

Name Fahmida Usman

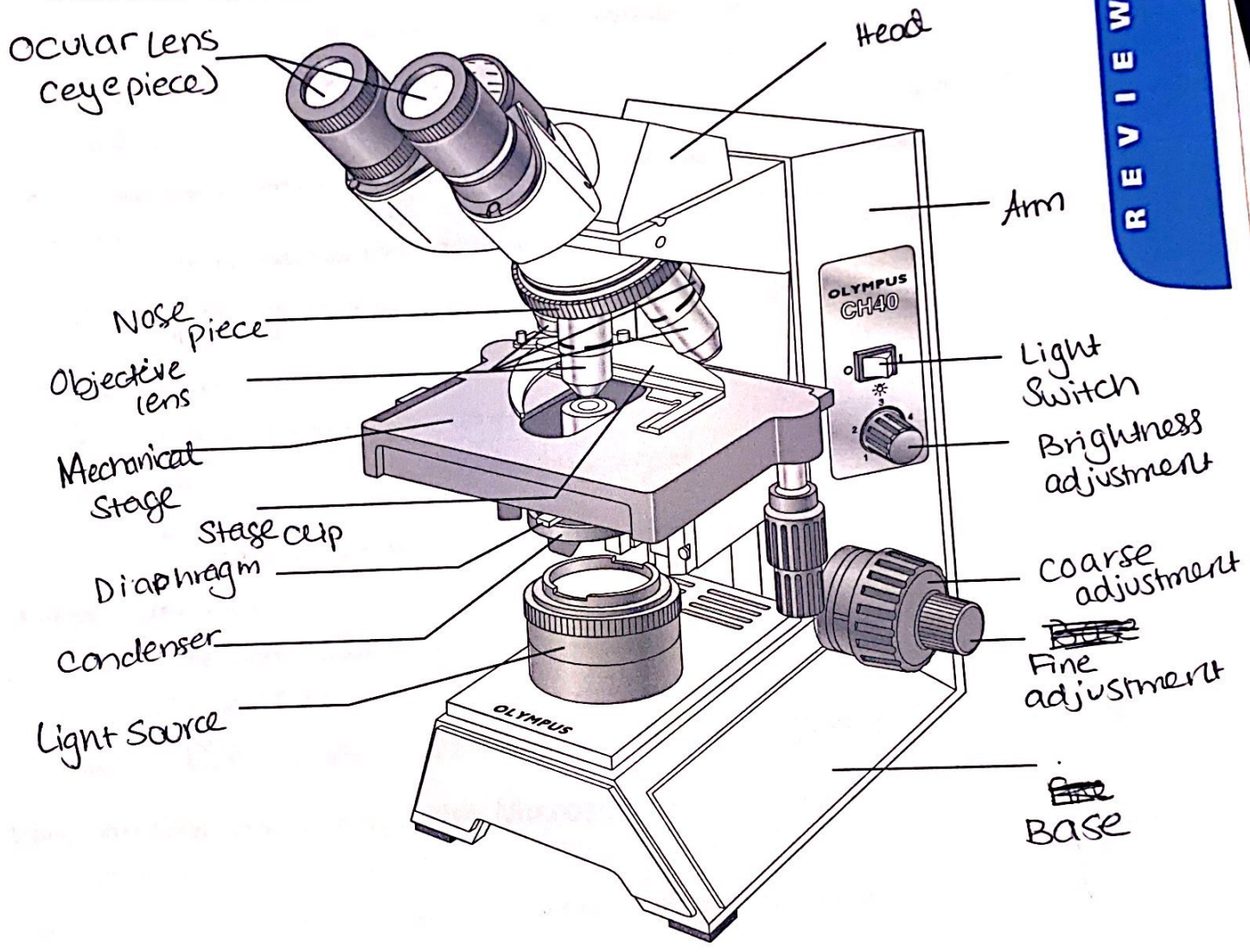
Lab Time/Date Wednesday's

2:30-5:00pm

The Microscope

Care and Structure of the Compound Microscope

1. Label all indicated parts of the microscope.



2. Explain the proper technique for transporting the microscope.

hold the microscope in an upright position with one hand and its arm and the other supporting its base.

7. If, when using a 10X ocular and a 15X objective, the field size is 1.5 mm, what is the field size of the 40X objective?

3. The following statements are true or false. If true, write *T* on the answer blank. If false, correct the statement by writing on the blank the proper word or phrase to replace the one that is underlined.

- false (special paper) 1. The microscope lens may be cleaned with any soft tissue.
- false (lowest-power) 2. The microscope should be stored with the oil immersion lens in position over the stage.
- True 3. When beginning to focus, use the lowest-power lens.
- false (away) 4. When focusing, always focus toward the specimen.
- True 5. A coverslip should always be used with wet mounts and the high-power and oil lenses.

