

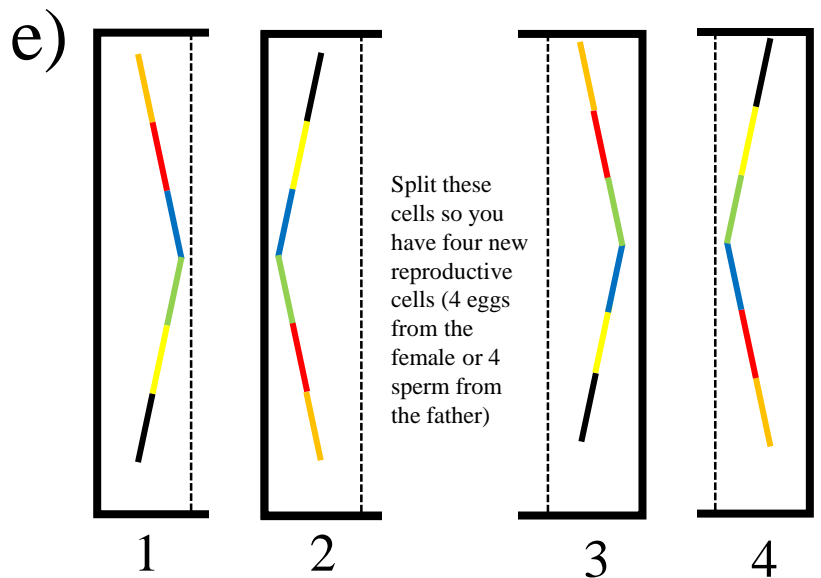
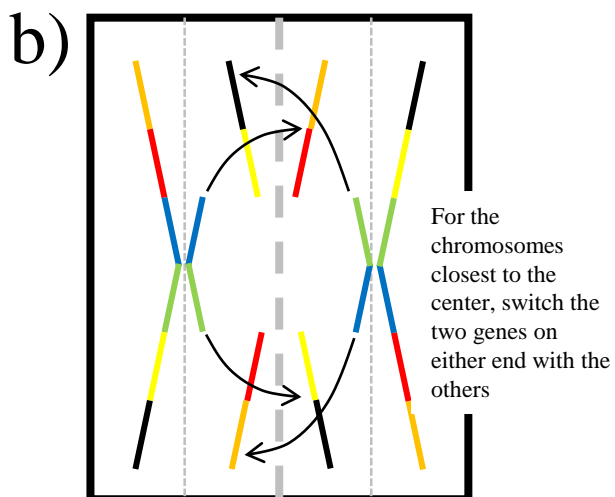
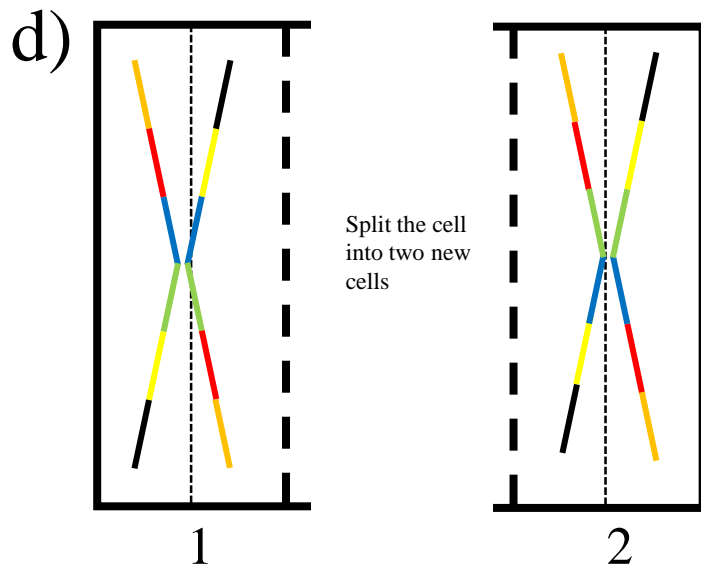
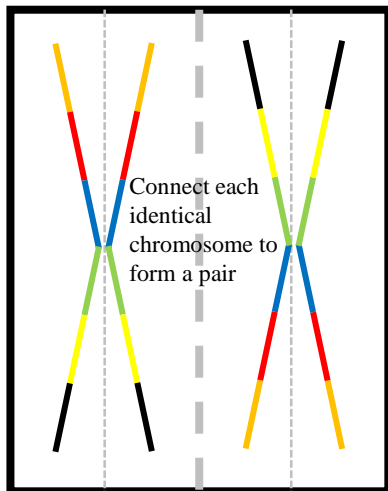
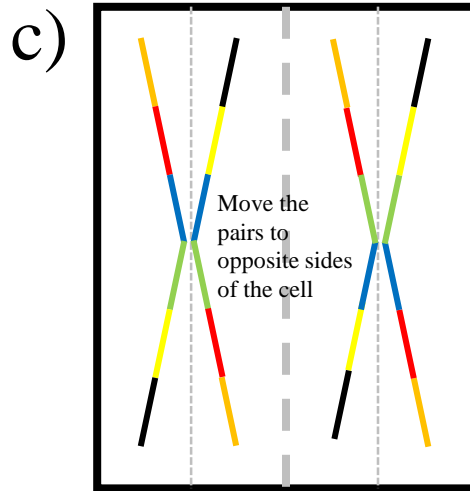
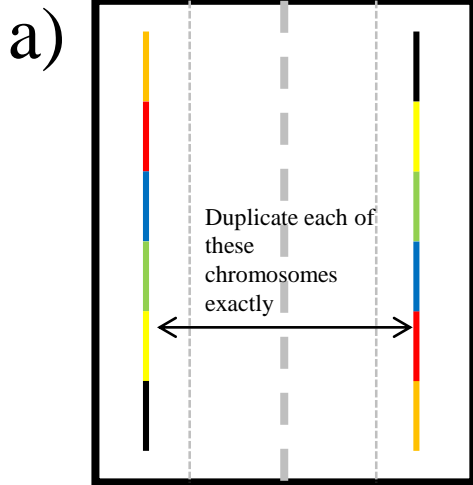
MEIOSIS: PIPE CLEANER GENES

