

The Phases of Meiosis

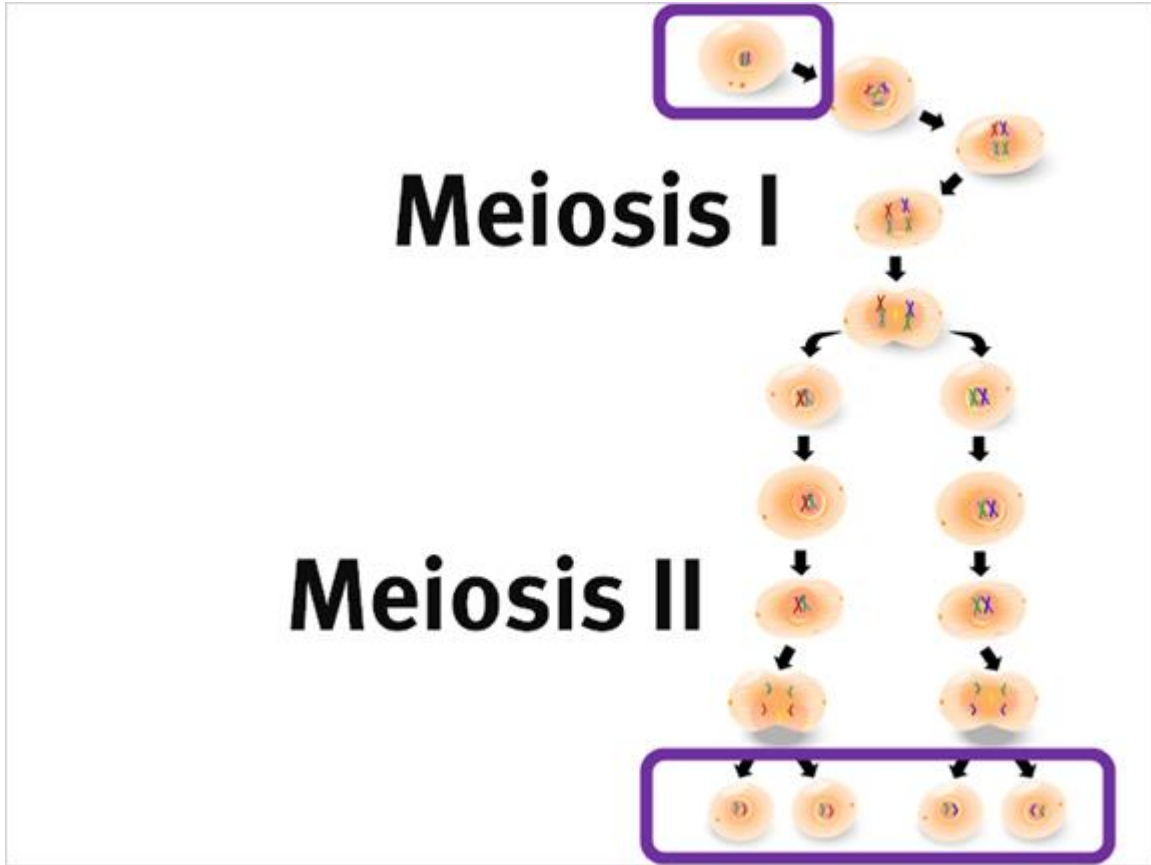
Click *NEXT* to begin.

The Phases of Meiosis

Click NEXT to begin.

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Topic 3 Content: The Phases of Meiosis Notes

