

## Chapter 16

## ENRICHMENT

Use with Section 2

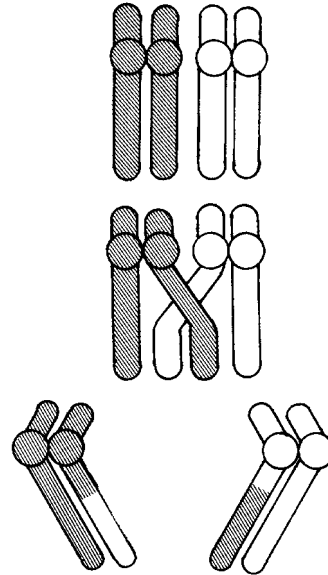
# Sexual Reproduction and Meiosis

## Crossing Over

When pairs of chromosomes come together during meiosis I, they trade some genetic material. The trading of genetic material between chromosomes is called **crossing over**. This is why sexual reproduction results in so much genetic variability. For example, brothers and sisters can have different hair color.

Here is a summary of how crossing over occurs:

1. Chromosome pairs line up side by side during early prophase I. At this stage, each chromosome is made up of two identical strands held together at the centromere.
2. The pairs of double-stranded chromosomes twist around each other. Breaks in the strands of each chromosome reattach to strands from the paired chromosome. The point where crossing over occurs is visible as an X-shaped structure.
3. Spindle fibers attach to one side of each centromere during metaphase I. As the chromosomes are pulled apart during anaphase I, the points where the chromosomes cross over separate. Each chromosome takes a small piece of new genetic material with it.



*In the following activity, you will demonstrate crossing over by making a clay model of chromosomes.*

### Materials

red and blue plasticene

### Procedure

1. Make one chromosome using red plasticene. Each chromosome is made of two identical strands held together by the centromere. The centromere can be shown as a ball of red plasticene.
2. Make another chromosome using blue plasticene.
3. Show different ways crossing over can occur. Show how double crossovers occur.

### Conclude and Apply

How does crossing over explain genetic variability? \_\_\_\_\_

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