

Name _____
Date _____
Period ____

Lab Activity Report

Meiosis – Modeling Meiosis in Cells

Background:

Meiosis is the division of the nucleus (and the chromosomes inside of it) in sex cells. One cell divides to form 4 cells with a lower chromosome number. This process happens continuously in all living things that are made up of more than one cell, after puberty. In males, the process will lead to the formation of sperm cells, and in females, meiosis leads to the formation of one viable egg cell at a time.

Purpose:

In this activity, you will be simulating the process of meiosis.

Biology Content Standard:

Genetics 2a. Students know meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce gametes containing one chromosome of each type.

Materials:

2 different colored threads	Meiosis 2 paper
2 beads	Colored pencils
Scissors	Tape (For crossing over)
Meiosis 1 paper	Stapler

Procedure:

1. INTERPHASE 1:

- a. Draw a circle in the center of the Interphase 1 cell.
- b. Place 2 threads of one color and 2 threads of another color in the center. They should not look like chromosomes yet. This is Interphase 1.
- c. Remove the threads, and use the colored pencils to draw what they looked like when they were in the nucleus. BE ACCURATE with your drawings.

2. PROPHASE 1:

- a. Create a pair of homologous chromosomes. One should be one color; the other should be the other color. (You will need to use a bead in the center for a CENTROMERE.)
- b. Place them in the center of the Prophase 1 cell. The nuclear membrane should be breaking down, so make sure that you use a dashed line for the nuclear membrane.
- c. Remove the chromosomes, and use the colored pencils to draw what they looked like when they were in the nucleus. BE ACCURATE with your drawings.

3. METAPHASE 1:

- a. Line up the chromosomes as a homologous pair in the center (Equator) of the cell. There should not be a nucleus. One chromosome should be closer to the Northern pole, and the other chromosome should be closer to the Southern pole.
- b. There needs to be a crossing-over event. A portion of each chromosome needs to touch, so that they will exchange this piece of their chromosomes in the next phase.
- c. Remove the chromosomes, and use the colored pencils to draw what they looked like when they were in the nucleus. BE ACCURATE with your drawings.

4. ANAPHASE 1:

- a. Cut a piece (same size) off of each of the chromosomes. Use tape to connect the new piece to the chromosome of the other color.
- b. Pull the chromosomes from the centromeres towards the poles that they are closer towards.
- c. Remove the chromosomes, and use the colored pencils to draw what they looked like when they were in the nucleus. BE ACCURATE with your drawings.

5. TELOPHASE 1 & CYTOKINESIS:

- a. You are preparing the cell after cytokinesis has occurred (There are now 2 cells). Draw a circle in the center of each cell (nucleus). Place 1 chromosome in the nucleus of each new cell.
- b. Remove the chromosomes, and use the colored pencils to draw what they looked like when they were in the nucleus. BE ACCURATE with your drawings.

6. PROPHASE 2:

- a. Draw a circle using a dashed line in the center of the cell. The nuclear envelope is breaking down. Place 1 chromosome in the center of each cell.
- b. Remove the chromosomes, and use the colored pencils to draw what they looked like when they were in the nucleus. BE ACCURATE with your drawings.

7. METAPHASE 2:

- a. Place the chromosome at the center of the cell (on the Equator). Make sure that the centromere is an equal distance from each pole.
- b. Remove the chromosomes, and use the colored pencils to draw what they looked like when they were in the nucleus. BE ACCURATE with your drawings.

8. ANAPHASE 2:

- a. Remove the beads.
- b. Pull the 2 separate chromatids apart from each other. One chromatid will be pulled towards each pole.
- c. Remove the chromosomes, and use the colored pencils to draw what they looked like when they were in the nucleus. BE ACCURATE with your drawings.

9. TELOPHASE 2 & CYTOKINESIS:

- a. Place 1 chromatid in each cell.
- b. Staple the chromatids to the cell where they are found.
- c. Staple both pages in order to the back of this lab report. (Top page – lab report. Second – Meiosis 1. Last – Meiosis 2.)

10. Clean up your area and return all unused supplies (and beads) to the teacher.
Answer the questions.

Conclusions:

1. What is meiosis?

2. What are homologous chromosomes?

3. What are centromeres?

4. What material was used to represent the centromeres?

5. What are chromatids?

6. What material was used to represent chromatids/chromosomes?

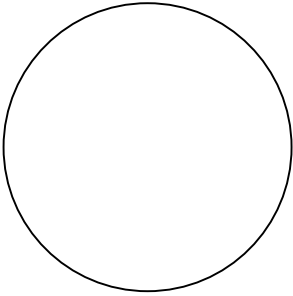
7. How many total chromosomes were there in Interphase 1? _____
8. How many total chromosomes were there after Telophase 1? _____
9. How many cells were there after Telophase 1? _____
10. How many chromosomes were there per cell after Telophase 1? _____
11. How many total chromosomes were there after Telophase 2? _____
12. How many cells were there after Telophase 2? _____
13. How many chromosomes were there per cell after Telophase 2? _____
14. In which phase did crossing over occur?

15. In which phase did the crossing-over get broken apart, so that the original homologous chromosomes exchanged pieces with each other?