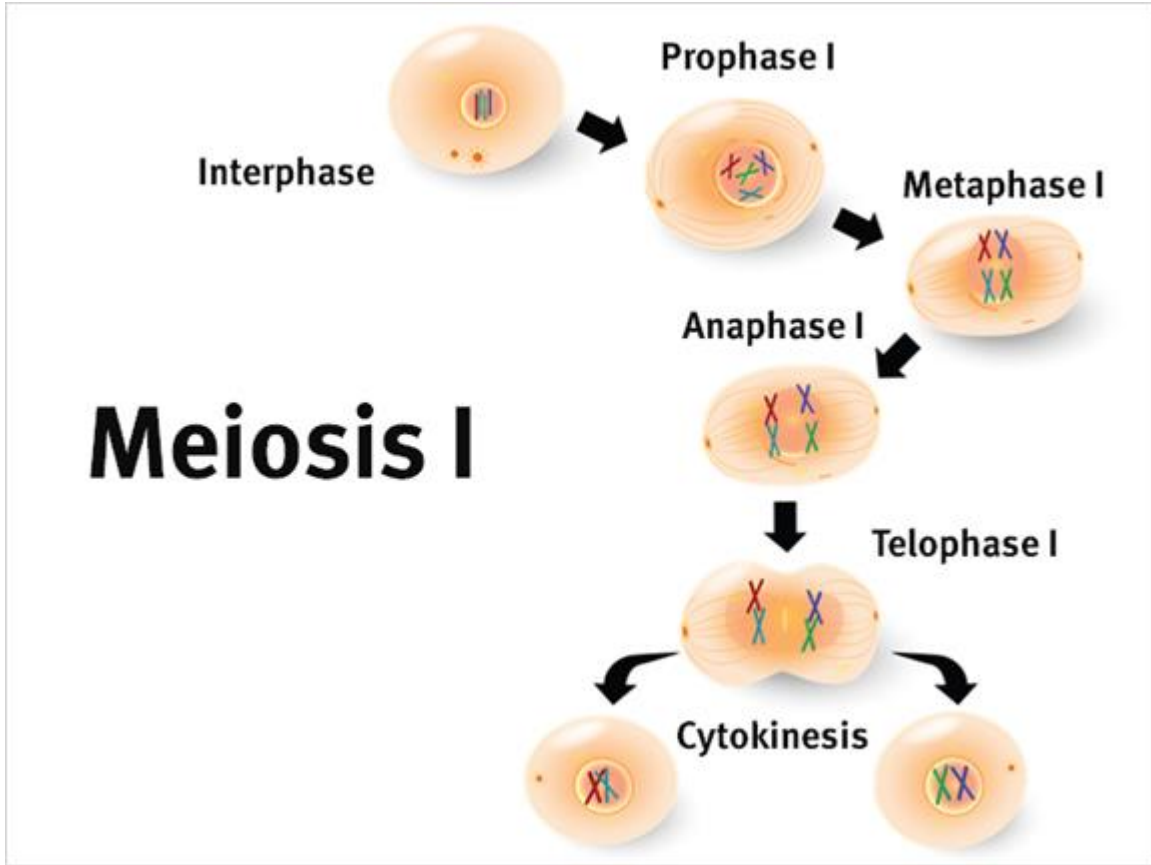


During meiosis, a cell undergoes two division cycles through meiosis I and meiosis II.

Meiosis shares many similarities with mitosis; however, by the end of meiosis, there are four genetically diverse haploid gametes produced from one diploid cell. None of the gametes are identical to the parent cell or to the other gametes.

