

Standard: Students will analyze how biological traits are passed on to successive generations.

Element: Compare the advantages of **sexual reproduction** and asexual reproduction in different situations.

EQ: How are **gametes** formed?

Organisms that reproduce sexually use **gametes**.

Remember what we know about gametes:

1. they are haploid
2. gametes from each parent combine to form a zygote

Gametes are **haploid** and your other body cells are **diploid**.

That means there must be a special process that diploid cells use to produce haploid gametes.

This process is called **meiosis**.

When a diploid cell produces a haploid gamete by **meiosis**, the number of chromosomes is **divided in half**.

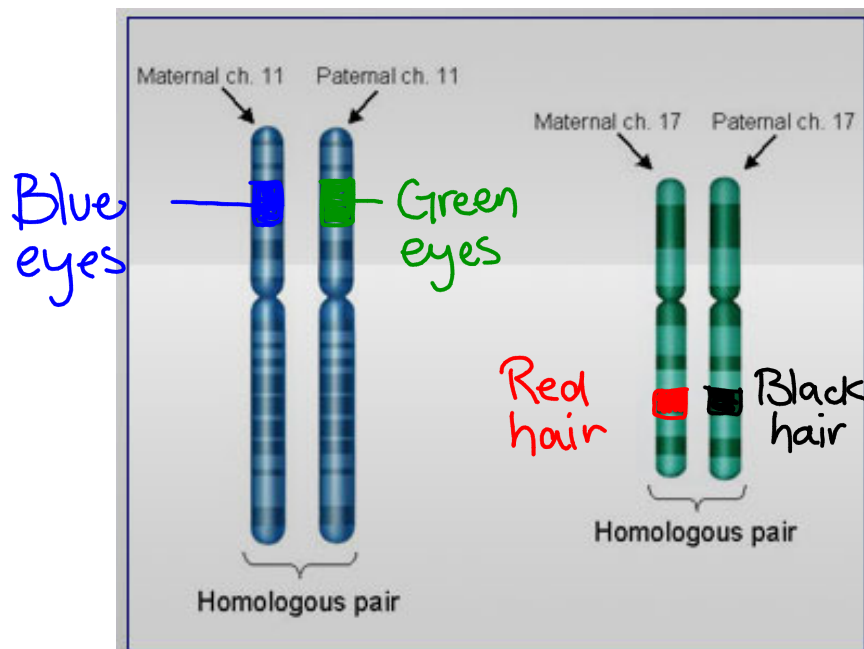
This works because diploid cells have pairs of chromosomes that are similar in **size, shape, and the genes they contain**.

These are called **homologous chromosomes**.

Each chromosome in the homologous pair came from a different parent.

Homologous chromosomes can have different forms of the same gene. For example, one of the homologous chromosomes might have the code for blue eyes while the other in the pair has the code for brown eyes.