4. Match the microscope structures in column B with the statements in column A that identify or describe them.

Column A

- j 1. platform on which the slide rests for viewing
- d 2. used to increase the amount of light passing through the specimen
- e 3. secure(s) the slide to the stage
- b 4. delivers a concentrated beam of light to the specimen
- c 5. used for precise focusing once initial focusing has been done
- f 6. carries the objective lenses; rotates so that the different objective lenses can be brought into position over the specimen

Column B

- a. coarse adjustment knob
- b. condenser
- c. fine adjustment knob
- d. iris diaphragm
- e. mechanical stage
- f. nosepiece
- g. objective lenses
- h. ocular
- i. spring clips
- j. stage

5. Define the following terms.

virtual image: produces an image of the product which reflects back.

resolution: Distinguish detail ~~in~~ ^{the} microscope provides.

Viewing Objects Through the Microscope

6. Complete, or respond to, the following statements:

Working distance 1. The distance from the bottom of the objective lens to the specimen is called the _____

left 2. Assume there is an object on the left side of the field that you want to bring to the center (that is, toward the apparent right). In what direction would you move your slide? _____

field 3. The area of the specimen seen when looking through the microscope is the _____

95x 4. If a microscope has a 10x ocular and the total magnification at a particular time is 950x, the objective lens in use at that time is _____ x.

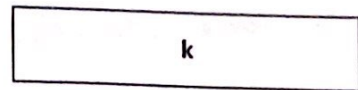
to increase contrast 5. Why should the light be dimmed when looking at living (nearly transparent) cells?

The par focal lens 6. If, after focusing in low power, only the fine adjustment need be used to focus the specimen at the higher powers, the microscope is said to be _____.

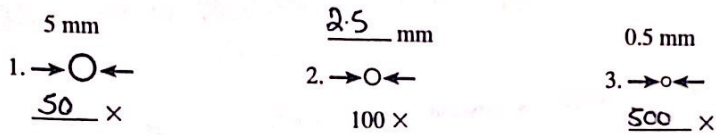
3 7. If, when using a 10x ocular and a 15x objective, the field size is 1.5 mm, the approximate field _____

0.4 _____ 8. If the size of the high-power field is 1.2 mm, an object that occupies approximately a third of that field has an estimated diameter of _____ mm.

7. You have been asked to prepare a slide with the letter *k* on it (as shown below). In the circle below, draw the *k* as seen in the low-power field.



8. Figure out the magnification of fields 1 and 3, and the field size of 2. (Hint: Use your ruler.) Note that the numbers for the field sizes below are too large to represent the typical compound microscope lens system, but the relationships depicted are accurate.



9. Say you are observing an object in the low-power field. When you switch to high-power, it is no longer in your field of view.

a) Why might this occur? as we move to higher power lens, the field view is narrowed

b) What should be done initially to prevent this from happening? center the object being viewed before switching to higher power.

10. Do the following factors increase or decrease as one moves to higher magnifications with the microscope?

resolution: increase amount of light needed: increase
 working distance: decrease depth of field: decrease

11. A student has the high-dry lens in position and appears to be intently observing the specimen. The instructor, noting a working distance of about 1 cm, knows the student isn't actually seeing the specimen.

How so? it should be 0.5 mm, isn't observing because not focused.

12. Describe the proper procedure for preparing a wet mount.

The object is placed in a drop of water or saline. Then coverslip is held 45 degree lowered carefully.

13. Indicate the probable cause of the following situations arising during use of a microscope.

a. Only half of the field is illuminated: blockage in light path

b. Field does not change as mechanical stage is moved: mechanical contact b/w the specimen and lens.

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EXERCISE

4

REVIEW SHEET

The Cell: Anatomy and Division

Anatomy of the Composite Cell

1. Define the following terms:

organelle: a lot of number of ~~cells~~ structures in
a living cell

cell: Basic ~~the~~ building blocks of all living organisms

2. Although cells have differences that reflect their specific functions in the body, what functions do they have in common?