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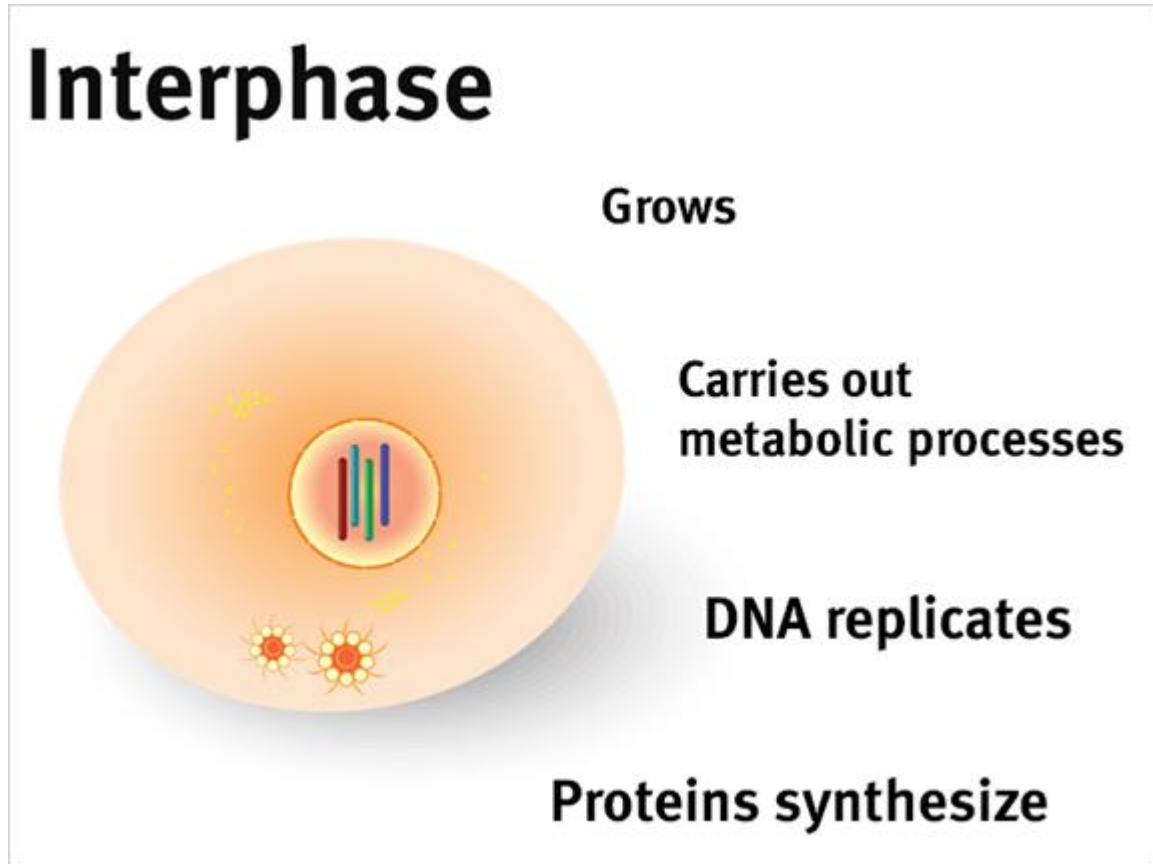
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The entire process is shown here. Click **NEXT** to begin learning about meiosis I.

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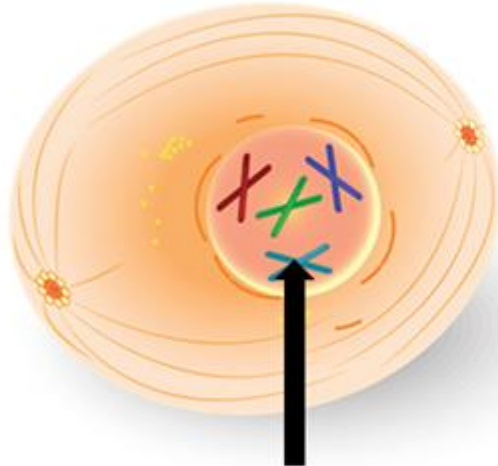
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Before meiosis begins, the cell is in interphase. During this interphase period, the cell grows and carries out other metabolic processes. This is also the period when the DNA replicates and proteins are synthesized. At the end of interphase, each chromosome includes two different sister chromatids attached in the middle by centromeres, which are also produced during this time.

Prophase I

the replicated chromosomes condense, the nuclear membrane breaks down, and the spindle fibers form



