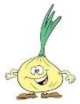


Honors Mitosis: Onion Roots

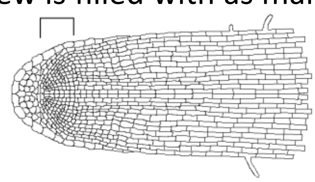
Name: ___________________________
Date: ____________________________

Background: Growth of new roots is due to the production and elongation of new cells. These new cells are produced through the process of *mitosis*. Mitotic divisions are usually confined to the cells near the tip of the root. Mitosis is one part of the cell cycle. The cell cycle is the sequence of events that includes cell growth (interphase), and division (mitosis and cytokinesis). In this lab, you will be looking at the cells in an onion root tip.

Purpose:
To see if each phase of mitosis happens for an equal amount of time in onion root tip cells.

Materials:
You will choose materials for your experiment from the following:
Microscope, prepared onion root tip slide, ruler

Procedures:
1. Place an onion root tip slide on the microscope stage. Under high power (400x), move and focus the slide until the field of view is filled with as many cells in various phases of the cell cycle as possible.

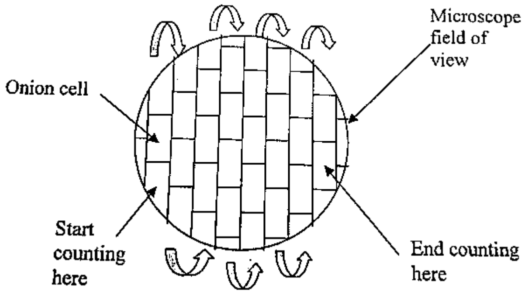


The bracketed area of this diagram shows where you are most likely to find dividing cells.

2. Begin counting the cells one column at a time from left to right. You will need to count at least 100 cells. If you need more cells, move the slide to the right and continue counting rows.
3. Indicate the stage of each cell for your partner to tally on the table under "Group: Total Number of Cells". Use the chart below to keep track of the phase of each type of cell.
4. Each group should share their phase totals with the class. Write these averages on the table.
5. Complete the calculations in table 1 for the % in each phase.

Tally Chart: Record the phase for each cell. Key: I= Interphase P= Prophase M= Metaphase A= Anaphase T= Telophase

1	11	21	31	41	51	61	71	81	91
2	12	22	32	42	52	62	72	82	92
3	13	23	33	43	53	63	73	83	93
4	14	24	34	44	54	64	74	84	94
5	15	25	35	45	55	65	75	85	95
6	16	26	36	46	56	66	76	86	96
7	17	27	37	47	57	67	77	87	97
8	18	28	38	48	58	68	78	88	98
9	19	29	39	49	59	69	79	89	99
10	20	30	40	50	60	70	80	90	100



Use this image to identify what phase the onion cells are in.

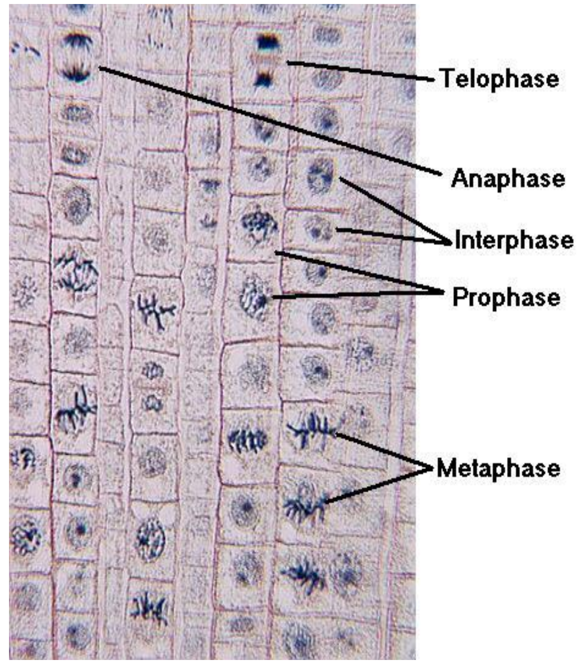


Table 1: Dividing Onion Root Tip Cells

Data:

