**Mitosis Onion Root Tip Lab**  Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period:\_\_\_\_\_

In this lab, you will look at tissue samples from onion root tips to determine the frequency of time spent in different phases of the cell cycle (interphase and the phases of mitosis-prophase, metaphase, anaphase, and telophase) by calculating percentages of cells observed in each.

The life cycle of the cell is typically divided into 5 major phases. The phases are listed below, along with the major events that occur during each phase.

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| --- | --- |
| http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/graphics/interphase.gif | **Interphase.**The cell is engaged in metabolic activity and performing its duty as part of a tissue. The DNA duplicates during interphase to prepare for mitosis (the next four phases that lead up to and include nuclear division). Chromosomes are not clearly discerned in the nucleus, although a dark spot called the nucleolus may be visible. |

|  |  |
| --- | --- |
| http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/graphics/prophase.gif | **Prophase.**Chromatin in the nucleus begins to condense and becomes visible in the light microscope as chromosomes. The nuclear membrane dissolves, marking the beginning of prometaphase. Proteins attach to the centromeres creating the kinetochores. Microtubules attach at the kinetochores and the chromosomes begin moving. |

|  |  |
| --- | --- |
| http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/graphics/metaphase.gif | **Metaphase.**Spindle fibers align the chromosomes along the middle of the cell nucleus. This line is referred to as the metaphase plate. This organization helps to ensure that in the next phase, when the chromosomes are separated, each new nucleus will receive one copy of each chromosome. |

|  |  |
| --- | --- |
| http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/graphics/anaphase.gif | **Anaphase.**The paired chromosomes separate at the kinetochores and move to opposite sides of the cell. Motion results from a combination of kinetochore movement along the spindle microtubules and through the physical interaction of polar microtubules. |

|  |  |
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| http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/graphics/telophase.gif | **Telophase.**New membranes form around the daughter nuclei while the chromosomes disperse and are no longer visible under the light microscope. Cytokinesis or the partitioning of the cell may also begin during this stage. |

Materials Needed:

Chromebook or iPad Onion prepared slides Microscope

**Procedure:**

**Part 1:**

On an iPad or Chromebook. Open a web browser such as Chrome or Safari to: <http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/cell_cycle.html>

-Click Next, then Next, then Next, proceed with determining the phases of each cell picture.

-Note, some phases will be use more than once.

-Once you have completed the 36 pictures, count the pictures for each phase and find the percentage of cells in the phase by taking the number of cells divided by 36. Record the percent of cells in each box in the table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Interphase | Prophase | Metaphase | Anaphase | Telophase | Total |
| Number of cells |  |  |  |  |  | 36 |
| Percent of cells |  |  |  |  |  | 100% |

**Part 2:**

Have each member of your group examine the prepared onion root tip slide. Choose 50 cells at random nearest to the tip to look at. Tally how many are at each stage. Record each person’s count as a trial. Round the student averages.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | Interphase | Prophase | Metaphase | Anaphase | Telophase |
| Student Name: | Total: | % | Total: | % | Total: | % | Total: | % | Total: | % |
| 1. |   |   |   |   |   |   |   |   |   |   |
| 2. |   |   |   |   |   |   |   |   |   |   |
| 3. |   |   |   |   |   |   |   |   |   |   |
| 4. |   |   |   |   |   |   |   |   |   |   |
| 5. |   |   |   |   |   |   |   |   |   |   |
| Student Average |   |   |   |   |   |   |   |   |   |   |

Graph the percentages of the student average and the average from part 1. Be sure to include a key. You should have the stage for each percentage on the x-axis and the percent on the y-axis. Use a bar graph.

**Conclusion Questions:**

1. Which stage/phase are most cells in? Why?

2. Why are individual chromosomes only visible during mitosis? What is the advantage of doing this?

3. How is cell division important to single-celled organisms?

4. How does the information in one of your body cells compare to ones in other body cells?

5. Why is it important to replicate DNA before cell division?

6. How is the cell cycle controlled?

7. What would happen if the controls were defective?

Graph for Parts 1 and 2:

