Names: _____ Period: _____ Date: _____

Biology
Mr. Croft

Microscope #: _____

Introduction to the Microscope & Eukaryotes

50 Points

Part I: Parts of the Microscope

Define the function of the following parts of a compound light microscope:

1. Eyepiece

2. Body Tube

3. Revolving Nosepiece

4. Coarse Adjustment

5. Fine Adjustment

6. Arm

7. Low-power Objective

8. High-power Objective

9. Stage Clip

10. Diaphragm

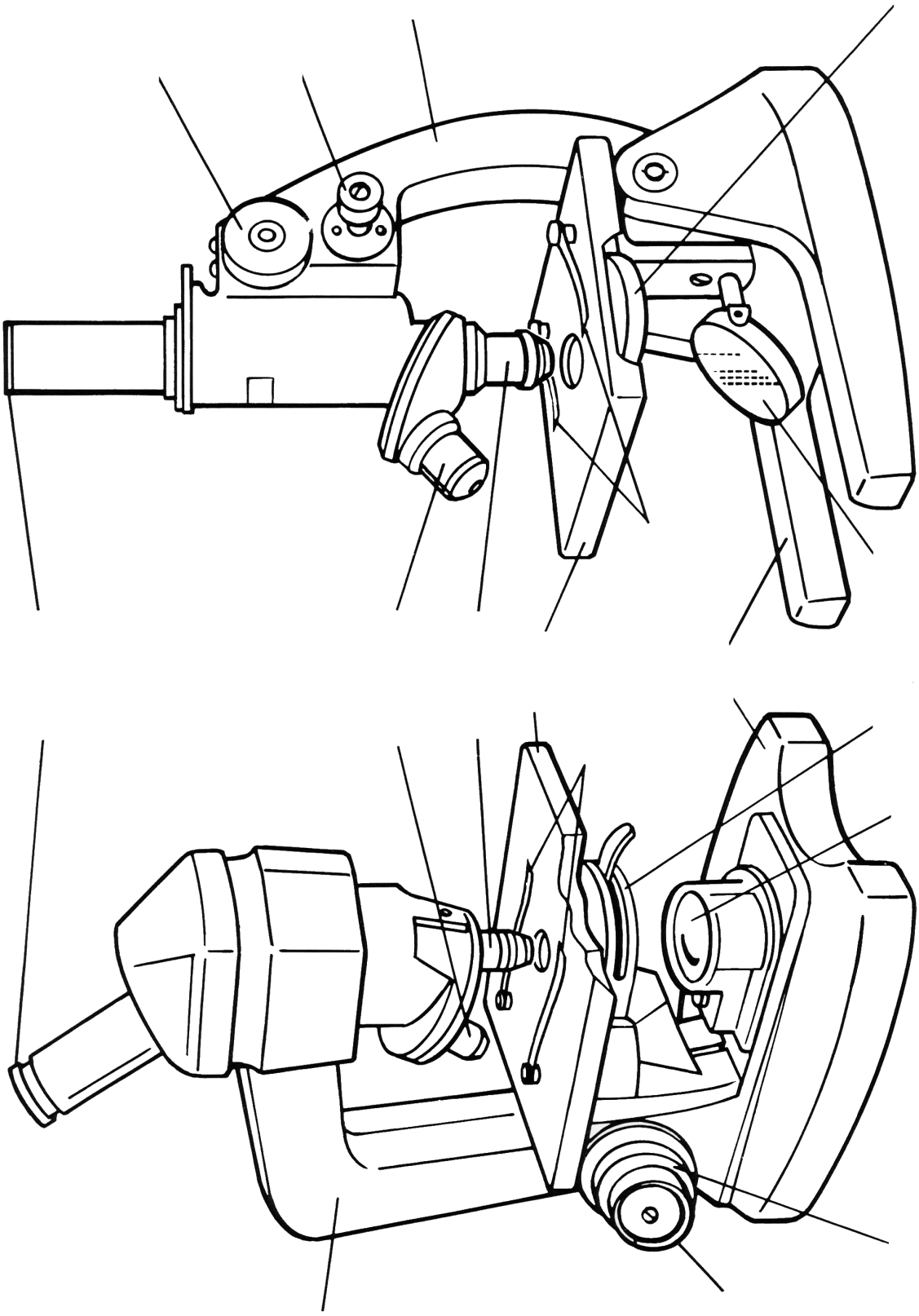
11. Stage

12. Light Source

13. Base

Part II: Label the picture of the microscopes below.

