Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

![C:\Documents and Settings\tcurry\Local Settings\Temporary Internet Files\Content.IE5\AFC9IGQ2\MCHM00287_0000[1].wmf]()Pop-Bead Mitosis and Meiosis

**Introduction:**

As we have studied, mitosis is the division of the nucleusof **somatic cells** with the intent of making two exact copies of the parent cell. During this activity we will be using pop beads and magnets to simulate the chromosomes during mitosis.

**Materials:**

60 red beads

60 yellow beads

4 magnetic “centromeres”

Dry erase board

Dry erase marker

**Procedure:**

First, produce two homologous chromosomes using thirty red beads for the paternal chromosome and thirty yellow beads for the maternal chromosome. How will you know that your chromosomes are homologous?

The dry erase board will represent your cell, demonstrate G1 using the dry erase marker, dry erase board and your chromosomes. Draw your representation below.

What is the cell doing at this stage?

Demonstrate S using the dry erase marker, dry erase board and your chromosomes. Draw your representation below.

What is the cell doing during S phase?

Demonstrate G2 using the dry erase marker, dry erase board and your chromosomes. Draw your representation below.

What is the cell doing during G2 phase?

Now you are going to use your cell model to demonstrate mitosis. Starting with interphase, demonstrate each stage of mitosis and illustrate relevant organelles by drawing them on the dry erase board. Once you have completed your demonstration and feel confident demonstrating mitosis call Ms. Schroeder or an approved “grading virus” over to initial your paper.

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**Meiosis:**

Meiosis is the process of “reduction division” or separating homologous chromosomes to produce **gametes** or **sex cells**. The process is really like going through mitosis twice with a couple of key differences.

First (and most importantly) the cell reduces its chromosome number from **diploid** to **haploid**. What does this mean?

Second, there are four cells produced at the end of meiosis. The types of cells depend on the sex of the organism undergoing meiosis. What types of cells, and how many, are produced by males?

What types of cells, and how many, are produced by females?

Use the chromosomes from the mitosis procedure to demonstrate the process of meiosis. Starting with prophase I, demonstrate each stage of mitosis and illustrate relevant organelles by drawing them on the dry erase board. Once you have completed your demonstration and feel confident demonstrating mitosis call Mrs. Schroeder or an approved “grading virus” over to initial your paper.

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**Crossing Over**:

Sometimes, during metaphase I the chromatids of homologous chromosomes become entangled and swap pieces in a process known as “crossing over”. Generally, crossing over occurs at the same spot on homologous chromosomes so equal amounts of chromatin and similar information is exchanged so no genetic damage occurs.

Use the chromosomes from the mitosis procedure to demonstrate the process of meiosis with crossing over. Starting with prophase I, demonstrate each stage of mitosis and illustrate relevant organelles by drawing them on the dry erase board. Make sure to illustrate when and where crossing over occurs. Once you have completed your demonstration and feel confident demonstrating crossing over call Mrs. Schroeder or an approved “grading virus” over to initial your paper.

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**Analysis and Conclusion:**

1. What type of cells generally undergo mitosis? Meiosis? Why is there a difference in cellular division between these cell types?
2. For a human cell 2N=46, how many chromosomes will there be in a daughter cell from mitosis from a human cell? How many chromosomes will there be in a human gamete?
3. Why is it crucial that gametes reduce their number of chromosomes by half?
4. Why do homologous chromosomes separate during meiosis (as opposed to randomly dividing the chromosome number in half)?
5. How does crossing over increase genetic diversity?
6. Do you see a place where problems could arise during meiosis? Explain.