Mitosis and the Cell Cycle

Introduction:

Imagine what would happen if every cell in a multicellular organism did exactly the same thing. If this were the case, we would fail to exist. Cells in a multicellular organism must function like the members of a team with each member having a specific job or specialty but that works in conjunction with the other members of the team. So how do we become multicellular? This occurs through repeated rounds of cell division. Cell division can be divided into two stages: 1) **mitosis** or nuclear division and 2) **cytokinesis** or division of the cytoplasm. These processes of a dividing cell however, only constitute a small percentage of the cell cycle. During the remainder of the cell cycle called **interphase**, growth, chromosome synthesis, and routine cellular functions occur such that the particular cell performs its duties for the team.

In this investigation, you will observe the stages of mitosis using prepared slides of onion root tips. Furthermore, you will measure the percentage of time required for different stages of mitosis and the cell cycle.

Problem/Hypothesis:

Formulate a hypothesis to answer the question:

Which stage of the cell cycle do multicellular organisms spend most of their time in; interphase, mitosis, or cytokinesis? _____

Procedure and Results:

Part A: Diagram the stages of mitosis

1) View the prepared slides of the onion root tip which have been set up. **Do not touch the microscope except the fine focus knob!!** Draw the stages of mitosis and cell cycle in the spaces below and label. **Note: Make sure to draw the stage which matches the appropriate description in the box below the space. Also be sure to label which stage is present.**

Stage: _____	Stage: _____	Stage: _____	Stage: _____	Stage: _____
During this phase the cell increases in size and the DNA is replicated. The chromosomes are dispersed in the nucleus and appear as a network of long threads called chromatin.	During this phase, the chromosomes condense and the nuclear envelope begins to disappear. Chromosomes attach to the spindle at their centromere.	During this phase the condensed chromosomes move to the spindle equator. The chromosomes are attached to the spindle at their centromere.	Centromeres split and the sister chromatids separate and move to opposite poles.	During this phase, the daughter chromosomes arrive at the opposite poles. The nuclear envelope begins to reform

Part B: Measuring time needed for mitosis

1) View a prepared slide of an onion root tip on high power.
2) Count the number of cells in the field of view and record below.
3) Then count the number of cells in each phase of mitosis; prophase, metaphase, anaphase, and telophase. Record the information in the data table below.
4) To determine the approximate portion of time a cell spends in each phase of mitosis, divide the number of cells in each phase by the total number of cells in the field of view and record in the data table. To convert each decimal into a percentage, multiply by 100 and record in the data table.

Total number of cells
In field of view: _____

Phase	Number of cells in phase	Number of cells in phase / Total Number of cells	Percentage of time Spent in Phase
Prophase			
Metaphase			
Anaphase			
Telophase			

Analysis:

1) Which stage of mitosis did the onion root tip spend the most time in? _____.
   The least time? _____.

2) What is the total percentage of time a cell spends in mitosis? _____.

3) What percentage of time were the cells you viewed not undergoing mitosis (Note: Also called interphase)?
   _____.

4) What are the cells doing when they are not undergoing mitosis?
   _____
   _____
   _____

Conclusion:

1) Which stage of the cell cycle do multicellular organisms spend most of their time in; interphase, mitosis, or cytokinesis? _____

Was your hypothesis correct? _____.