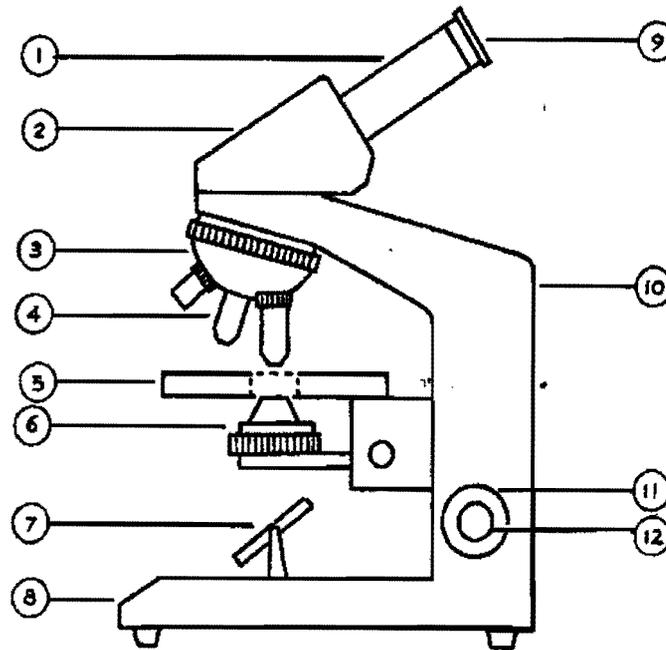


Unit 3 – Cells and The Microscope

Topic			
History and Parts of the Microscope			
Cell Theory			
Prokaryotes vs. Eukaryotes			
Plant and Animal Cells			
The Plasma Membrane			
Passive vs. Active Transport			

Cell Theory		
Prokaryotes vs. Eukaryotes	Prokaryotes:	Eukaryotes:
Plant and Animal Cells	Plant:	Animal:
The Plasma Membrane		
Passive vs. Active Transport	Passive: (no energy)	Active: (energy)

Parts of the Microscope



1. **Eyepiece**-where you look through to see the image of your specimen.
2. **Body Tube**-the long tube that holds the eyepiece and connects it to the objectives.
3. **Nosepiece**-the rotating part of the microscope at the bottom of the body tube; it holds the objectives.
4. **Objective Lenses**-(low, medium, high) the microscope may have 2/3 objectives, they vary in length (the shortest is the lowest power; the longest is the highest power).
5. **Arm**-part of the microscope that you carry the microscope with.
6. **Coarse Adjustment Knob**-large, round knob on the side of the microscope used for focusing the specimen; it may move either the stage or the upper part of the microscope.
7. **Fine Adjustment Knob**-small, round knob on the side of the microscope used to fine-tune the focus of your specimen after using the coarse adjustment knob.
8. **Stage**-large, flat area under the objectives; it has a hole that allows light through; the specimen/slide is placed on the stage for viewing.
9. **Stage Clips**-shiny, clips on top of the stage which hold the slide in place.
10. **Diaphragm**-controls the amount of light going through .
11. **Light**-source of light usually found near the base of the microscope; the light source makes the specimen easier to see.

Cell Wall : _____

Chloroplast: : _____

Cytoplasm: : _____

Nucleolus: : _____

Nucleus: : _____

Plasma (Cell) Membrane: : _____

Vacuole: : _____

Chromosomes: : _____

Endoplasmic Reticulum: : _____

Golgi Body: : _____

Lysosomes: : _____

Mitochondria: : _____

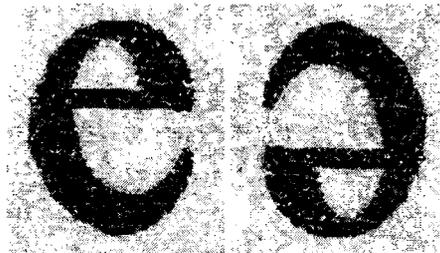
Ribosomes: : _____

Lab Equipment Facts:

Lab Equipment	Fact
Compound Light Microscope	430 times magnification
Binocular Stereomicroscope/Dissecting Microscope	2/ 3.5 times macroscopic
Phase Contrast Microscope	200-500 times magnification
Electron Microscope	250,000 times magnification (can see inside organelles)
Ultracentrifuge	Spins materials and separates them according to their density
Microdissection Apparatus	Fine needle that cuts out cell organelle

Microscope Facts:

- What does an image look like when viewed under a compound light microscope?



