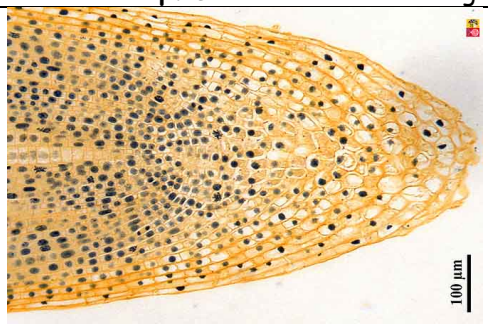
Name: Period:

# MITOSIS AND CELL DIVISION LAB

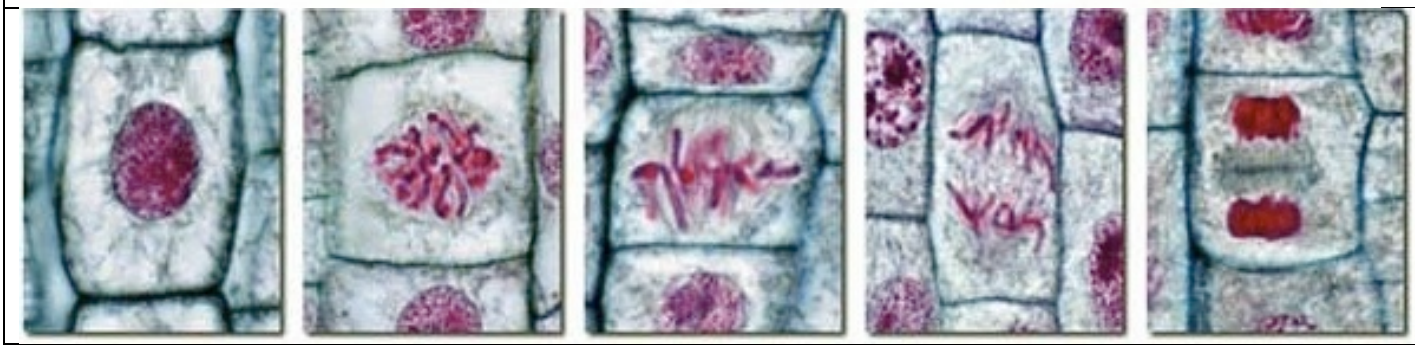
**1. Understanding the Onion Root tip.** Draw arrows indicating each region.




tip of the root

1. Protective Root cap
2. Zone of cell division
3. Zone of cell elongation

**2. Drawing set one: Use the diagrams and the photographs below for reference.**



Using a microscope, focus on high power on cells in the zone of cell division in an onion root tip. Find and draw one cell in interphase, prophase, metaphase, anaphase, and telophase. **In your drawing, label the nuclear membrane, chromosomes, spindle fibers, and the new cell wall.**

| Interphase | Prophase | Metaphase | Anaphase | Telophase |
|---|---|---|---|---|
| | | | | |

## 3. TIME FOR MITOSIS: (you can also take pictures and count on your phone's camera)

1. Under high power, view cells in **the zone of division**. It's essential that you're in this zone (see diagram on other side).
2. Using the pointer in the eyepiece to keep track of columns of cells, count *all* the cells in the field of view, and categorize them as interphase, prophase, metaphase, anaphase, telophase. Record your data in column "A"
3. Repeat in another field (also in the zone of division). Record your data in column "B."
4. Repeat for column "C"
5. Complete columns "D" and "E,"
6. Complete column "F" by dividing your result in column D by the total number of cells (in "E").
7. Assume that division takes 24 hours. Multiply your result in column F by 24 to see how many hours a cell will spend in each phase.

| | | *Number of Cells* | | | | F | (G) Class Data | Class Data | Hours in each stage |
|---|---|---|---|---|---|---|---|---|---|
| | **Phase** | **A Field 1** | **B Field 2** | **C Field 3** | **D Total Cells A+B+C** | **% of total (D/E)** | **(% of total from class spreadsheet)** | **(standard Error)** | **(G X 24 hours)** |
| *A* | **Interphase** | | | | | | | | |
| *B* | **Prophase** | | | | | | | | |
| *C* | **Metaphase** | | | | | | | | |
| *D* | **Anaphase** | | | | | | | | |
| *E* | **Telophase** | | | | | | | | |
| TOTAL CELLS COUNTED **(E)** | | | | | | 100% | | | 24 hrs. |

**4. Graphic representation of the cell cycle.** In the space below, use the class data to draw a pie chart showing what proportion of time a cell spends in I,P, M, A, and T.

**Extension**: Grow some onion root tips in water, and others in lectin (a protein that's secreted by some fungi that are plant pathogens). Use the squash method to determine the percentage in I, P, M, A, T, C. Use a statistical analysis to compare results, with key question being "Does lectin have a statistically significant impact on cell division in onion root tips?"

Pie chart of class data

$X^2$

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

1: Onion root tips grown in water

| | I | P | M | A | T | total |
|---|---|---|---|---|---|---|
| Obs | | | | | | |
| obs % | | | | | | |

Note that "expected" for lectin = "observed" above.

2: Onion root tips grown in water plus lectin.

| | I | P | M | A | T | total |
|---|---|---|---|---|---|---|
| Obs | | | | | | |
| exp. | | | | | | |
| o-e | | | | | | |
| $(o-e)^2$ | | | | | | |
| $(o-e)^2$ /e | | | | | | |

df= _____

critical value at 0.05 level =

Conclusion:

## 5. Content mastery practice.

Pretend that you're a cell in an onion root tip in interphase. Describe what happens to you over the next few hours as you divide from one cell to become two. Write small, and include lots of detail.