Parts of the Microscope



Part III: Calculation of the Field of Vision

1. Place a transparent metric ruler under the low power (LP) objective of a microscope.

2. Focus the microscope on the scale of the ruler, and measure the diameter of the field of vision in millimeters (mm). Record this number in the results section below.

3. Convert this measurement to micrometers (μm) by using the following equation:

$$\textbf{diameter in } \mu\textbf{m (LP)} = \textbf{diameter in mm} \times \frac{\textbf{1000 } \mu\textbf{m}}{\textbf{1 mm}}$$

4. Calculate the diameter in μm of the field of vision under high power (HP) using the following formula:

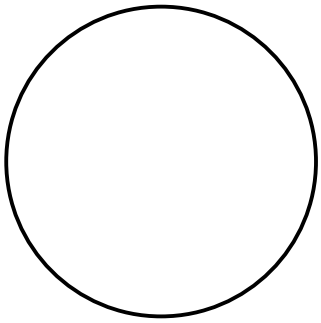
$$\textbf{diameter in } \mu\textbf{m (HP)} = \frac{\textbf{diameter (LP) x mag. of LP objective}}{\textbf{mag. of HP objective}}$$

Results: diameter of the LP field of vision (mm) = _____

diameter of the LP field of vision (μm) = _____

diameter of the HP field of vision (μm) = _____

Part IV: The letter "e"
Cut out the small letter "e" from a newspaper. Place a drop of water onto a clean microscope slide. Place the letter on the drop of water using forceps. The letter should be placed so that it can be read without turning the slide. View the letter under the microscope and answer the following questions:



1. Draw the letter "e" as it appears under the microscope.

2. Describe the position of the "e."

3. What happens to the "e" as you move the slide to the right?

4. What happens if you push the slide away from you?

5. What is the total magnification of the low-power lens?

6. What happens when you change to the high-power lens?

7. What is the total magnification of the high-power lens?

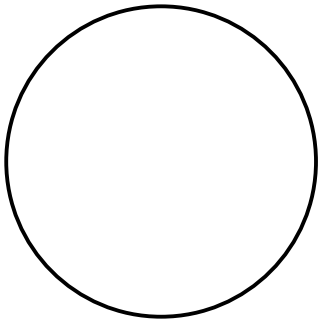
8. About how many times was the magnification increased when you changed from low-power to high-power?

9. How does this change the area of the slide included in the high-power field?

10. Measure the height of the letter "e" in micrometers (low power)

Part V: Thread

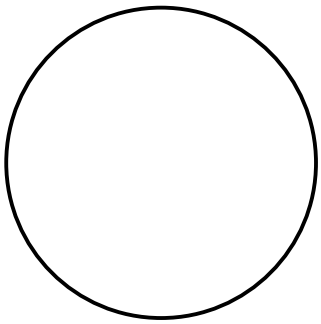
Cross two pieces of different colored thread on a slide. Place a drop of water where the two strands cross. Place a cover slip on the slide using the previously described procedure. View the slide under the microscope and answer the following questions:



1. Draw what you see under low power.
2. Describe any changes in the appearance of the position of the fibers when you turn the adjustment knob back and forth.
3. Explain why these apparent changes occur.
4. How can you determine which fiber is on top when you look through the microscope?
5. What happens to the resolution when you change from low-power to high-power?
6. What happens to the field of vision when you change from low-power to high-power?
7. Measure the width of one of the strands of thread in micrometers (<u>low power</u>).

Part VI: Hair

Pull a piece of hair from someone's head making sure that you obtain an entire strand. Place a drop of water on a clean slide and then place the strand of hair on the slide so that the end that came from the scalp is in the water.



1. Draw and describe what you see under low power.
2. Measure the width of the strand of hair in micrometers (<u>low power</u>).