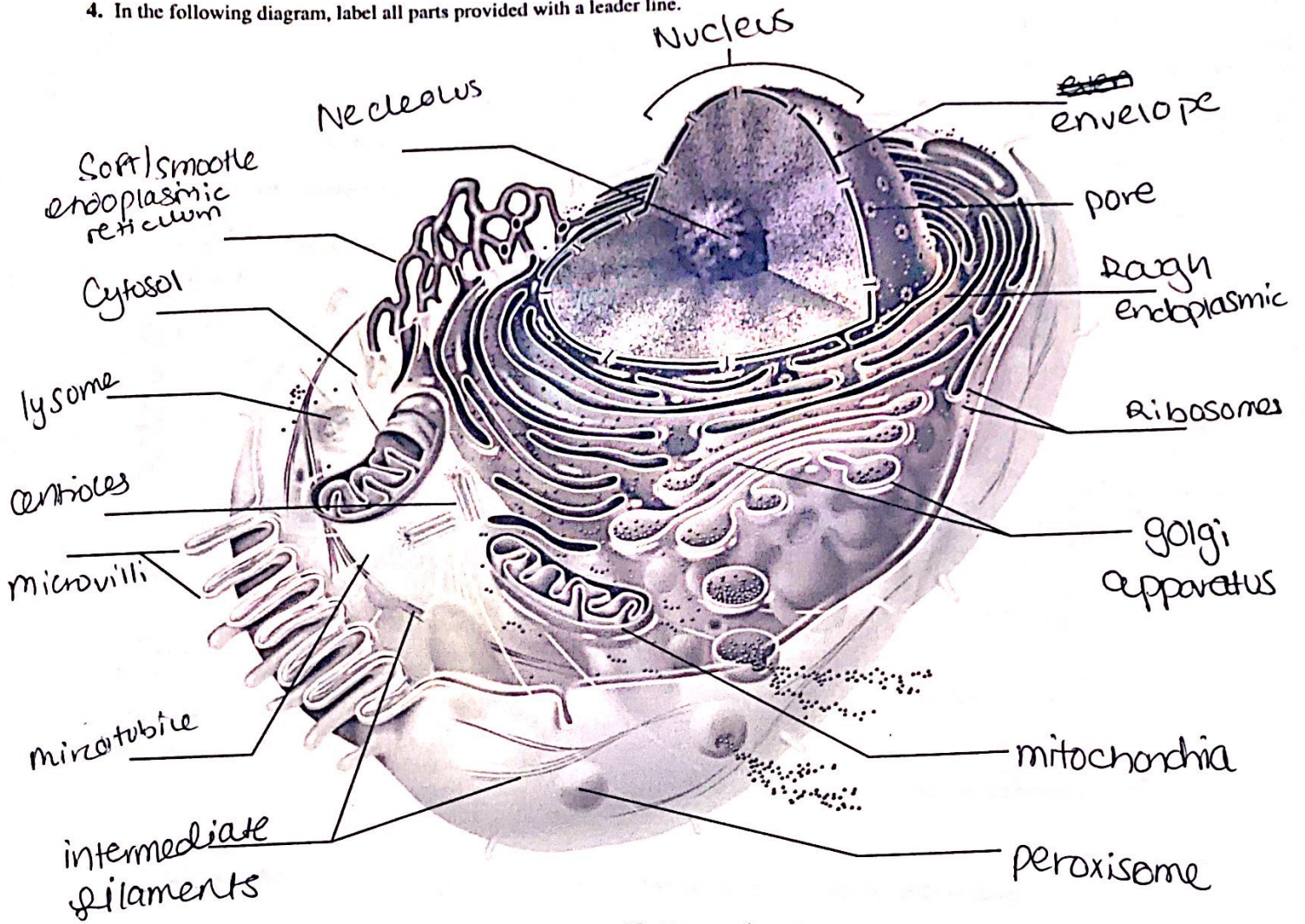
The functions they have in common is to break down, reproduce, move, and breathe (metabolism)

3. Identify the following cell parts:

- | | |
|------------------------|--|
| <u>plasma membrane</u> | 1. external boundary of cell; regulates flow of materials into and out of the cell; site of cell signaling |
| <u>lysosome</u> | 2. contains digestive enzymes of many varieties; "suicide sac" of the cell |
| <u>mitochondria</u> | 3. scattered throughout the cell; major site of ATP synthesis |
| <u>microvilli</u> | 4. slender extensions of the plasma membrane that increase its surface area |
| <u>inclusions</u> | 5. stored glycogen granules, crystals, pigments, and so on |
| <u>golgi</u> | 6. membranous system consisting of flattened sacs and vesicles; packages proteins for export |
| <u>nuclei</u> | 7. control center of the cell; necessary for cell division and cell life |
| centrioles | 8. two rod-shaped bodies near the nucleus; associated with the formation of the mitotic spindle |
| <u>centrioles</u> | |
| <u>nucleus</u> | 9. dense, darkly staining nuclear body; packaging site for ribosomes |
| <u>microfilaments</u> | 10. contractile elements of the cytoskeleton |
| <u>rough er</u> | 11. membranous system; involved in intracellular transport of proteins and synthesis of membrane lipids |
| <u>ribosome</u> | 12. attached to membrane systems or scattered in the cytoplasm; site of protein synthesis |
| <u>chromosomes</u> | 13. threadlike structures in the nucleus; contain genetic material (DNA) |
| <u>peroxisome</u> | 14. site of free radical detoxification |

and to cut

4. In the following diagram, label all parts provided with a leader line.



Differences and Similarities in Cell Structure

5. For each of the following cell types, list (a) *one* important structural characteristic observed in the laboratory, and (b) the function that the structure complements or ensures.

