Name: Date:

HANDS-ON ACTIVITY

Modeling Meiosis

Meiosis is the process of cell division in which each daughter cell receives half the number of chromosomes as the parent cell. Meiosis involves two divisions and results in the formation of four daughter cells. Gametes, or sex cells, are formed by meiosis. In this lab you will make a model of meiosis that will be reusable as a study tool.

PREDICT

How does a diploid cell divide to form haploid cells?

_____

_____

_____

_____

MATERIALS

- hook-and-loop tabs, 2-cm piece (2)
- markers, assorted colors
- notebook paper
- pipe cleaner, white (4)
- scissors

PROCEDURE

1. Construct a pair of homologous chromosomes. Use pipe cleaners to make the chromosomes and hook-and-loop tabs to represent the centromere that holds the sister chromatids together.

   The homologous chromosomes should have bands of color that represent the different genes carried on those chromosomes. Dark and light shades of the same colors can be used to represent different variations of a single gene.

2. Lay out the chromosomes on notebook paper and model the four steps of meiosis I (Prophase I, Metaphase I, Anaphase I, and Telophase I). Then remove the chromosomes and sketch the position of the chromosomes at the end of meiosis I on your paper.

3. Cut the sheet of paper in half to represent cytokinesis. Make sure that each half of the notebook paper, or cell, has one homologous chromosome.

4. Model the four steps of meiosis II in both cells (Prophase II, Metaphase II, Anaphase II, and Telophase II).

5. Remove the chromosomes. Sketch the position of the chromosomes in both cells at the end of meiosis II.

6. Cut the cells in half again to show cytokinesis. Each cell should have one chromosome.

Name: **Date:**

ANALYZE

1. How does the genetic material on two sister chromatids compare? How does the genetic material on the homologous chromosomes compare?

2. Which aspects of meiosis are not represented in your model? What changes could you make to show these processes?

3. Refer to your model to explain why meiosis is also called "reduction division." Use the words diploid and haploid in your explanation.

4. Explain how sexual reproduction increases genetic diversity.

EXTEND

Nondisjunction describes what happens when homologous chromosomes fail to separate during meiosis I or when sister chromatids fail to separate during meiosis II. On chromosome 21, it can lead to Down syndrome. Research the effects of having three copies of chromosome 21.