Name:_____ Per:_____

Paper Crossing Over Meiosis Lab

MATERIALS:
Male & Female chromosomes (cut out)
Paper Clips
Dice (Or dice rolling website)

INTRODUCTION:

The body cells of plant and animals are diploid. A diploid (2n) cell has two sets of chromosomes in its nucleus. A cell with only one set of chromosomes in its nucleus is termed haploid (n). Gametes, which are also called egg and sperm, are examples of haploid cells. When gametes join at fertilization, a diploid zygote is formed. The zygote contains one set of chromosomes from each parent.

Meiosis is a process that produces haploid (n) cells, such as gametes (sex cells) from diploid (2n) cells. As in mitosis, before meiosis begins, DNA replication must occur. Following replication, each chromosome consists of two chromatids that are joined by a centromere. Meiosis involves **two** successive divisions of the nucleus, where mitosis only has one division.

MEIOSIS LEADS TO GENETIC VARIATION!!!! VARIETY LEADS TO MORE FIT INDIVIDUALS!!

PROCEDURE:

Interphase:

1. Cut out each strip from the 3 sets of chromosomes.
2. Start with the original cell that has 6 chromosomes (3 green and 3 yellow). This is because half your chromosomes are from your mom and half are from your dad.

DNA Replication:

3. S PHASE= DNA replication must occur before the chromosomes can be divided. Complete replication by creating an exact copy of all the chromosomes present.
4. After replication, the copies of the chromosomes attach at the centromere. The centromere is represented by the paperclip. Attach the original and copy of each chromosome using the paperclip.

MEIOSIS I - Prophase I: Crossing Over

5. During Prophase I, pieces of homologous chromosomes break off and switch places with each other. Roll the dice to determine how many squares of your chromosome will cross over. NOTE: The number cannot be greater than the number of squares to the centromere. For example, on chromosome #1, there are only 3 squares before the centromere, if you roll a 4 or higher, re-roll until you get a 3 or lower.
6. Cut with the scissors the chromosome at the determined spot on both genes and switch their places. Tape the pieces of chromosomes together.
7. Repeat with chromosomes 2, but not the X and y chromosomes – ***they are not homologous***.

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Telephase I:

8. Show what the chromosomes would look like at the end of telophase I. Take a picture of your chromosomes.

MEIOSIS II:

9. Now separate each numbered chromosome so that there is a chromosome 1 – 2 in each gamete and one sex chromosome.

DISCUSSION QUESTIONS:

1. What was the diploid number of chromosomes in your original cell?

2. What is the haploid number of chromosomes in your ending cell?

3. Are the chromosomes in your gamete cells all the same? Explain why or why not.

4. What happens to the chromosomes during crossing over in Prophase I?

5. If a species have 6 chromosomes in their cells, how many chromosomes would be in their gametes? Draw what the cells would look like before meiosis and after meiosis in the circles below.

6. If two parents have 4 children (no twins), explain how it is not possible for the children to have the same exact genetic make-up?