Part VII: Plant Cells - Onion Epidermis

The epidermis of the onion is ideal for study because it is composed of a single layer of cells.

Procedure:

1. The outer thick scale of the onion has been removed for you.
2. Peel off a small piece of the delicate transparent tissue **<u>inside</u>** one layer.
3. Cut a small square of the tissue using a scalpel (if necessary).
4. Place the square on a slide, add two drops of water, and place a cover glass on top.
5. Examine the slide under <u>low power</u>.

Questions:

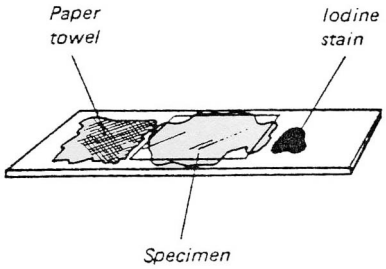
1. What is the shape of the cells?

2. Are all the cells similar in shape?

3. What color is the cytoplasm?

Procedure (look at figure below):

6. Place one drop of iodine to the right of the cover glass (CAUTION: will stain your clothes and skin).
7. Place a small piece of paper towel to the left of the cover glass.
8. As the towel absorbs water, the iodine stain will be drawn under the cover glass.
9. Absorb any excess iodine with a small piece of paper towel.
10. Examine the slide again under low power.



Questions:

4. When you add a drop of iodine, what effect does the stain have on the cells?

5. Measure the length of an average-sized onion cell in micrometers (low power).

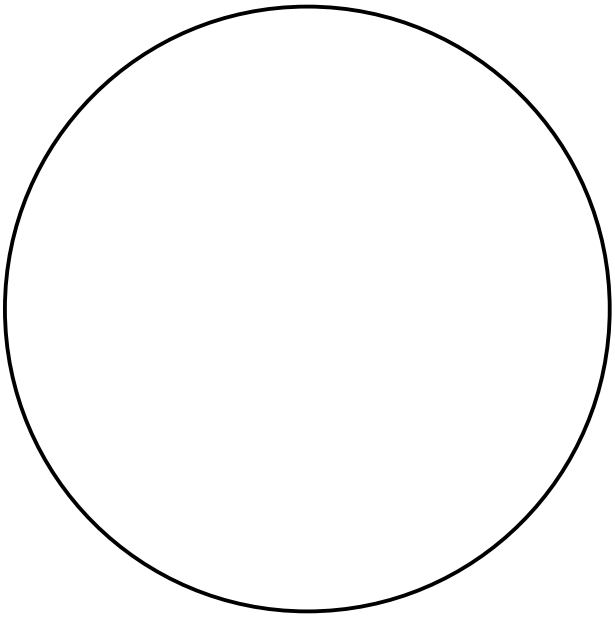
6. Measure the width of that onion cell in micrometers (low power).

Procedure:

11. Select a cell that is clear, center it in the field of vision, and switch to high power.
12. Focus using the fine adjustment knob.
13. Rotate the fine adjustment back and forth to observe the cell at various depths.

Questions:

7. Draw and label the entire field of vision under high power.



8. What is the appearance of the cytoplasm?

9. What is the appearance of the nuclei?

10. Are the nuclei always in the same position in the cell?

11. Does the onion epidermal cell appear to have depth? (are cells 3-D?) Explain.

Part VIII: Animal Cells - Human Epithelial Cells

Procedure:
1. GENTLY scrape the inside of your cheek with the wide end of a clean toothpick.
2. Roll the toothpick back and forth on a clean slide.
3. Add **less than one drop** of methylene blue (CAUTION: will stain your clothes and skin) by quickly touching the pipette on the slide.
4. Place a cover glass on the slide.
5. Examine the slide under low power.
6. Select a cell that is clear, center it in the field of vision, and switch to high power.
7. Focus using the fine adjustment knob.

Questions:
1. How does the outer edge of the cheek cells compare with the outer edge of the onion cells?

2. What is the outer edge of an animal cell called?

3. In what ways do the cheek cells differ from the onion cells?

4. Measure the diameter of the cheek cell in micrometers (low power).

5. Draw and label the entire field of vision under high power.