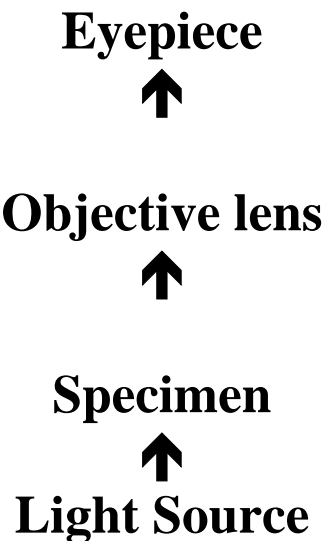
The ability of a microscope to make an object appear larger.

$$\text{TOTAL MAGNIFICATION} = \text{Eyepiece lens} \times \text{objective lens}$$

TYPES OF MICROSCOPES

1. Compound Light Microscope

- ☺ **Has two lenses (eyepiece lens, objective lens)**
- ☺ **Has a light source that shines up through the specimen, through the objective lens, and then through the eyepiece**



Compound light microscopes can magnify up to about 2000 times and have a resolving power of about 500 nanometers (that's a billionth of a meter!!!)

2. Electron Microscope

- ☺ Utilizes a beam of electrons, rather than light, to illuminate the specimen**

- ☺ Can magnify hundreds of thousands of times with a resolving power as great as 0.2 nm (that's 2500 times closer than a compound microscope!!!)**

Types of Electron Microscopes

1. Transmission Electron Microscope (TEM)

- ❖ Uses a beam of electrons to form an image**
- ❖ The electrons are focused by magnets instead of lenses**
- ❖ Specimens must be sliced very thin**
- ❖ Gives only a 2-dimensional image**
- ❖ Living specimens cannot be viewed**

2. Scanning Electron Microscope (SEM)

- Produces 3-dimensional images**
- Specimens are not sliced, but coated with a thin layer of metal**
- Electrons do not pass through specimen—they bounce off**
- The resulting image can be viewed on a video screen**