**Homologous
Chromosomes**

Tetrad

a group of four chromosomes

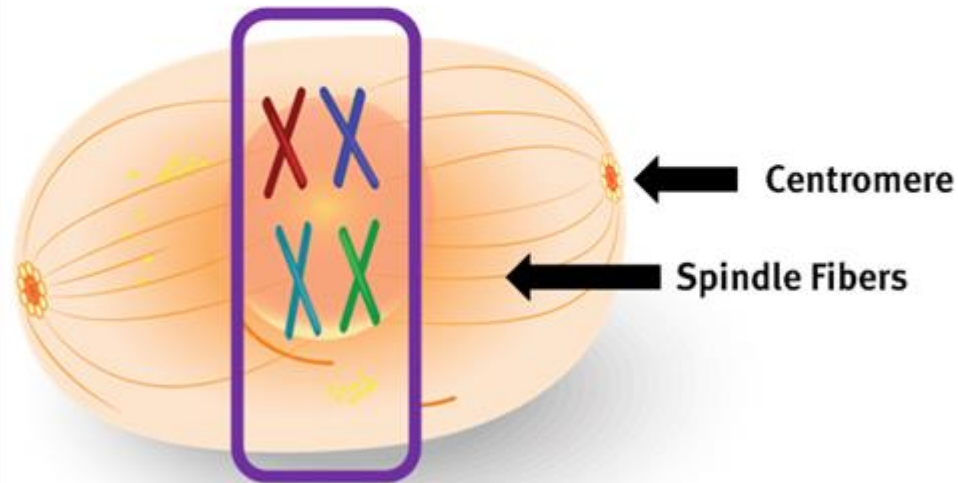
Crossing Over

pieces of chromosomes are exchanged in order to increase genetic diversity

The first stage of meiosis I is prophase I. During prophase I, the replicated chromosomes condense, the nuclear membrane breaks down, and the spindle fibers form. The homologous chromosomes pair up in a process called synapsis, and form a tetrad. Crossing over also occurs during synapsis. Crossing over is a process in which pieces of chromosomes are exchanged between a pair of homologous chromosomes.

Metaphase I

pairs of homologous chromosomes line up randomly at the equator of the cell



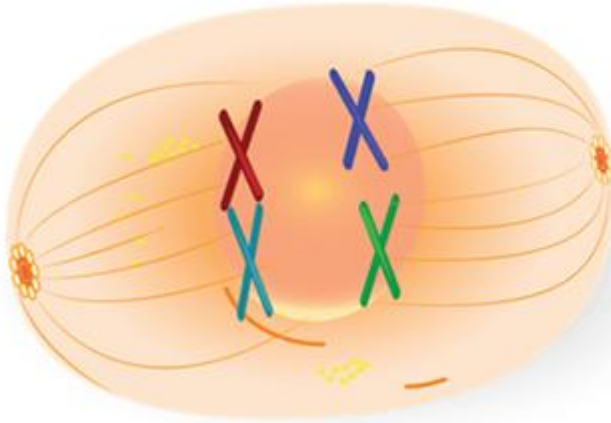
Following prophase I is metaphase I. During metaphase I, pairs of homologous chromosomes line up at the equator of the cell. The homologous pairs line up randomly, causing the chromosomes from each parent to locate on either side of the equator. This increases the genetic diversity of the species. Toward the end of metaphase I, the spindle fibers attach to the centromere of each homologous chromosome.

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Anaphase I

the spindle fibers shorten and pull each homologous chromosome to opposite ends of the cell



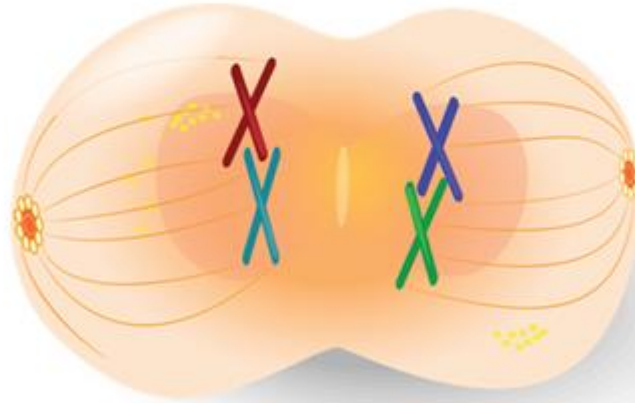
Anaphase I is next in the process. During anaphase I, the spindle fibers shorten and pull each homologous chromosome to opposite ends of the cell. The tetrads split up, but not the actual chromosomes.

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Telophase I

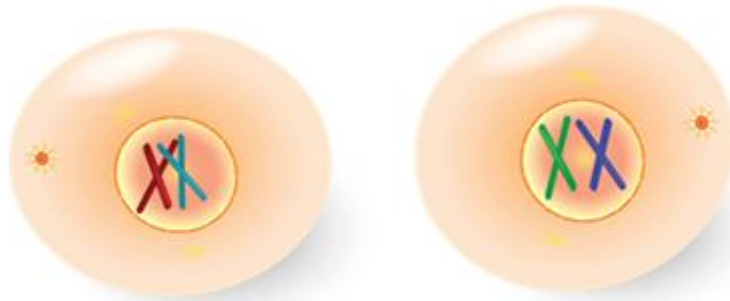
homologous chromosomes reach opposite ends of the cell



After anaphase I is telophase I. During telophase I, the homologous chromosomes, each of which consists of two sister chromatids, reach the opposite ends of the cell and cytokinesis begins.

Cytokinesis

the nuclear membranes reform, the spindle fibers disappear, and two genetically different cells are formed.