- What is the relationship between millimeters and micrometers?

1 millimeter = 1000 micrometers

2 millimeters = _____

2.5 millimeters = _____

Name: _____

Centrioles are cell structures involved primarily in

- A) cellular respiration
 B) storage of fats
 C) cell division
 D) enzyme production

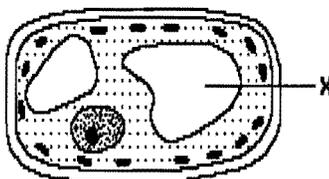
2) Which structures are visible in an amoeba viewed with a compound light microscope?

- A) chloroplast, vacuoles, and nucleus
 B) ribosomes, nucleus, and nucleolus
 C) vacuoles, nucleus, and cytoplasm
 D) cell wall, cytoplasm, and lysosomes

3) A student viewing a specimen under low power of a compound light microscope switched to high power and noticed that the field of view darkened considerably. Which microscope part should the student adjust to brighten the field of view?

- A) eyepiece
 B) diaphragm
 C) fine adjustment
 D) coarse adjustment

4) In the diagram of a cell below, the structure labeled X enables the cell to



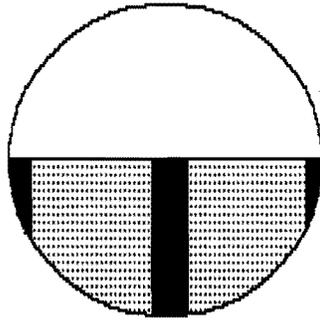
- A) manufacture proteins
 B) release energy
 C) store waste products
 D) control nuclear division

A slide of the letters *F* and *R* is placed on the stage of a microscope in the position shown in the diagram below.

How would the image of the letters appear when the slide is viewed under the low power of a compound microscope?

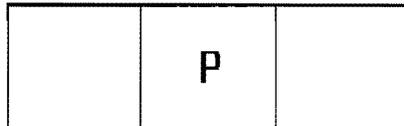
- A) **ƎR**
 B) **RF**
 C) **ƎƎ**
 D) **LR**

- 6) A student was using a microscope with a 10× eyepiece and 10× and 40× objective lenses. He viewed the edge of a metric ruler under low power and observed the following field of vision.



The diameter of the high-power field of vision of the same microscope would be closest to

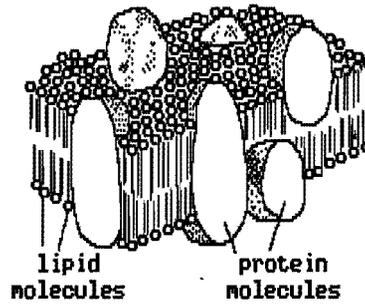
- A) 500 mm B) 5 mm C) 0.05 mm D) 0.5 mm
- 7) Which cell structures are most directly involved in protein synthesis?
 A) nucleus and ribosome C) endoplasmic reticulum and cell wall
 B) cell membrane and lysosome D) chloroplast and centriole
- 8) The diameter of the field of vision of a compound light microscope is 1.5 millimeters. This may also be expressed as
 A) 15,000 microns B) 15 microns C) 1,500 microns D) 150 microns
- 9) A student placed a slide, as shown in the diagram below, on the stage of the compound light microscope.



What would be viewed when observed on the low power of the compound light microscope.

- A)  B)  C)  D) 
- 10) Which is the correct sequence of historical developments leading to our present knowledge of cells?
 A) electron microscope → cell theory → compound light microscope
 B) electron microscope → compound light microscope → cell theory
 C) compound light microscope → cell theory → electron microscope
 D) cell theory → electron microscope → compound light microscope

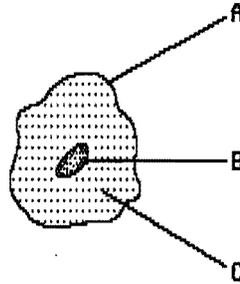
11) Which cellular organelle is represented by the diagram below?