Instruction Card

1. In your groups, form two subgroups: one is the male parent and the other is the female parent. Move to your appropriate cell (labeled “male parent” and “female parent”).
2. Within each subgroup is a pair of homologous chromosomes already assembled that contain genes controlling the following traits: attached earlobe, tongue rolling, freckles, widow’s peak hairline, cleft chin, and dimples. Each pair of genes that control one of these traits is labeled. The cards on the table show which traits are visible (the phenotype). In that gene pair, one gene is dominant (capital letter) and the other is recessive (lower case letter).
3. Each subgroup will divide their parent cell via meiosis. Meiosis results in four reproductive (gamete) cells from each parent cell, and in the process, genes are shuffled to enhance variety in the offspring. Follow these steps to perform meiosis:
 - a) First, **replicate** the two chromosomes in your cell (Meiosis card step a).
 - b) Perform **recombination**, or chromosomal crossover by swapping some of the genes on the ends of the linked chromosomes (Meiosis Card step b).
 - c) Now, move the two pair of chromosomes (both X’s) to opposite sides of the cell (Meiosis Card step c). This aligns them side by side. This is called **random alignment** because in nature, the alignment can be right or left.
 - d) Perform meiosis I: Cut the cell in half down the large dashed line so that each new cell has on of the pair of chromosomes (Meiosis Card step d).
 - e) Perform meiosis II: In each of the two new cells, separate the chromosome pairs, and label each gamete (single chromosome) 1, 2, 3, and 4 (Meiosis Card step e).
 - f) Any combination of gametes is possible during reproduction. This is called **random fertilization**. For this activity, take gamete 2 from the mother (an egg) and gamete 4 from the father (a sperm) and bring those two gametes together to form a new organism (Meiosis Card step f).
 - g) Observe what specific gene combination you have in this new organism. Use the trait cards to show which traits (phenotypes) are visible in the offspring. Are any traits different from either parent?

Review: Through meiosis, one cell divided into four cells with only one chromosome (a gamete, i.e. and egg or sperm). During the process, the DNA were replicated and then **recombined, randomly aligned, and randomly fertilized**. All the actions in bold resulted in increased variety to the offspring.

MEIOSIS CARD



MEIOSIS CARD

f)