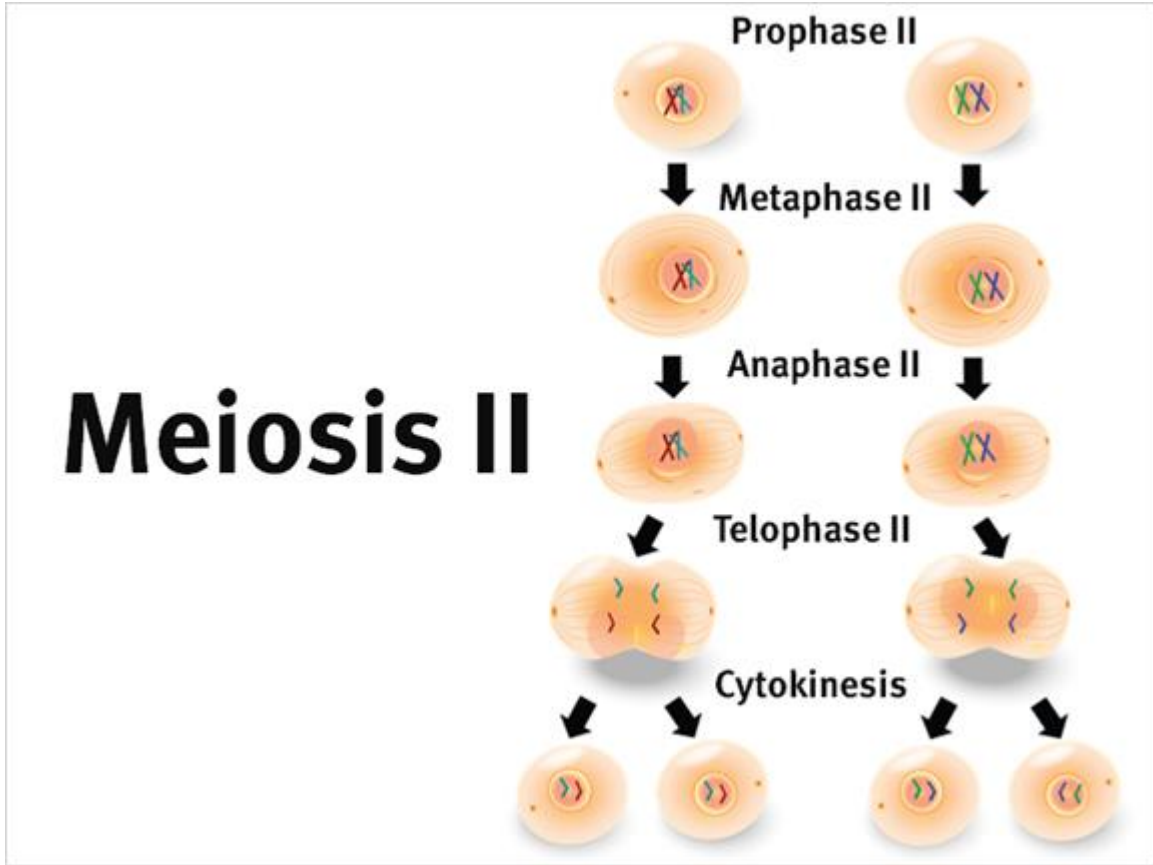
Diploid ($2n$) – 46 chromosomes

Haploid (n) – 23 chromosomes

During cytokinesis, the nuclear membranes reform, spindle fibers disappear, and two genetically different cells are formed. At this point, the chromosome number is reduced from diploid, represented as $2n$, to haploid, represented as n . This means that each cell contains 23 chromosomes, instead of 46 chromosomes.

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After meiosis I and cytokinesis, meiosis II begins. Click NEXT to learn about meiosis II.