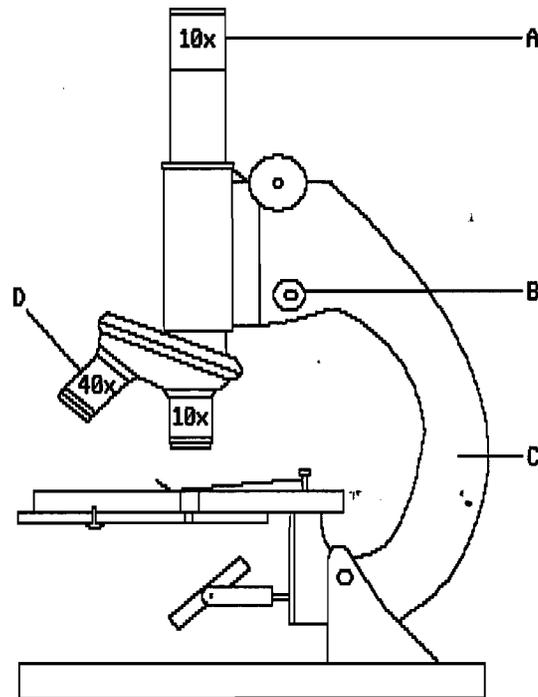
- A) plasma membrane
 B) cell wall
 C) centriole
 D) ribosome

Questions 12 and 13 refer to the following:

The diagram below represents a human cheek cell.



- 12) Using one or more complete sentences, state the function of part *A*.
- 13) Using one or more complete sentences, state the function of part *B*.
- 14) Which structures are found in every living cell?
 A) a cell wall and nucleus
 B) centrioles and chromosomes
 C) a plasma membrane and cytoplasm
 D) chloroplasts and mitochondria
- 15) Which cell organelles are the sites of aerobic cellular respiration in both plant and animal cells?
 A) nuclei
 B) centrosomes
 C) chloroplasts
 D) mitochondria



16)

The highest possible magnification that can be obtained when using this microscope is

- A) 100× B) 4,000× C) 400× D) 40×

17) Microscopic examination of an animal cell reveals the presence of a plasma membrane but no cell wall. Which additional structures would normally be present within this cell?

- A) large vacuoles B) chloroplasts C) starch grains D) centrioles

18) Which group of measurement units is correctly arranged in order of increasing size?

- A) micrometer, centimeter, millimeter, meter C) millimeter, micrometer, centimeter, meter
 B) meter, micrometer, centimeter, millimeter D) micrometer, millimeter, centimeter, meter

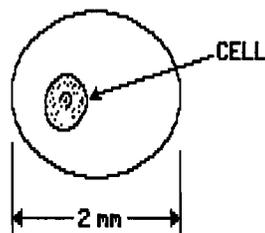
19) According to the cell theory, which statement is correct?

- A) Cells are basically unlike in structure. C) Cells come from preexisting cells.
 B) Mitochondria are found only in plant cells. D) Viruses are true cells.

20) A cover slip should be used when preparing a

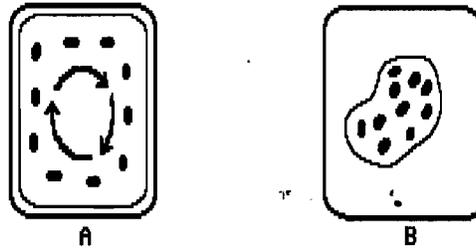
- A) suspension of cells for centrifugation C) wet mount of elodea
 B) frog for dissection D) solution of iodine for food testing

21) The diagram below represents the field of vision of a microscope. What is the approximate diameter of the cell shown in the field?



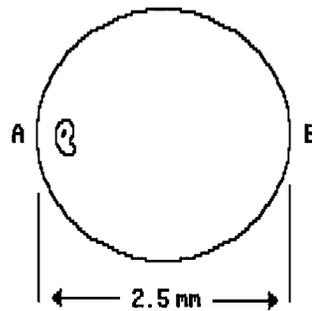
- A) 2,000 microns B) 1,000 microns C) 500 microns D) 50 microns

- 22) Which organelle contains hereditary factors and controls most cell activities?
- A) endoplasmic reticulum
B) vacuole
C) nucleus
D) cell membrane
- 23) A student observed a green plant cell under the low-power objective of her microscope and noted the movement of organelles as shown in diagram *A*. She then added three drops of a 10% salt solution to the slide, waited a few minutes, and observed the cell as shown in diagram *B*.



