CELL DIVISION (MITOSIS)

Introduction:

Somatic or body cells divide at the end of a process called the cell cycle. During the cell cycle there is a division of replicated or doubled chromosomes (**karyokinesis**) and a division of the cytoplasm or non-chromosome parts of the cell (**cytokinesis**). The function of the cell cycle is to build an exact copy of each chromosome and then distribute an identical set of chromosomes to each of the two daughter cells.

During a part of the cell cycle called **interphase** each chromosome replicates or doubles, making an exact copy of itself. This doubling produces a chromosome with two identical strands that are attached to a common centromere.

During a part of the cell cycle called mitosis chromosome movements are continuous, but four distinct phases are easily recognized: **prophase, metaphase, anaphase and telophase**.

In this exercise, you will observe and identify the various phases of the cell cycle in plant and animal cells. You may want to use your text as a reference.

Events of the Life Cycle

INTERPHASE	Replication or doubling of chromosomes. A spherical nucleus is visible.
PROPHASE	Chromosomes become condensed and visible in the light microscope as sister chromatids. Spindle fibers appear and the nucleus, nucleolus and nuclear membrane, disappears.
METAPHASE	Chromosomes line up on the equator or center of the cell. Centromeres attach to the spindle fibers.
ANAPHASE	The chromatids separate at the centromere and move to the poles or ends of the cell.
TELOPHASE	The chromatids are at the poles. The chromatids uncoil and become less and less visible in the light microscope. The spindle fibers disappear and the nucleus reappears, including the nucleolus and the nuclear membrane.
CYTOKINESIS	Division of the cytoplasm of the cell. In a plant cell, a cell wall is formed. In an animal cell, the cell furrows at the outer edges of the cell and cleaves the cell in two.

Exercise #1 — Video of the Cell Cycle

In this video, you will see the cell cycle including cell division (cytokinesis) as an entire process with one stage blending into the next, rather than a series of distinct steps. The video shows excellent images of the major phases of the cell cycle.

Exercise #2 — Examination of the Onion Root Tip Sections: Plant Cell Cycle

The onion root tip can be divided into four regions: **root cap, cell division, elongation and maturation.** The root cap covers the tip of the root and is a mass of cells that aids the root in its penetration of the soil.

In the region of cell division, you will observe the cell cycle events. The region of elongation is where the cells elongate, and though it is only a few millimeters in length, it is responsible for most of the increase in the length of the root.

The region of elongation is followed by the region of maturation, where most of the cells mature. This is where cells become plumbing (xylem or phloem), epidermis or food storage cells (cortex).

In the region of maturation root hairs are also produced. Root hairs provide a large surface area to absorb water and minerals. Here is an illustration of an onion root tip.

Materials Needed:

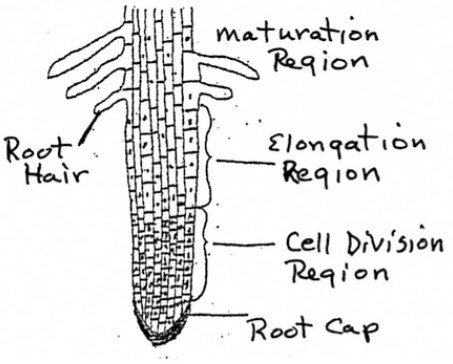
Microscope
Onion mitosis or Allium root tip slide

Procedure:

1. Examine the root tip with low power to find the region of cell division. This region of the root shows the greatest number of cell cycle phases.

2. Examine the root tip with high power to locate and identify the phases of the cell cycleOn the next page, draw the phases of the cell cycle. .

ONION ROOT TIP



Name_____

Plant Cell Cycle (Mitosis) Report Sheet

Interphase **Prophase** **Metaphase**

Anaphase **Telophase & Cytokinesis**

Name_____

Exercise #3 — Examination of Whitefish Blastula: Animal Cell Cycle Report Sheet

Materials Needed:

Microscope
Whitefish or Fish Blastula slide

Procedure:

1. Locate cells under low power, then focus the cells at high power.

2. In spaces provided below, draw the phases of the cell cycle indicated.

Interphase **Prophase** **Metaphase**

Anaphase **Telophase & Cytokinesis**