




CHAPTER 16**ANSWER KEY**

The Phases of Meiosis

Exercise Answer Key

BLM 16.3.3A

1.




Prophase I		Chromatin coils to form chromosomes. Each pair of homologous chromosomes (tetrad) aligns side by side (synapsis). Crossing over occurs during this phase of meiosis.
Metaphase I		A spindle fibre attaches to the centromere of each chromosome. A spindle fibre from one pole attaches to one pair of the sister chromatids in a tetrad and a spindle fibre from the opposite pole attaches to the other pair of sister chromatids. The spindle fibres then guide the tetrads to the equator of the cell where they line up as homologous pairs. Independent assortment of homologous pairs occurs in metaphase I.
Anaphase I		The spindle fibres shorten, separating the homologous chromosome pairs to opposite poles of the cell. A single chromosome (made up of two sister chromatids) of each homologous pair is now at each pole of the cell.

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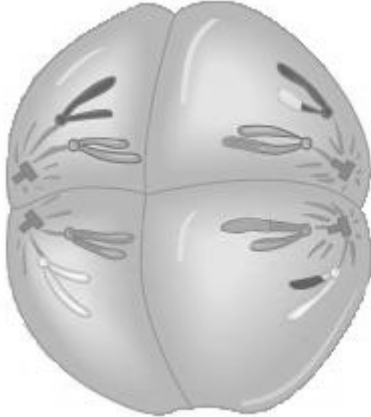
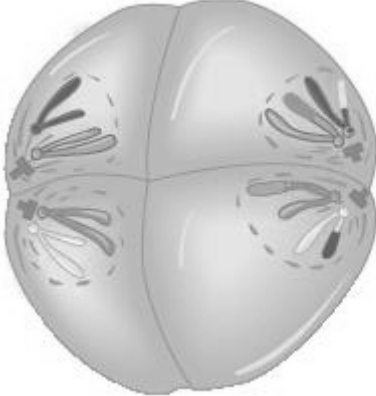
Telophase I		The chromosomes start to uncoil and spindle fibres disappear. A nuclear membrane forms around each group of chromosomes. The cytoplasm is divided in cytokinesis and two new haploid daughter cells are formed. (Note that some cells skip telophase I and move directly from anaphase I to prophase II.)
Prophase II		If the cell went through telophase I, the chromatin coils to form visible chromosomes. Centrioles migrate towards the poles of each cell. The nuclear membranes disappear. A network of spindle fibres forms in each cell.
Metaphase II		Spindle fibres guide chromosomes to the equator of each cell. One sister chromatid faces one pole and the other sister chromatid faces the opposite pole.

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Anaphase II		<p>The centromeres split apart and the sister chromatids are pulled apart to opposite poles of each cell as spindle fibres shorten. Microtubules of the spindle apparatus lengthen and force the poles away from each other, lengthening each cell.</p>
Telophase II		<p>The chromatids unwind into strands of chromatin. Spindle fibres break down. The nuclear membrane reforms around each set of chromosomes. A nucleolus forms within each new nucleus. Four daughter cells in total are formed when the cells enter cytokinesis.</p>

2. Meiosis II is more similar to mitosis than to meiosis I. Prophase II, metaphase II, anaphase II, and telophase II are identical to prophase, metaphase, anaphase, and telophase of mitosis except for the following differences: 1) two cells enter prophase II while only one cell enters prophase in mitosis; 2) each cell that enters meiosis II is haploid (but consists of replicated chromosomes), while each cell that enters mitosis is diploid; and 3) at the end of meiosis II, the four daughter cells produced are haploid (containing single unreplicated chromosomes), while at the end of mitosis, both new daughter cells are diploid.