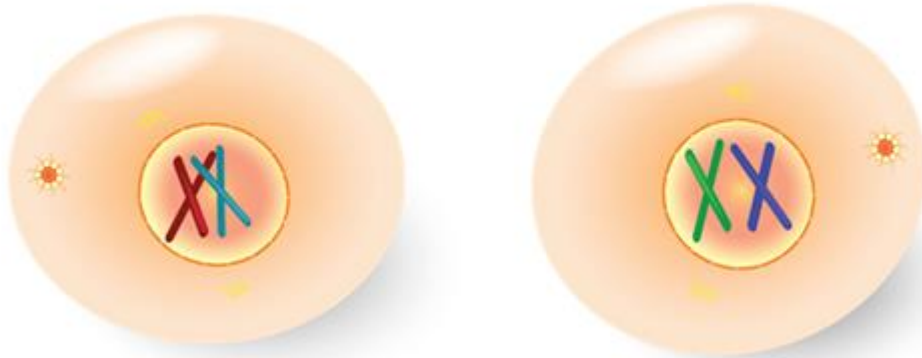
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Topic 3 Content: The Phases of Meiosis Notes

Prophase II

the chromatids condense and the spindle fibers form

synapsis and crossing over does not occur



Meiosis II begins with prophase II, when the chromatids condense and the spindle fibers form. Synapsis and crossing over do NOT occur in prophase II.

Metaphase II

the sister chromatids line up at the equator



During metaphase II, sister chromatids line up at the equator of the cell.

Anaphase II

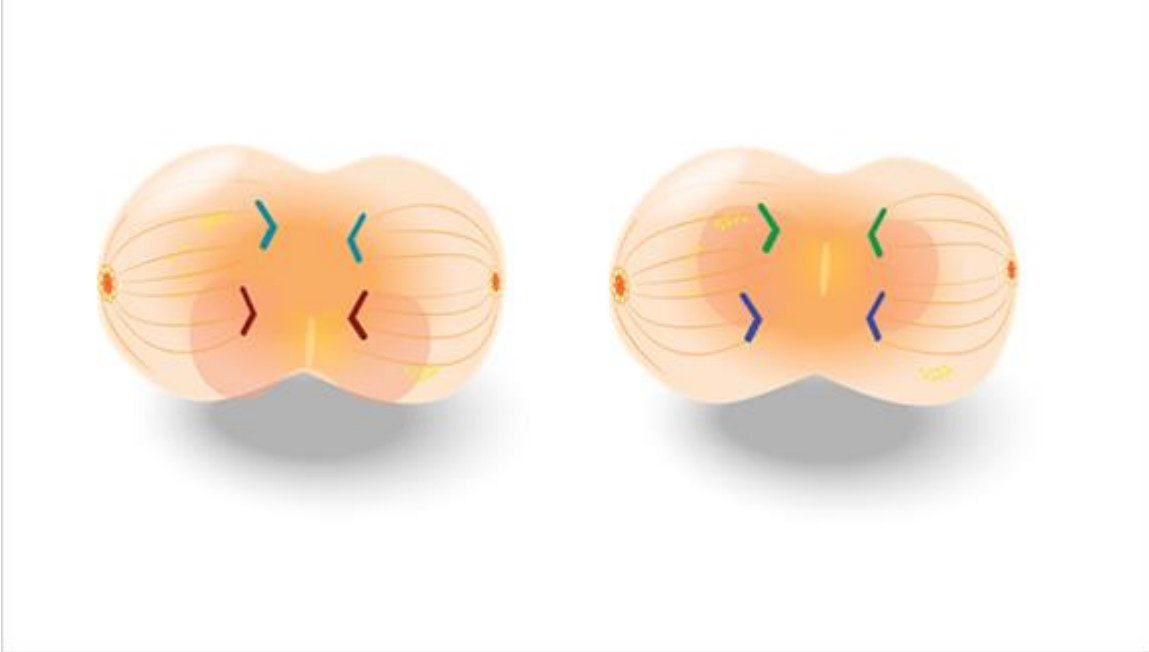
the sister chromatids are pulled to opposite ends of the cell and pulled apart



During anaphase II, the sister chromatids are pulled to opposite ends of the cell. This pulls the sister chromatids apart.

Telophase II

the chromatids reach the poles and the nuclei reform



During telophase II, the chromatids reach the poles of the cells and the nuclei reform.

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Topic 3 Content: The Phases of Meiosis Notes

Cytokinesis

four genetically different haploid cells are formed



haploid (n) – 23 chromosomes

After cytokinesis in meiosis II, four genetically different haploid cells exist.

The Phases of Meiosis

You have now explored all of the information related to the phases of meiosis. Click *Replay* to restart the interactivity or click *EXIT* to close the interactivity.

Replay

Exit

