Why don’t we look exactly like our siblings?

In examining parents and children, we have noticed that children often resemble, but don’t look exactly like their parents and their siblings. In this activity, you will develop a model to explain why this is the case. To do this, you will observe and manipulate two sets of chromosomes – one set from a male and one set from a female. Humans normally have a total of 46 chromosomes, however, you will be working with a more manageable number of 6 in this activity.

Record the following observations in your notebook:
1. List any similarities and differences that you see in the “female” set of chromosomes.
2. List any similarities and differences that you see in the “male” set of chromosomes.
3. Now look at the two different sets of chromosomes. List any similarities and differences that you notice between the two sets.

Parents pass on information to their children in their egg and sperm cells. The circles below represent an ovary cell, testis cell, an egg, a sperm, and a fertilized egg. Use the chromosomes to “make” a fertilized egg. Begin by placing the chromosomes from the female in the ovary cell and the chromosomes from the male in the testis cell. These cells contain the same chromosomal information as any other cell. Your goal is to now manipulate the chromosomes to make an egg and a sperm. Then, you are to manipulate the chromosomes further to mimic fertilization to create a Viable fertilized egg.

Raise your hand to get a stamp from your teacher when you think you have created a viable fertilized egg. Use pencils to draw in your chromosomes when done.
Answer the following:

4. Write down the steps you went through to produce a viable fertilized egg. Also, tell whether your offspring is a boy or a girl and how you know.

5. What would happen if you didn’t follow the steps you wrote in #4?

6. What are the “rules” for making any viable offspring?

7. How many different combinations of chromosomes are possible for the viable offspring in this model? (test this out and explain your answer)

8. According to this model, how many and which color sex chromosomes are needed to produce a girl? Produce a boy?

9. Do you think you could have a viable offspring with only one sex chromosome (instead of two)? Explain your reasoning.

10. So, why don’t we look exactly like our siblings? Refer back to the model of the viable offspring and the number of possible combinations of chromosomes in your answer.

11. Why can we look similar to our siblings but not look EXACTLY the same?