

# Lab 11: Mitosis and Meiosis

pp.59-78

## **GOALS:**

- Be able to name, understand and state what is happening all of the stages of the cell cycle for both plant and animal cells.
- Given a diagram or slide depicting mitosis or meiosis, be able to name the stage and state what is happening.
- Be able to state differences between oogenesis and spermatogenesis in mammals.
- Given a parent cell with any chromosome number, be able to trace the chromosomes step by step through mitosis or meiosis.

## **KEY TERMS:**

mitosis (know stages)

chromosome

homologous chromosomes

chromosome number

cleavage furrow

seminiferous tubules

polar bodies

meiosis (know stages)

sister chromatids

spindle fibers

diploid

cell plate

interstitial cells

crossing-over

cytokinesis

centromere

centriole

haploid

spermatogenesis

oogenesis

## **I. Introduction to the Cell Cycle:**

pp. 59- 60: Read and be able to explain each stage of the cell cycle.

## **II. Animal Cell Mitosis:**

pp. 61- 65: Read thoroughly and be able to explain what happens in each stage.

p. 64: Follow instructions to view models and slides of whitefish blastula.

p. 65: Read about cytokinesis in animal cells.

## **III. Plant Cell Mitosis:**

p. 64: Read and be able to explain what happens in each stage.

p. 64: Follow the instructions on to view models and onion root tip slides.

p. 66: Read about cytokinesis in plant cells and fill out table 5.2.

## **IV. Meiosis Exercise:**

pp. 67 -71: Read, follow procedures and answer all questions.

## **V. Mitosis vs. Meiosis:**

pp. 72 – 73: Read, follow procedures and answer all questions. Be able to demonstrate both with the pop beads.

## **VI. Gametogenesis (formation of gametes by meiosis) in animals:**

pp. 74 – 76: Read, follow procedures and answer all questions.

## **VII. Review:**

p. 77: Answer review questions 1-16.

### **Mitosis-simple cell division ( $2n \rightarrow 2n$ )**

- Prophase**- Duplicated chromosomes are scattered and spindles begin to form. Microtubules are assembled and move one of the two pairs of centrioles to the opposite end of the cell.
- Metaphase**- Sister chromatids align at the equator (the center of the fully formed spindle).
- Anaphase**- Sister chromatids separate at the centromere. The chromosomes migrate towards opposite poles.
- Telophase**- A nuclear envelopes begin to form. Each cell has the same number of chromosomes as parent cell. Two daughter cells are formed.

### **Meiosis: Completed in 2 stages ( $2n \rightarrow n$ )**

#### ***Meiosis I:***

- Prophase I**- Spindle fibers appear, nucleolus disappears, chromosomes have replicated and crossing-over may occur (exchange of genetic material)
- Metaphase I**- Homologous pairs align at the equator of the spindle.
- Anaphase I**- Homologous pairs separate and migrate towards opposite poles, unlike mitosis where pairs separate at centromere. Here the chromosomes are still composed of two chromatids.
- Telophase I**- The cell divides into two daughter cells.

#### ***Meiosis II:***

- Prophase II**-NO replication of chromosomes. Spindle fibers form.
- Metaphase II**- Sister chromatids line up at the equator.
- Anaphase II**-Similar to mitosis, chromatids separate at the centromere and the chromosomes move towards opposite poles.
- Telophase II**- Each cell formed in meiosis I divides into two daughter cells. This results in a total of 4 daughter cells; each containing half the number of chromosomes of the parent cell.

#### **Note:**

The main difference between animal and plant cells:

- Plants have a cell plate that forms during telophase, instead of a cleavage furrow, which leads to the division of the cytoplasm and creation of new daughter cells.
- Plant cells lack centrioles and asters.