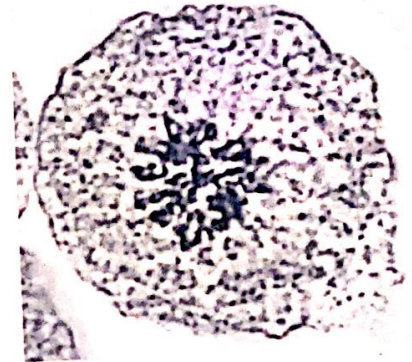
- | | |
|---------------------|--|
| squamous epithelium | a. <u>fit together like tiles</u> |
| | b. <u>covers the tissue</u> |
| sperm | a. <u>flagellum</u> |
| | b. <u>sperms travels to eggs (sexual reproduction)</u> |
| smooth muscle | a. <u>cell has width shape</u> |
| | b. <u>divided 2 subgroups</u> |
| red blood cells | a. <u>circular shape</u> |
| | b. <u>carries oxygen.</u> |

smaller easier to carry

6. What is the significance of the red blood cell being anucleate (without a nucleus)? the red blood cell can't produce new proteins and carry oxygen throughly
 Did it ever have a nucleus? (Use an appropriate reference.) yes If so, when? releases into blood.
7. Of the four cells observed microscopically (squamous epithelial cells, red blood cells, smooth muscle cells, and sperm), which has the smallest diameter? Sperm Which is longest? smooth muscle

Cell Division: Mitosis and Cytokinesis

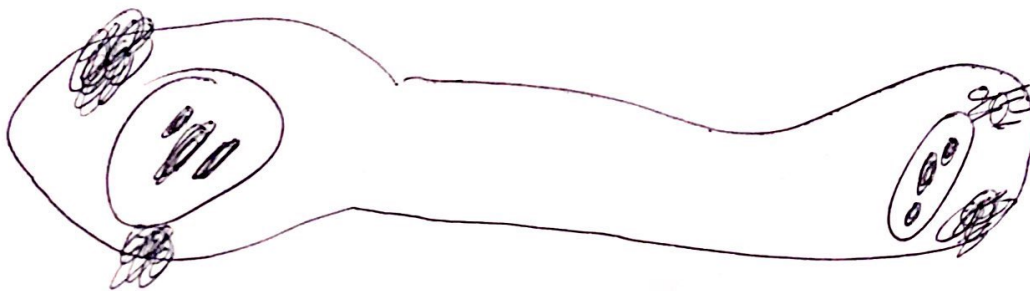
8. Identify the three phases of mitosis in the following photomicrographs.



- a. metaphase b. Anaphase c. prophase

9. What is the importance of mitotic cell division? Allows growth & repair of damage cells

10. Draw the phases of mitosis for a cell that contains four chromosomes as its diploid or $2n$ number.



11. Complete or respond to the following statements:

Division of the 1 is referred to as mitosis. Cytokinesis is division of the 2. The major structural difference between chromatin and chromosomes is that the latter are 3. Chromosomes attach to the spindle fibers by undivided structures called 4. If a cell undergoes mitosis but not cytokinesis, the product is 5. The structure that acts as a scaffolding for chromosomal attachment and movement is called the 6. 7 is the period of cell life when the cell is not involved in division. Two cell populations in the body that do not routinely undergo cell division are 8 and 9.

- nucleus
1. ~~prokaryote~~ ~~prokaryote~~
 2. cytoplasm
 3. ~~condense~~ condense
 4. centrioles
 5. ~~the~~ binucleate cell
 6. spindle
 7. interphase
 8. neurons
 9. skeletal

12. Using the key, categorize each of the events described below according to the phase in which it occurs.

Key: a. anaphase b. interphase c. metaphase d. prophase e. telophase

- d 1. Chromatin coils and condenses, forming chromosomes.
- a 2. The chromosomes are V shaped.
- e 3. The nuclear envelope re-forms.
- e 4. Chromosomes stop moving toward the poles.
- c 5. Chromosomes line up in the center of the cell.
- d 6. The nuclear envelope fragments.
- d 7. The mitotic spindle forms.
- b 8. DNA synthesis occurs.
- b 9. Centrioles replicate.
- d 10. Chromosomes first appear to be duplex structures.
- d 11. Chromosomal centromeres are attached to the kinetochore fibers.
- e 12. Cleavage furrow forms.
- a and e 13. The nuclear envelope(s) is absent.

13. What is the physical advantage of the chromatin coiling and condensing to form short chromosomes at the onset of mitosis?

Small and short, mechanically much easier to copy during mitosis.