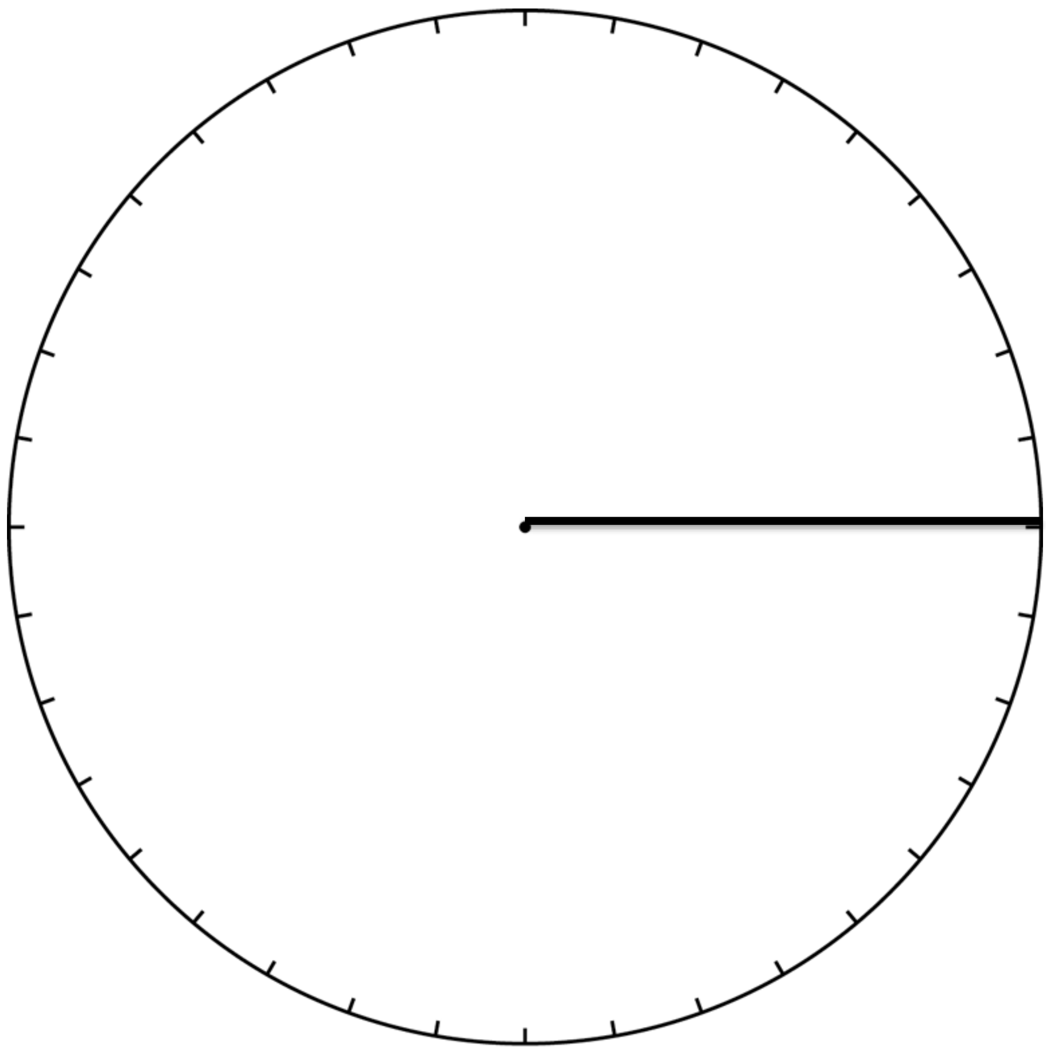
Phase	Group # of cells	Class Total number of Cells	Average % spent in each phase	Degrees of pie chart
Interphase				
Prophase				
Metaphase				
Anaphase				
Telophase				
Total cells	100		100	**360**

Divide class total for the phase/ total cells for class

Convert % to decimal and multiply by 360.

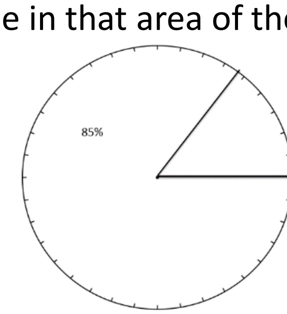
(Honors)Analysis: Use your data to construct a pie chart that shows the average time in each stage.

Title:____



Instructions:

1) Convert the percent to a decimal. Ex: 85% = .85
2)Multiply the decimal x 360   Ex: .85 x 360= 306
3)Divide the answer by 10. Ex: 306/10= 30.6
3) Count the number of lines around the circle from the starting line and draw a line from the center to that spot on the outside of the circle. Shade in that area of the circle. The part that you shaded in equals that percent of the circle. Ex:



4) Label the section with the name of the phase.
5) Repeat for each section. Continue counting from the Last line you drew.

On Level: Construct a bar graph comparing the average % spent in each phase. Be sure to label each bar and use a ruler when drawing.

Title: ______

X-Axis: ______

Y-Axis: ______

Directions: After completing the pre-readings, the mitosis lab activities, and researching web-based information, please answer the following questions.

1. Based on the table and pie chart, what can you infer about the relative amount of time a cell spends in mitosis?

2. What is the significance of using class data instead of individual group data?

Did all the groups report consistent data or were there any “outliers”? What criteria did you use to determine the outlier?

3. (Honors) Explain the protective significance of chromosomes condensing into tight coils during mitosis. (What would happen if you tried to separate 46 balls of yarn that were all unraveled? How does coiling up the chromosomes help to keep it organized?)

4. (Honors) When the DNA is tightly coiled into chromosomes it can’t be read to make proteins. Why is it a problem that cancer cells spend so much time in mitosis and very little time in interphase?