MITOSIS

INTRODUCTION

Cell reproduction usually involves two processes: 1) mitosis is the orderly separation and division of chromosomes in the nucleus and 2) cytokinesis is the division of the cytoplasm. Multicellular organisms such as us use mitosis to produce new cells for growth and repair of tissues. In single-celled organisms and in some multicellular, mitosis can be used for asexual reproduction. In mitosis, a cell divides its nucleus in two. The cell then divides up the cytoplasm to produce two identical daughter cells. The daughter cells have identical DNA, cytoplasm and organelles.

Most eukaryotic cells go through a life cycle that includes first mitosis (a division of the nucleus), followed by cytokinesis (division of the cytoplasm). Plant cell cannot undergo cytokinesis because of their cell wall. Instead, cell division in plants is accomplished through cell plate formation Mitosis is followed by a phase called the G₁ Phase. During G₁ the cell grows and assumes normal functions. Different types of cells remain in the G₁ for different lengths of time. Next is the S Phase, during which the chromosomes are copied (duplicated) by DNA replication. Each duplicated chromosome is held together at the centromere; each half of the duplicated chromosome is called a sister chromatid. The G₂ Phase is a period of organization for mitosis that follows next, and thus the cycle repeats itself.
MITOSIS DEMONSTRATION
Following your instructor’s instructions, add the chromosomes to these animal cell drawings of mitosis. Label your drawings. For clarification, refer your textbook.

ANIMAL CELL
MITOSIS DEMONSTRATION

1. INTERPHASE

2. EARLY PROPHASE

3. LATE PROPHASE
4. METAPHASE

5. ANAPHASE

6. TELOPHASE

7. LATE TELOPHASE
Mitosis phases
Referring to the lecture material and this hand-out, describe the key characteristics of each part of the cell cycle.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Characteristics of Phase</th>
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<tbody>
<tr>
<td>Interphase</td>
<td>( G_1 )</td>
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<tr>
<td></td>
<td>S</td>
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<tr>
<td></td>
<td>( G_2 )</td>
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<tr>
<td>Mitosis</td>
<td></td>
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<tr>
<td>Cytokinesis</td>
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Define the following terms and then answer the following summary questions:

- Chromosome
- Chromatin
- Chromatid
- Centromere
- Spindle Fibers

1. How do the daughter cells compare to each other and their parent cell with respect to quantity and quality of chromosomes?

2. Is mitosis a form of sexual OR asexual reproduction?

3. Why is the mechanism of cytokinesis different in plants versus animals?
Obtain the *Allium* slide (an onion root tip) from the side bench. Bring the section of onion root tip into focus under the low power objective, and observe the region of the root immediately above the root tip. The tip contains the growth region of the root and is made up of actively dividing cells. After locating this active region turn to medium and high power. The field of view should look like this picture.

Find an example of each stage of mitosis and make a sketch below.

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**Diagram:**

- **Interphase**
- **Prophase**
- **Metaphase**
- **Anaphase**
- **Telophase**

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What is the cell division mechanism in plants called?
Observation 6 Animal Cell Mitosis

Obtain the slide of a whitefish blastula. There are several cross section cuts on each slide; focus on one that is in good condition and in which the cells are easy to see. The blastula is an early phase of development found in animal embryos; during this phase all cells are actively dividing and growth is rapid. Since these cells may be difficult to see, reduce the light coming through the iris diaphragm.

Find an example of each stage of mitosis and make a sketch below.

![Diagram of cell division stages]

Prophase

Interphase

Metaphase

Telophase

Anaphase

What is the cell division mechanism in animal cells called?