

Name \_\_\_\_\_

Period \_\_\_\_

### Lab: Onion Root Mitosis

**Purpose:** To gain a better understanding of what the phases of the cell cycle look like in a typical plant cell and to determine the amount of time spent in different phases of the cell cycle.

#### **Background Information:**

In order to grow, living things do not increase the size of their cells. Instead, they grow by increasing the number of cells that they have, in the process of cellular division known as mitosis (one of the phases of the cell cycle). Organisms control their growth by regulating the cell cycle.

In plants, the roots continue to grow as they search for water and nutrients. These regions of growth are good for studying the cell cycle because at any given time, you can find cells that are undergoing mitosis. (Interphase is NOT considered a phase of mitosis, however it is part of the cell cycle.) Today you will be looking at prepared microscope slides of thin slices of onion root tips. These samples have been stained so that the chromosomes are visible.

**Hypothesis:** Look at the diagram of the cell cycle in your notes packet on Cell Division. Today you will be looking at 25 onion root cells. Make a prediction as to what percentage of these cells will be in interphase, prophase, metaphase, anaphase and telophase. Be sure to explain WHY you made this prediction. You must have a reason!

**Materials:** microscope, prepared slides of onion root tips

**Procedure:**

1. Choose 25 root tip cells at random that are all in the same area of the root tip (once you choose an area, you should not have to move your slide to see 25 cells). Record the number of cells in each phase in your data table. (The best way to do this is probably to have one person constantly looking through the microscope and calling out "interphase, prophase, interphase" etc., while the other person keeps track in the data table. A third person can keep track of the number of cells counted, and tell everyone to stop at 25.)
2. On a sheet of blank paper, draw a sketch of a cell that is clearly in interphase or one of the stages of mitosis. Each person in the lab group should look at this cell and draw their own sketch.
3. Find another cell that is clearly in a different stage of the cell cycle. Have your teammates look at it, draw a sketch of it. Continue doing this until you have a sketch of all four phases of mitosis (prophase, metaphase, anaphase, telophase) and interphase. Be sure to label your paper at the top with the type of cells you are looking at. Also, label all cell structures that are visible (nucleus, chromosomes, cytoplasm, cell wall, etc.) and include the magnification at which the cells were viewed.
4. Number the phases in the order in which they occur in the cell cycle from first through fifth.
5. Compile your data with the other lab groups in the class and record results in data chart.

**Data:**

	Interphase	Prophase	Metaphase	Anaphase	Telophase	Total
Group Count						
Class Totals						
Class Percentage						

**Do not discard your drawings, they are also data and should be included in your lab report.**

**Graphing the Data** (These questions will not be part of your final lab write-up.)

1. Which data is more accurate, the data for just your group or the class data?
2. Which data should you graph, the data for just your group or the class data?
3. Create a graph that shows the class percentage of cells in each phase. Is this a counting/grouping graph or a graph that shows change over time? Should this be a bar graph or a line graph?
4. Don't forget to put this graph in the **DATA** section of your report.

**Analysis:**

Answer each question in complete sentences as part of your lab report write-up in the Analysis section. Analysis section should be in paragraph format!

1. What evidence did you observe that shows that the cell cycle is a continuous process, not a series of separate events?
2. Why did we make our graphs based on the class data, and why is it important to answer all Analysis and Conclusion questions based on class data rather than the data for your individual group?
3. Based on the Class Percentage (not your Group Count), what was the most common phase (include numbers from data)? What does the difference in numbers of cells at each phase mean? (Of the five stages of the cell cycle, which takes the longest to complete? Which is the shortest?)

### Conclusion Questions:

Answer each question in complete sentences as part of your lab report write-up in the Conclusion section. Conclusion section should be in paragraph format!

1. Were you looking at animal cells or plant cells in this lab? What about the cells you were looking at would clearly show what kind of cell you were looking at even if you didn't have other clues?
2. Cells in the root divide many times as the root grows longer and thicker. With each cell division, the chromosomes are divided between two daughter cells, yet the number of chromosomes in each cell does not change. What process ensures that the normal number of chromosomes is restored after each cell division? (In other words, why don't the daughter cells end up with half of the parent cell's DNA?) During which part of the cell cycle does this process occur?
3. Scientists have divided the cell cycle into five major phases (interphase, prophase, metaphase, anaphase, telophase), each characterized by important events, but these divisions are fairly arbitrary. Scientists could have chosen to divide the cell cycle up in a variety of different ways. Why is it beneficial that scientists agreed upon one accepted version of the phases of the cell cycle?