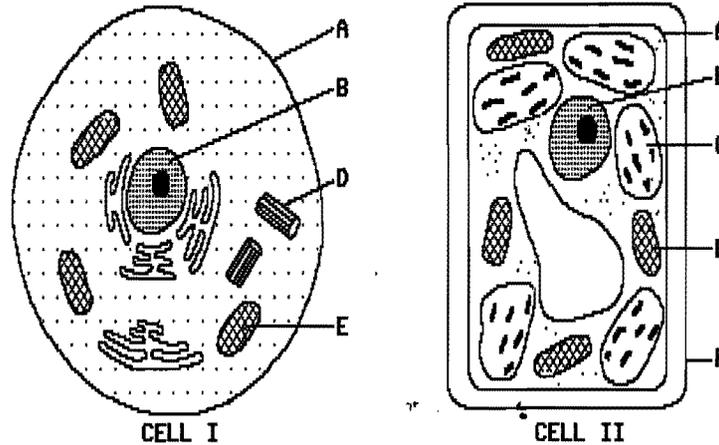
The organelles observed were most likely

- A) chloroplasts
B) centrosomes
C) ribosomes
D) mitochondria
- 24) The diagram below represents a microscope field that has a diameter of 2.5 millimeters. A protist is shown in this microscope field. Which action would center the specimen in the field of view?



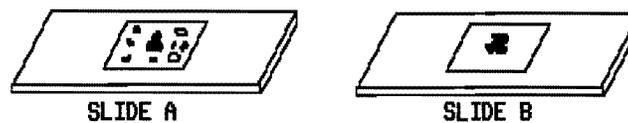
- A) Move the slide 2.5 mm to the left toward *A*.
B) Move the slide 2.5 mm to the right toward *B*.
C) Move the slide 1 mm to the left toward *A*.
D) Move the slide 1 mm to the right toward *B*.
- 25) Which type of organism is an exception to the cell theory?
- A) plant
B) protozoan
C) virus
D) bacterium
- 26) The ultracentrifuge is an instrument that separates cellular components into distinct layers according to their relative
- A) acidities
B) charges
C) densities
D) solubilities

- 27) The diagrams below represent two different cells.



Cell II most likely represents a plant cell due to the presence of

- A) A B) E C) F D) B
- 28) Which organelles can be observed only with the aid of an electron microscope?
 A) cell walls B) chloroplasts C) ribosomes D) nuclei
- 29) Which organelle is present in the cells of a mouse but *not* present in the cells of a bean plant?
 A) centriole B) cell wall C) cell membrane D) chloroplast
- 30) Most cell membranes are composed principally of
 A) proteins and lipids C) chitin and starch
 B) nucleotides and amino acids D) DNA and ATP
- 31) Which structure includes all of the others?
 A) chromosomes B) genes C) nucleus D) nucleolus
- 32) The diagrams below represent wet mount microscope slides of fresh potato tissue.



The formation of air bubbles on slide A could have been prevented by

- A) bringing one edge of the cover slip into contact with the water and lowering the opposite edge slowly
 B) holding the cover slip parallel to the slide and dropping it directly onto the potato
 C) using a thicker piece of potato and less water
 D) using a longer piece of potato and a cover slip with holes in it
- 33) Which statement best describes the plasma membrane of a living plant cell?
 A) It is composed of proteins and carbohydrates only.
 B) It is a double protein layer with floating lipid molecules.
 C) It selectively regulates the passage of substances into and out of the cell.
 D) It has the same permeability to all substances found inside or outside the cell.

- 34) A student used the low-power objective of a microscope to view the millimeter markings of a ruler. After changing to the high-power objective, the student would observe
- A) fewer millimeter markings in the microscope field
 - B) millimeter markings that are closer together
 - C) more millimeter markings in the microscope field
 - D) the same number of millimeter markings in the microscope field

1) C 2) C 3) B 4) C 5) C

D 7) A 8) C 9) C 10) C

11) A

12) Part *A* regulates the passage of materials into and out of the cell.

13) Part *B* directs the activities of the cell.

14) C 15) D 16) C 17) D 18) D

19) C 20) C 21) C 22) C 23) A

24) C 25) C 26) C 27) C 28) C

29) A 30) A 31) C 32) A 33) C

34) A