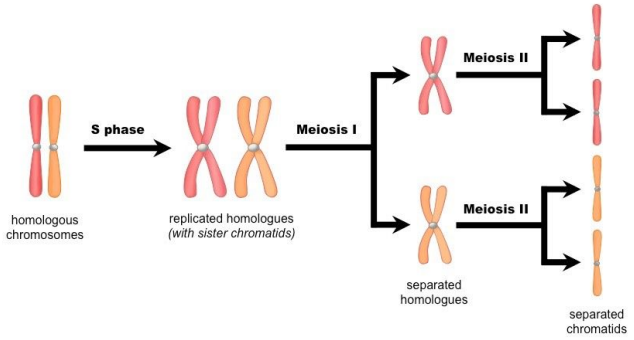
10.1 MEIOSIS

Replication of chromosomes

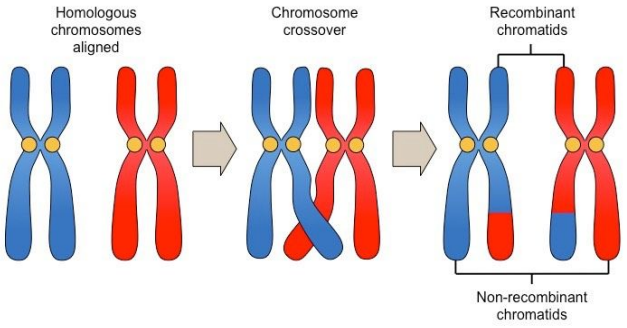
Chromosomes replicate before meiosis during the S phase of the cell cycle, so that each chromosome has a copy of itself and consists of two sister chromatids.



During meiosis I, chromosomes condense and synapse to form bivalents (homologous chromosomes are aligned next to each other).

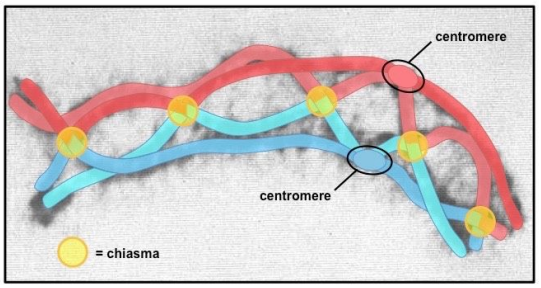
Crossing over

1. Crossing over is the exchange of DNA material between non-sister homologous chromatids.
2. Crossing over produces new combinations of alleles on the chromosomes of the haploid cells.
3. Crossing over occurs during prophase I of meiosis.



Formation of Chiasmata

- Chiasmata are points where two homologous non-sister chromatids exchange genetic material during crossing over in meiosis.
- The chiasmata are separated during anaphase 1 which can result in an exchange of alleles between the non-sister chromatids from the maternal and paternal chromosomes.

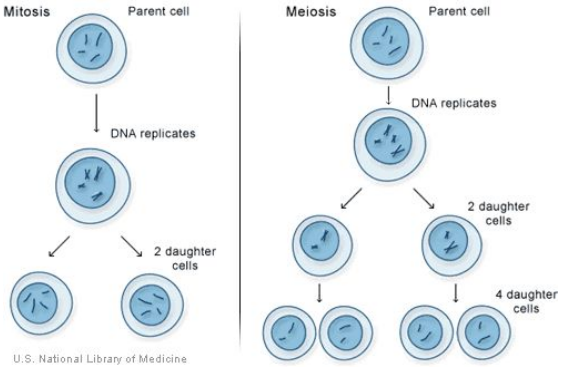


Answer: There are **5** chiasmata present between these homologous chromosomes

Overview of what happens in Meiosis -

- Homologous chromosomes separate in meiosis I.
- Sister chromatids separate in meiosis II.

The Independent assortment of genes is due to the random orientation of pairs of homologous chromosomes in meiosis I



"The orientation of how one set of homologues line up has no effect on how any of the other homologues line up."

For example, if chromosome pair one is heterozygous for a certain trait, there is a 50% chance that the gamete will receive the dominant trait and a 50% chance that the gamete will receive the recessive trait.

Also if chromosome pair five is heterozygous for a particular trait, again there is a 50% chance that the gamete will receive the dominant allele and a 50% chance that it will receive the recessive allele.

Both of these homologues line up independently during meiosis and have no effect on which gamete the other alleles will end up in.