16. In which phase did the chromosomes get split into chromatids?

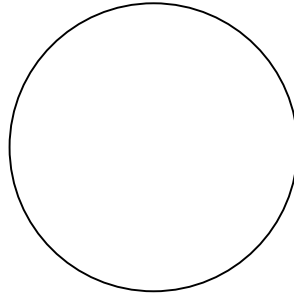
Meiosis I

Interphase I



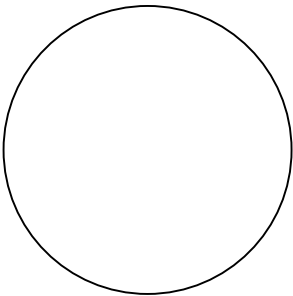
__ Cells
__ Chromosomes

Anaphase I



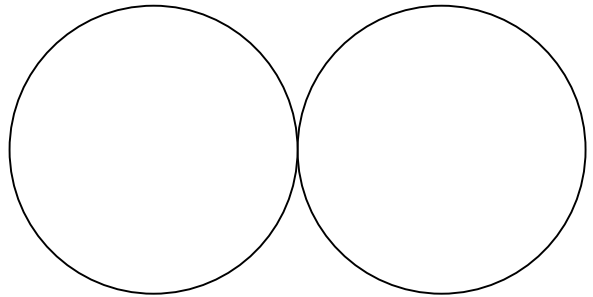
__ Cells
__ Chromosomes

Prophase I



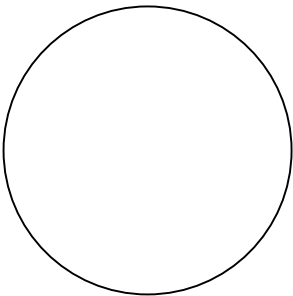
__ Cells
__ Chromosomes

Telophase I & Cytokinesis



__ Cells
__ Chromosomes

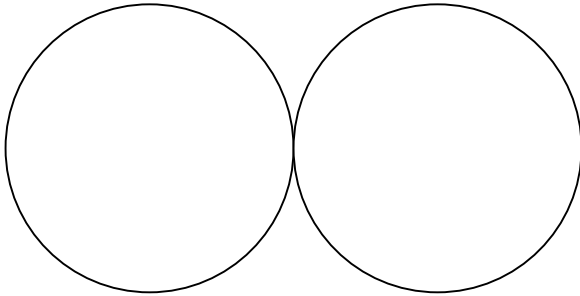
Metaphase I



__ Cells
__ Chromosomes

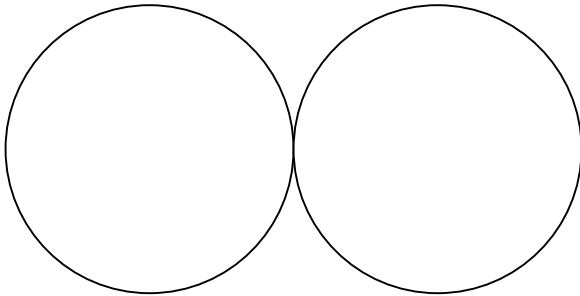
Meiosis II

Prophase II



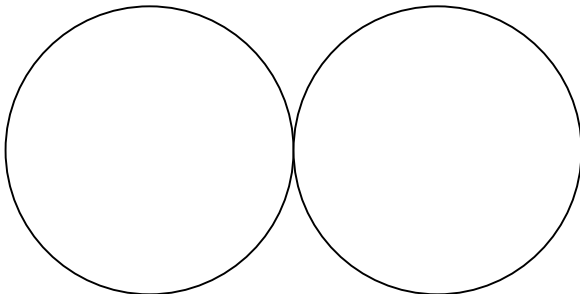
__ Cells
__ Chromosomes

Metaphase II



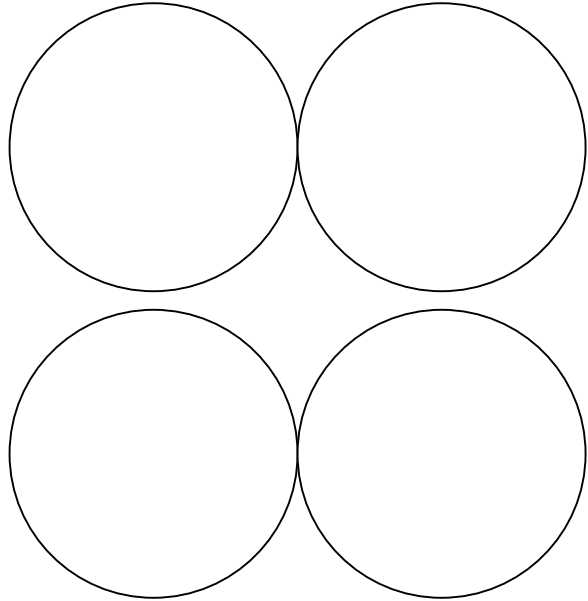
__ Cells
__ Chromosomes

Anaphase II



__ Cells
__ Chromosomes

Telophase II & Cytokinesis



__ Cells
__ Chromosomes