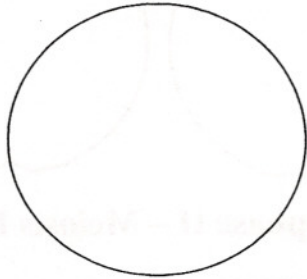


MEIOSIS I

Interphase I – Meiosis I

WHAT HAPPENS: DNA replication occurs, resulting full chromosomes. The centrioles also replicate.

TO SIMULATE: Place one red chromatid and one yellow chromatid in the center – but remember that chromosomes aren't yet visible at this stage, only chromatin. Place one centriole near the chromosomes. DNA replication occurs – make two more chromatids identical to the first, and join them at the centromeres. You now have paired chromatids (chromosomes). Replicate the centriole by placing another near the first.



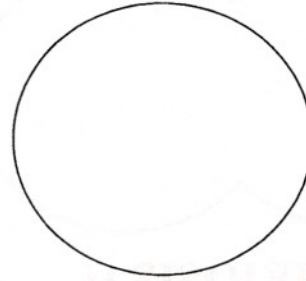
Prophase I – Meiosis I

WHAT HAPPENS: A process called synapsis occurs – homologous chromosomes move close together and pair along their entire length. A tetrad of 4 chromatids forms. Centrioles migrate to opposite sides of the cell.

TO SIMULATE: Align the tetrads so that their arms are tangled together. Separate the centrioles and move them to opposite sides of the cell.

CROSSING OVER: Crossing over results when DNA is exchanged between arms of homologous chromosomes. This results in a greater amount of genetic diversity between the gametes formed. Crossing over only occurs in Prophase I of Meiosis I.

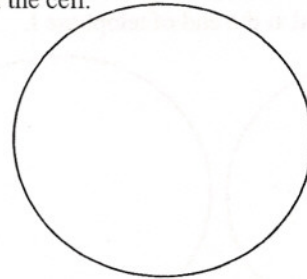
TO SIMULATE: Exchange the last 3 beads of a red chromatid with 3 beads from a yellow chromatid. Place your tetrads back they were in when you drew them early in Prophase I.



Metaphase I – Meiosis I

WHAT HAPPENS: Tetrads untangle and become aligned in the center of the cell. They are still in tetrads!

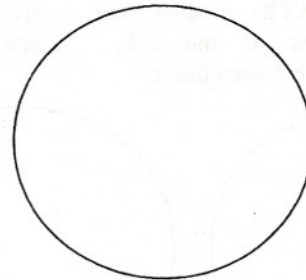
TO SIMULATE: Place your tetrads in the center of the cell.



Anaphase I – Meiosis I

WHAT HAPPENS: The tetrads separate into chromosomes and are pulled to opposite sides of the cell by the centrioles.

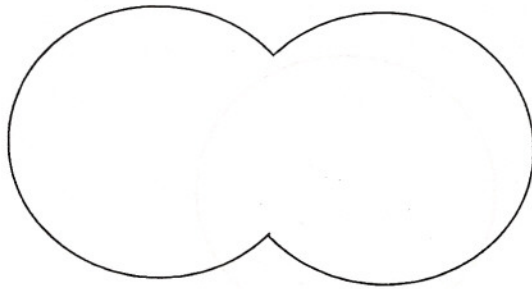
TO SIMULATE: Move your chromosomes toward their respective centrioles. Remember they're being drawn apart by the spindle fibers.



Telophase I – Meiosis I

WHAT HAPPENS: Cell division occurs at this point resulting in two cells containing individual chromosomes. Centrioles also replicate at this time.

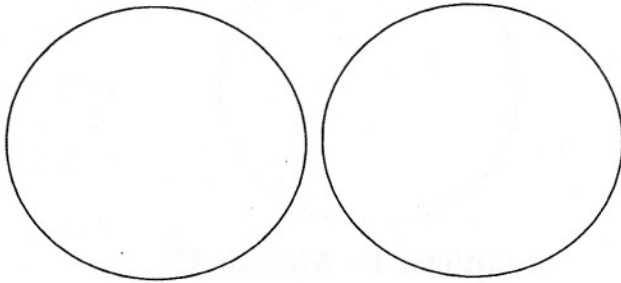
TO SIMULATE: Move each chromosome to its centriole. Then, make a copy of this centriole; two centrioles will be needed for Meiosis II.



MEIOSIS II

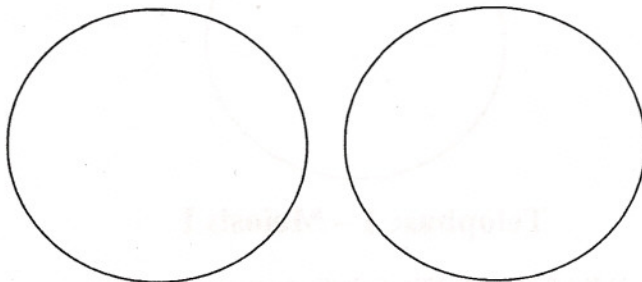
Interphase II – Meiosis II

WHAT HAPPENS: Nothing seems to happen here. Scientists think it maybe a resting period.
TO SIMULATE: Draw your two cells exactly as they appeared at the end of telophase I.



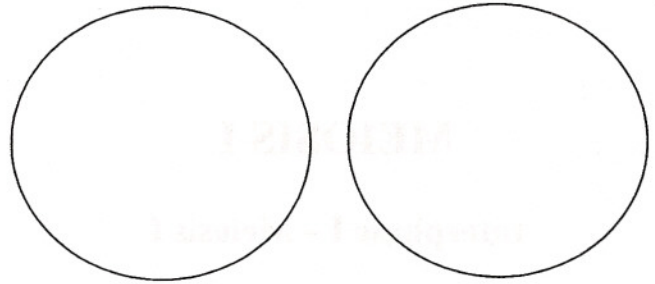
Prophase II – Meiosis II

WHAT HAPPENS: The newly replicated centrioles move to opposite sides of the cell. The chromatin appears to shorten and thicken into chromosomes.
TO SIMULATE: Move the centrioles to opposite sides of the cell. Place your chromosomes between them.



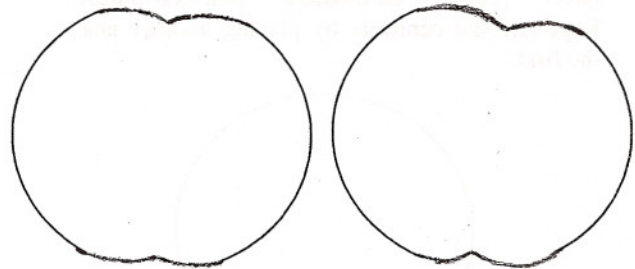
Metaphase II – Meiosis II

WHAT HAPPENS: All the chromosomes line up in the center in preparation to divide again.
TO SIMULATE: Line up your chromosomes evenly so they are centered between the centrioles



Anaphase II – Meiosis II

WHAT HAPPENS: The chromosomes separate into individual chromatids by the centrioles. They are drawn by the spindle fibers to opposite sides of the cell.
TO SIMULATE: Separate the chromosomes into chromatids and have them move towards their respect centrioles.



Telophase II – Meiosis II

WHAT HAPPENS: Cell division is completed and four cells are formed. Each has half the chromosome number of the original parent cell. A nuclear membrane reforms.
TO SIMULATE: Place each chromatid near its respective centriole. Draw imaginary lines around each cell.

