

Name: _____ Period: _____ Seat Number: _____ Date: _____

LAB: Mitosis in Plant Cells

Objective: The purpose of this lab is to observe how cells reproduce to provide growth for an organism. (Indiana State Academic Standards: Biology, 1.11, 1.12, 1.15, 1.18, & 1.21)

Instructions: Follow each step of the procedure below and complete the analysis questions.

Background: Cells in both plants and animals must be able to reproduce in order for the organism to grow, which is one of the basic characters of life. When cellular division occurs in most cells the cell passes on a complete set of **chromosomes** to the offspring. This process is called **mitosis**. Mitosis occurs in 4 main phases. They are:

- **Prophase:** In prophase the chromosomes of the cell begin to coil tightly and the nuclear membrane begins to disintegrate.
- **Metaphase:** In metaphase, the chromosomes begin to line up at the center of the cell in a structure called the **mitotic spindle**.
- **Anaphase:** In anaphase, the chromosomes split into two **chromatids** that were connected at a central **centromere**. Once they split they begin to migrate to opposite poles of the cell.
- **Telophase:** The final phase is telophase in which the chromosomes reach the opposite poles and begin to recoil. The nuclear membrane encapsulates them and forms 2 separate nuclei. During telophase the cytoplasm also divides at the **cleavage furrow**. When the 2 edges of the cleavage furrow meet the cell splits into 2 identical cells. This is called **cytokinesis**.

Interphase is not a phase in mitosis, but is part of the **cell cycle**. Cells in interphase continue to grow, but do not divide until they reach mitosis.

Materials:

Compound Light Microscope

Prepared Slides of *Allium* (Onion) Root Tip

Procedure:

1. Obtain your microscope and slide and get the slide in focus under high power.
2. Locate the meristem, which is located just above the root cap in the center of the root. This is the region where cellular division is most active.
3. Examine the meristem carefully. Choose a sample of 50 cells (look for a group of cells that seems to have been actively dividing when the slide was made. You will recognize this because all of the cells will not look exactly the same.) The dark stained parts of the cell are the chromosomes.
4. For each cell in your sample, identify the phase of mitosis that it is in and keep tally of the cells using the **Table 1**. (Use the pictures provided as a reference to determine the phase.)
5. Once you have completed your data collection, calculate the percentage of cells that are in each phase. Record your data in **Table 1**. (To calculate the percentage, take the number of cells in that phase, divided by fifty then multiply by 100.)
6. Once you have calculated the percentage of cells in each phase you can use that data to determine the average length of each phase. If you assume that the average length of mitosis in *Allium* root is 80 minutes, take the percentage, divided by 100 then multiply by 80 minutes. Record your data in **Table 1**.
7. Return your microscope and slide then answer the analysis questions that follow.

Reference: These are photographs of typical *Allium* root tip cells in the various phases of mitosis and interphase.

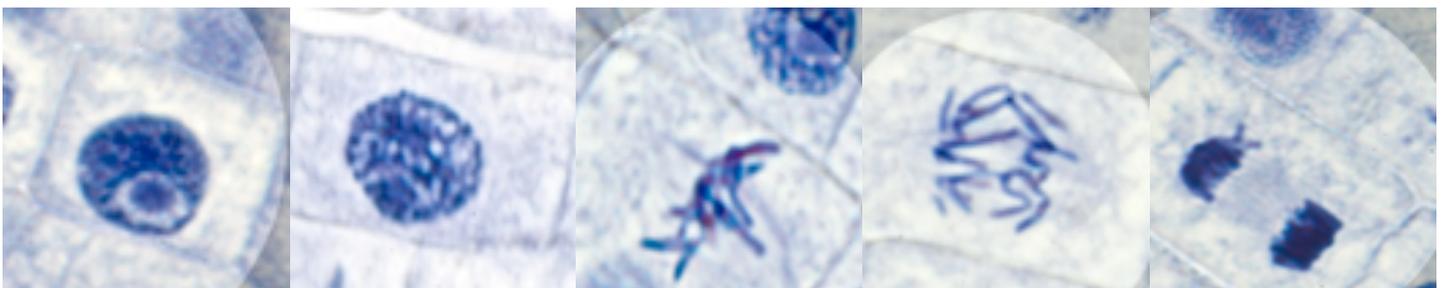
Interphase

Prophase

Metaphase

Anaphase

Telophase



GRADE: _____/20

Data:

Data Table 1.

Phase of Cell	Count	Percentage	Time (in minutes)
Prophase			
Metaphase			
Anaphase			
Telophase			
Interphase			

Analysis and Conclusion: (Complete sentences are required.)

1. According to your data, which phase of mitosis last the longest? Why do you think that phase takes the longest? (NOTE: Interphase is NOT a mitotic phase.)

2. Is it possible to distinguish between early anaphase and late anaphase? How?

3. At what point is mitosis over? How can you tell if this has occurred?

4. Mitosis creates offspring that are genetic copies of their parent cell. Why is this true?

5. There are four (4) phases to mitosis. List them and describe what is occurring at each. Use BOTH a diagram and complete sentences to explain your answer.