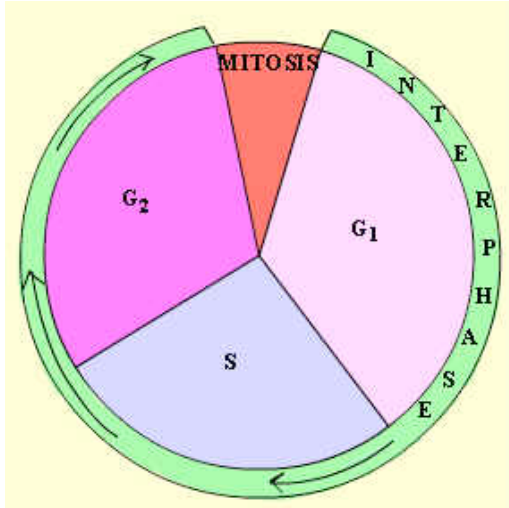


■ **Pre-Lab**

Examine the cell cycle diagram and complete the following data table:



The cell cycle is an ordered set of events, culminating in cell growth and division into two daughter cells. The  $G_1$  phase is a period of activity in which cellular growth and development take place. During the S, or DNA synthesis phase DNA replication takes place. Several proteins, including those associated with the chromosomes, are also synthesized during the S phase. Finally when the S phase is completed, the cell enters the  $G_2$ . This phase is usually shortest of the three phases of interphase. The  $G_2$  phases involves the synthesis of organelles and materials required for cell division.

- Summarize the following phases:  $G_1$ , S ,  $G_2$ .

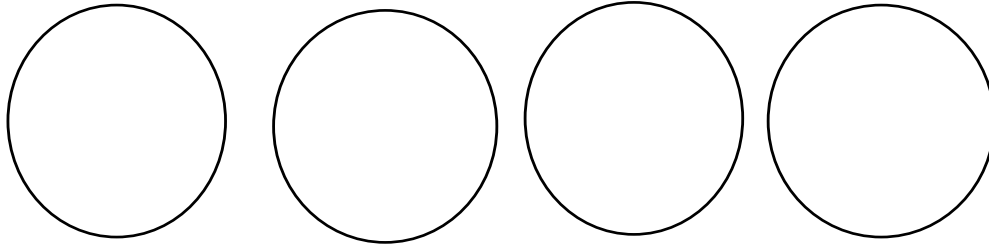
Cell Cycle Phase Summaries		
$G_1$	S	$G_2$

■ **Procedure A: Plant Cells**

- Using a compound light microscope, scan the entire length of an *Allium* root tip slide. Study each section of the root tip under low power and then under high power.
- In which region of the slide do you find the most small tightly packed cells? \_\_\_\_\_
- Do these cells appear to be old or new? \_\_\_\_\_ How can you tell? \_\_\_\_\_
- Can you recognize any cells that are undergoing mitosis and/or Cytokinesis? How can you tell? \_\_\_\_\_  
 \_\_\_\_\_
- What looks like strings or bars in the nucleus are chromosomes. Examine these structures in several cells. What appears to be happening to the chromosomes during mitosis? \_\_\_\_\_  
 \_\_\_\_\_

6. Mitosis is a continuous process in which the contents of dividing cells change shape and position.  
 Draw 4 complete nuclei undergoing the 4 different phases of Mitosis – draw them in order.

• **Drawings:** (draw the 4 *different* stages in order)



• **Name each stage**

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• **Observations/Description**

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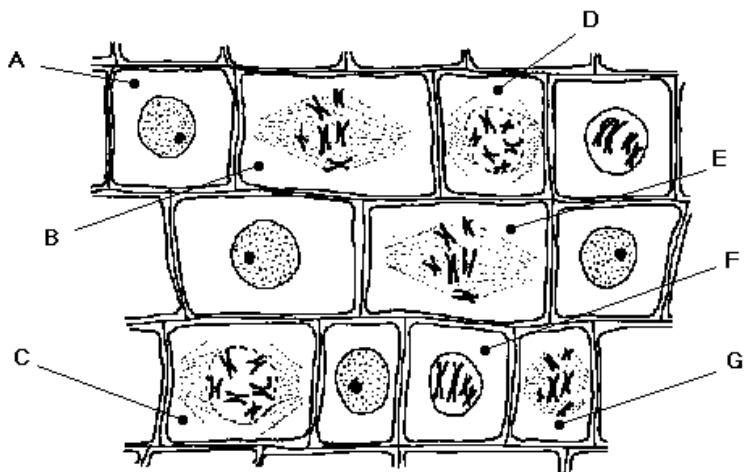
■ **Procedure B: Animal Cells**

1. Examine 2 separate animal cells from the slides provided (*fish blastodisc* -or- *whitefish*). Look for similar stages that you saw in the onion root tip. Describe the similarities and differences between plant and animal cells. Sketch two animal cells.

animal cell 1	animal cell 2	similarities between plant and animal cells
		differences between plant and animal cells

■ **Plant Cell Mitosis Key**

- A) Interphase
- B) Late Prophase or Early Metaphase
- C) Early Prophase
- D) Middle Prophase or Early Telophase
- E) Late Prophase or Early Metaphase
- F) Early Prophase or Telophase
- G) Late Prophase or Early Metaphase



## ■ Analysis and Conclusions

1. Mitosis produces two nuclei from one nucleus. The number of chromosomes in each new nucleus is the same as that in the nucleus from which they were formed. What does this suggest must happen to the number of chromosomes in the *nucleus* before it divides?
2. In which stage are the chromosomes duplicated?
3. Based on your observations describe the differences of mitosis and cytokinesis in plant and animal cells.
4. What might *temporarily* increase the frequency of mitosis in a human organ or tissue capable of mitosis?
5. What human disease is characterized by unregulated mitosis? \_\_\_\_\_

## ■ For Further Investigation

You suspect that the frequency of mitosis in onion roots varies with the time of day. Use the worksheet below to design an experiment to confirm or refute your suspicion.

Title:

Hypothesis:

Independent Variable (I.V.):  
 continuous     discontinuous

Levels of the I.V. (indicate control):					
# of trials you will conduct for each I.V. level					

Dependent Variable (s)

- Quantitative Measurements (include unit):
- Qualitative Measurements (no units required):

Constants: