Genotype to Phenotype Simulation Booklet

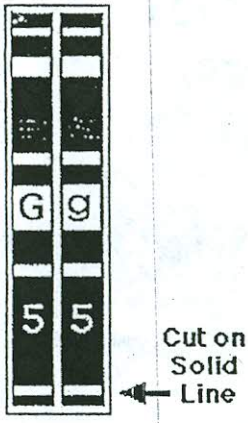
Combining germ cells to create a new baby human

Name: _____ Period: ____

Cutting Out the Chromosomes

Step #1

Cut out each pair of chromosomes on the solid line that surrounds <u>each pair</u>.

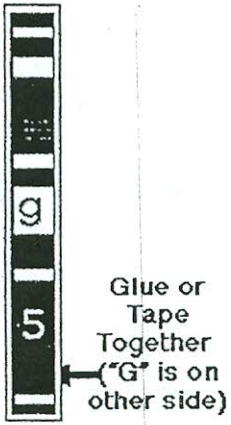


Step #2

Fold along the dotted line <u>between the pair</u> of chromosomes.

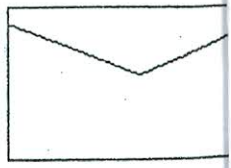
Step #3

Glue/tape the folded pair together, press until they are perfectly flat. Watch for undried glue squeezing out from between the chromosomes; they may stick with other chromosomes!



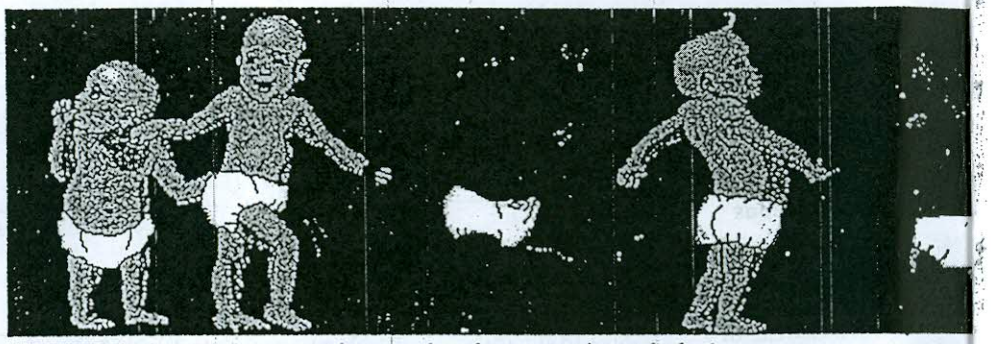
Step #4

Bring your chromosomes to school in an envelope stored in one of your books.... keep your paired chromosomes **flat!**



Making A Face:
A Genetic Simulation

Converting Genotype into Phenotype by Simulating Meiosis and Fertilization



Congratulations, you are going to simulate creating a baby!

After this simulation, you should be able to answer the following questions:

- How many chromosome pairs does each human parent have?
- How many chromosomes does each parent "donate" to the next generation?
- Are some genes and gene characteristics expressed over others.... are dominant and recessive genes responsible for how a baby looks?
- What is the difference between Genotype and Phenotype?
- Do some traits require more than one gene to be fully expressed?
- What are sex-linked traits?
- How is there so much variation in the way children look even if they come from the same parents?
- What is epistasis?
- What is a polygenic inheritance?

You have been given a pink set of chromosomes if you are going to represent the mother, and a blue set of chromosomes if you are going to represent the father. We are asking the question... What would your baby look like if both

you and your classmate (who will simulate the other parent) have one dominant gene and one recessive gene for each of the facial features illustrated on the following pages? This, of course, is not the way it really is, but this is a simulation. Each of you will be heterozygous (hybrid) for each trait.

To determine the facial appearance of your child, you and your spouse will drop your 23 pair of chromosomes to the floor to simulate germ cell formatic This "dropping your chromosomes" will determine which one of the pair of chromosomes will enter the successful germ cell. Each parent, mom and dad, donate one and only one of each of their 23 pairs of chromosomes. Therefore they each donate 23 chromosomes. Since genes ride in the DNA of the chromosomes, each child will end up with a pair of genes for each trait, one from the dad and one from the mom.

After you drop your own chromosomes and line them up according to size, then you will pair with your partner by pushing the chromosomes one at a time toward one another until they are side by side. This represents the establishment of pairs of chromosomes. When you are done you should have twenty three pairs of chromosomes again. The mathematics of sex is..... **one** of each pair from the mother.....**Plus.... one** of each pair from the father equals a pair of each kind for the baby! You essentially will supply one gene and the other parent will supply one gene for each characteristic. The resulting two genes that are paired up will produce the genotype.

Record the genetic contributions from each parent on the chart provided. Translate the genetic information into the phenotypic information (what will your baby look like). A mother and father will produce one child only. Then, each student will produce a drawing of his or her child 15 years later when he or she is in high school! Write your own name only on the back of your drawing -- we want to see if we can match the mother's and father's drawings of their children. Don't collaborate with your partner on the drawing assignment. In addition, answer the questions on the Question sheet.