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**Meiosis Models Lab**

Problem: How does crossing over affect the genes passed down to daughter cells?

Hypothesis:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Materials**:

* 4 different colors of beads
* 4 colored pencils/pens/markers  Meiosis 1. You have an individual whose diploid number is 4 (2n=4).

**Procedures**

1. Assume that one color of clay represents chromatids from  the mother and the other color represents chromatids from the father. Pop together 4 pink strands of 6, 4 blue strands of 6, 4 orange strands of 4, 4 green strands of 4.
2. The cell starts with one strands of each color. In interphase the chromosomes duplicate.
3. Move the chromosomes into Prophase I, where **homologous pairs** come together. Remember, homologous chromosomes are the same length and have the same genes, although not always the same alleles.
4. Next move the chromosomes into Metaphase I. Using your colored pencils, recorded what your cell looks like below.

5. Move your chromosomes through Anaphase I into Telophase I. What do your two cells look like now? Record below.



6. Move the chromosomes in each of the daughter cells through the different stages of Meiosis II. The four resulting cells are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



What are the genotypes of the four gametes?

**Independent Assortment**

7. Look at the four cells in step 6, as well as the one cell in step 4. Is there a way to rearrange the chromosomes in step 4 to produce different gamete cells? Use your clay models and record on the next page.

 Metaphase I



Meiosis II

What are the genotypes of the above gametes?

**Crossing Over**

8. You have gone through the different combinations of once more, this time focusing on you are going to repeat these stages the effects of crossing over. Start back at Metaphase 1 . Assume that crossing over occurs between the long chromosomes. Record the movement of chromosomes below

 Metaphase I



Meiosis II



What are the genotypes of the above gametes?

9) Are there any other gene combinations you could get?

**Conclusions**

1. What is the difference between a haploid cell and a diploid cell?
2. What does independent assortment mean? How does it affect variation?
3. Define crossing over.
4. Are there any advantages to crossing over? If so, what?
5. Is crossing over random, or does it happen more often at specific points?
6. Explain the reasons why different gametes produced by the same person can have different allelic combinations.
7. Describe one similarity and one difference between meiosis I and meiosis II.
8. If a diploid cell contains 34 chromosomes undergoes meiosis, how many chromosomes will each daughter cell have?

10. Explain why meiosis is necessary for sexual reproduction.