NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ HOUR: \_\_\_\_\_

**Meiosis Lab**

Purpose

To understand what happens to the chromosome number during gamete formation and fertilization and to see how variations develop in the offspring.

Materials

* Three “cell” sheets of paper
* Chromosome models

Procedure

1. Locate “Cell Sheet #1”. This sheet contains 2 cells. 1 cell labeled male and 1 cell labeled female.
2. The male has inherited 3 green chromosomes (1 long, 1 medium, 1 short) from his father and 3 white chromosomes (1 long, 1 medium, 1 short) from his mother. Place these 6 chromosomes in the male cell.
3. The female has inherited 3 red chromosomes (1 long, 1 medium, 1 short) from her father and 3 black chromosomes (1 long, 1 medium, 1 short) from her mother. Place these 6 chromosomes in the female cell.
4. As these cells prepare to divide, each chromosome duplicates itself. So, there are twice as many chromosomes now as in the original cells. Add these additional chromosomes to the cells.
5. The chromosome pairs of the same kind (same length, but not necessarily the same color) then line up on an imaginary center axis of the cell. **HAVE YOUR TEACHER CHECK YOUR CHROMOSOME ALIGNMENT.**
6. Locate “Cell Sheet #2”. This sheet contains 4 cells. 2 labeled male and 2 labeled female. After the chromosomes from step E have separated to the poles there would be two daughter cells. Carry out the division and separation steps for each of the cells on “Cell Sheet #1” and transfer the chromosomes to “Cell Sheet #2”.
7. Locate “Cell Sheet #3”. This sheet contains 8 cells. 4 labeled male and 4 labeled female (4 are mature sperm cells and 4 are potential egg cells). The chromosomes on “Cell Sheet #2” again line up on an equator and then separate to the polar regions. Thus, from the original one female cell on “Cell Sheet #1”, we get 4 potential egg cells! Move the chromosomes to these last cells. **HAVE YOUR TEACHER CHECK YOUR “CELL SHEET #3”, BUT DO NOT PUT YOUR CHROMOSOMES AWAY YET!**
8. You have created 4 egg cells and 4 sperm cells. Combine each egg cell with a sperm cell by taking the chromosomes out of the sperm cell and placing them into an egg cell. Do this for each of the 4 sperm cells, so you now have 4 fertilized egg cells. Copy the chart below onto your white board and fill in the columns with the size and color of each chromosome founding the fertilized egg cells.

|  |  |  |  |
| --- | --- | --- | --- |
| Fertilized Egg Cell #1 | Fertilized Egg Cell #2 | Fertilized Egg Cell #3 | Fertilized Egg Cell #4 |
|  |  |  |  |

Questions

*Record your answers to the following questions on your white board.*

1. How many chromosomes were place in each of the original parent cells?
2. How many chromosomes are now in each one of the final reproductive cells?
3. If question 1 referred to humans, what would this number be?
4. If question 2 referred to humans, what would this number be?
5. What do these many different combinations tell you about reproduction by meiosis?
6. What is one important function of meiosis, as related to chromosomes number?

Conclusion

On a sheet paper write a brief summary of the lab. Write a conclusion, which includes the answers to the questions above.

**Instructional Notes: Meiosis Lab**

**Pre-activity Discussion**

Ask students the following questions. Why do cells need to divide? What are some ways in which cells divide? What do cells need to do before they divide? Why do they need to do this? How are new organisms produced? Which type of cell division is necessary to make new organisms?

**Activity Performance Notes**

Use pipe cleaners to represent the chromosomes.

Create Baggies of chromosomes for each lab group. Each baggie should contain:

* 2 large green chromosomes
* 2 medium green chromosomes
* 2 short green chromosomes
* 2 large white chromosomes
* 2 medium white chromosomes
* 2 short white chromosomes
* 2 large red chromosomes
* 2 medium red chromosomes
* 2 short red chromosomes
* 2 large black chromosomes
* 2 medium black chromosomes
* 2 short black chromosomes

Make sure chromosomes are cut to identical lengths; this helps to assure that students can form homologous pairs.

Remind students that homologous pairs do not need to always be matching colors and lengths; they only need to be made of matching lengths.

The teacher checkpoints during the lab can be removed for higher-level students or to allow students more freedom to learn the process. The checkpoints will help facilitate students modeling the meiosis process correctly.

**Post-activity Discussion**

Discuss how meiosis helps to maintain chromosomes number and why this process is necessary. Discuss the comparison between meiosis to mitosis, including the steps involved and the outcomes.

Cell Sheet #3

Cell Sheet #3

Male Cell (Sperm)

Male Cell (Sperm)

Male Cell (Sperm)

Male Cell (Sperm)

Female Cell (Egg)

Female Cell (Egg)

Female Cell (Egg)

Female Cell (Egg)

Female

Male

Male

Female

Cell Sheet #2

Male

Female

Cell Sheet #1