Genes on Homologous Chromosomes

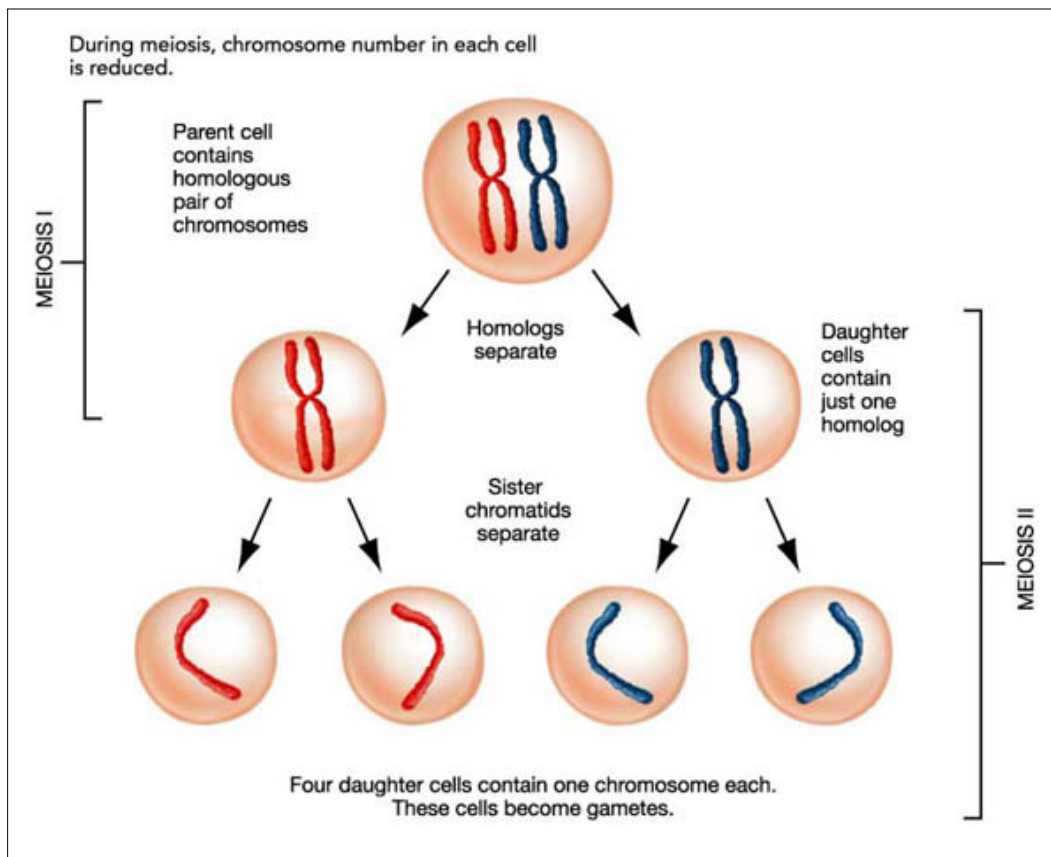


Meiosis: the Formation of Gametes

In meiosis, a **diploid cell** goes through **two divisions** to form **four haploid cells**.

During the first division, **homologous chromosomes** are separated from each other.

During the second division, **sister chromatids** are separated.

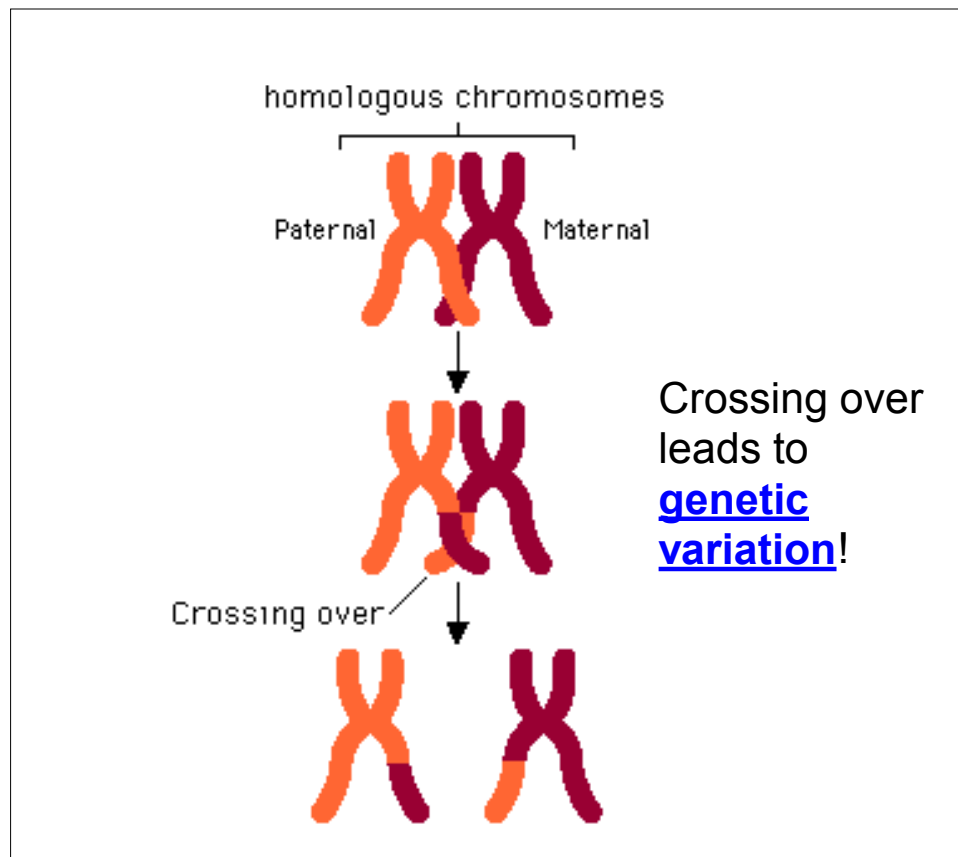


Crossing Over

Before the first division, homologous chromosomes are very close together.

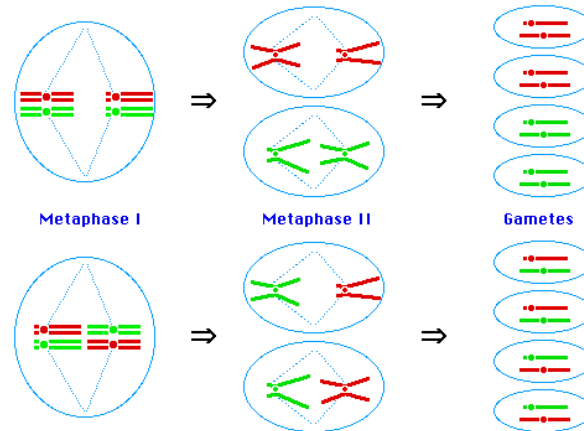
During this time, crossing over can happen.

Crossing over is the exchange of genetic information between homologous chromosomes.



More Genetic Variation

During meiosis, all gametes that are produced are slightly **different** because the **chromosomes are randomly separated** into the four gametes.



Let's answer the EQ:

How are **gametes** formed?

Meiosis produces 4
haploid gametes from
1 diploid cell.