

scientific inquiry
UNDERSTANDING THE MICROSCOPE
guided notes

Name _____

Date _____

Block _____

THE MICROSCOPE - AN INTRODUCTION

The microscope is among the most widely used _____

A microscope is an instrument that produces an _____ of an object.

Biologists use microscopes to study cells, cell parts, and organisms that are _____ to be seen with the naked eye.

Microscopes both _____ the image of an object and _____.

There are two types of microscopes

- _____ microscopes: forms an image of a specimen using a _____ rather than light.
- _____ microscopes: light passes through one or more _____ to produce an _____ image of a specimen.

THE HISTORY OF THE MICROSCOPE AND EARLY CELL STUDIES

Zaccharias Janssen – 1590

Zaccharias Janssen was a Dutch spectacle maker. While experimenting with several _____, he discovered that _____ objects appeared to be greatly _____.

This was the first very simple _____.

A compound microscope is one that has _____ of lenses.

Robert Hooke – 1665

Robert Hooke used a crude microscope to observe a _____. The chambers he saw reminded him of the _____ in which monks lived, so he called them “_____.”

He was the first to use the word “cell” to describe the _____.

Although Hooke’s microscope had three lenses, they were of very _____ and he could see very _____.

Anton van Leeuwenhoek – 1674

He was able to polish lenses of great curvature that obtained a magnification of nearly _____.

He built a _____ microscope. A simple microscope is one that has only _____ lens.

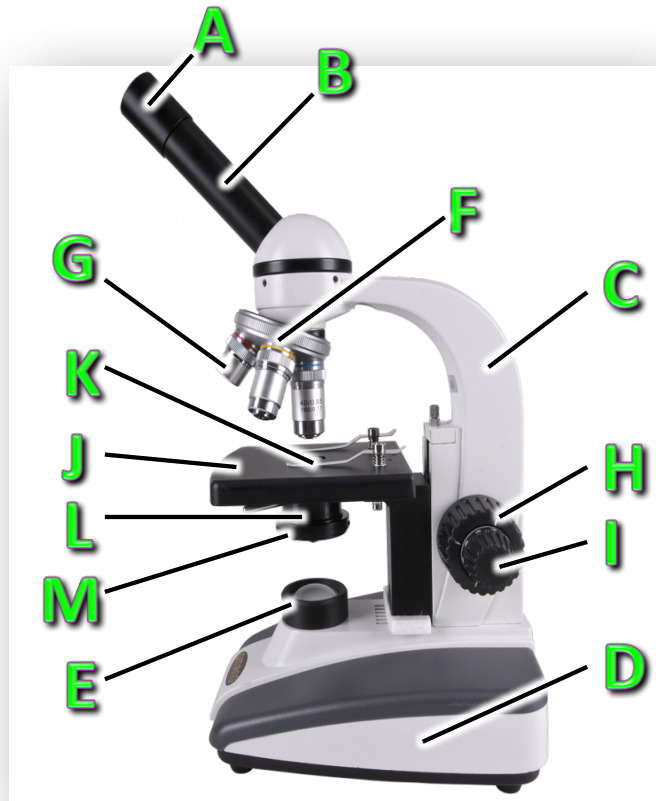
He is considered “_____” because of the great discoveries he made with his microscopes. He built over _____ different microscopes.

He was the first to _____ microorganisms under a light microscope.

He observed a drop of pond water teeming with life. He referred to these small microorganisms as _____.

PARTS OF THE MODERN COMPOUND LIGHT MICROSCOPE

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____
- H. _____
- I. _____
- J. _____
- K. _____
- L. _____
- M. _____



This microscope allows light to _____ through the specimen and uses _____ to form an image.

The modern compound microscope is capable of two things: _____

Magnification is a measure of how much the image is _____

Total magnification = _____ x _____

4x objective = _____ x _____ = _____ times magnification

10x objective = _____ x _____ = _____ times magnification

40x objective = _____ x _____ = _____ times magnification

Resolution: a) A measure of the _____ of an image. b) It is the power to show _____ clearly.

RULES FOR USING THE COMPOUND MICROSCOPE

1. Always carry the microscope by the _____ and the other hand supporting the _____.
2. Turn on the microscope and place your slide on the _____.
3. Always start with the _____ objective. Focus this objective using the _____ adjustment knob.
4. Once the image is in focus, carefully swing the _____ objective in place. _____ this objective using the course adjustment knob.
5. Once the image is in focus, very carefully swing the _____ objective into place. Focus this objective using **ONLY** the _____ adjustment knob.
6. Never use the _____ adjustment knob while using the _____ power objective.
7. Keep the stage _____ and always make sure the bottom of your _____ is dry before putting it on the microscope.
8. Return your objective to _____ power before you put the microscope away.

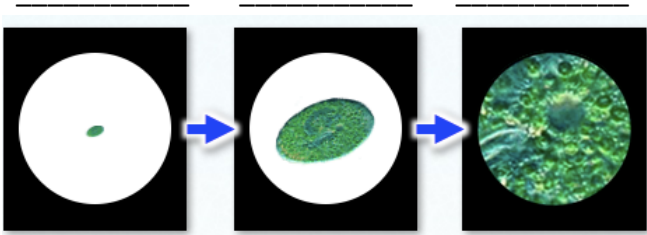
PREPARATION OF A WET MOUNT SLIDE

Most of the slides we will make are _____ slides.

Wet mount slides are used to view _____, as well as _____ substances of all kinds.

They are also used for any sort of specimen that needs to be kept _____.

1. Obtain a clean, dry _____.
2. Put your _____ in the center of the slide.
3. Add one large drop of _____. (It should be one solid drop of water over the specimen.) It should not run all over the slide or get on the back of the slide.
4. Hold a clean _____ at a ____ degree angle over the specimen. Allow one _____ of the coverslip to touch the edge of the drop of water.
5. Gently drop the _____ into place.
6. The whole coverslip should be in contact with _____, but make sure the back of the slide is dry.



As the power _____, the magnification becomes larger, but the field of view (visible area) becomes _____.

THE ELECTRON MICROSCOPE

_____ is the limiting factor to a light microscope. At _____ magnifications, the light microscope is unable to resolve the image. At powers of magnification beyond _____, the image becomes _____.

To examine cells or cell parts at magnifications greater than 2000x, scientists use _____.

Electron microscopes do not use _____. Instead a beam of _____ produces an enlarged image of the specimen.

Both the electron beam and the specimen must be placed inside a _____ so that the electrons in the beam will not bounce off _____ in the air. Since _____ cannot survive in a vacuum, the _____ cannot be used to view living cells.

There are two types of electron microscopes:

TEM: _____

It uses a _____ transmitted through a very thinly sliced _____.

_____ guide the stream of electrons toward the specimen, and the image is projected on a _____.

Advantage: Magnification up to _____

Disadvantage: The method used to prepare the specimen will _____ the cells so that living cells _____ be observed.

SEM: _____

The specimen is not _____ for viewing, but the specimen is _____ with a fine metal coating. Like the transmission electron microscope, living cells _____ be viewed.

When the beam of electrons is passed over the specimen's surface, it causes the metal coating to emit a shower of electrons. A _____ image of the _____ of the specimen is projected on a photographic plate.

The scanning electron microscope can magnify _____