GENETIC RECOMBINATION:

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1. Cut out all of the chromosomes. (Humans have _____, but I couldn't fit that many on the page).

2. Put them all on the blank sheet, within the nuclear membrane boundary.

3. Slide them together with their homologs (matching partners). Humans have 46 chromosomes, BUT there are actually doubles of each chromosome so humans actually have_____ pairs of chromosomes.

   Having doubles is useful for several reasons: 1) one comes from your mom and one from your dad, thus you are a mixture of genes from both of them (genetic variation), 2) it allows you to have two copies of each gene – useful if one copy gets damaged, 3) it allows "mixing" of genes when bits of chromosomes trade around – more variation again.

4. Tape your homologous pairs to the cell. **Tape lightly** as you will be removing some bits and manipulating them as GENETIC RECOMBINATION happens.

5. Practice recombination by:

   a) Picking one chromosome and clip out a small section in the middle of ONE chromosome. Move it to a new place on the SAME chromosome and tape it in place. This is called _____. Label it on the diagram.

   b) Picking another chromosome pair. Clip out the same <u>end</u> section on each piece and SWAP them and tape in place. This is called _____. Label it on the diagram.

6. **After all this recombining, the cell might actually now divide. BEFORE dividing, however the paired chromosomes get dragged apart to the opposite ends of the cell. Then the cell can split into two new cells.**

7. Define or explain the following:

   a) **inversion:**
   b) **deletion:**
   c) **framshift mutation:**
   d) **.**

nuclear membrane