**Topic 10.1: Meiosis**

**Essential Idea: Meiosis leads to independent assortment of chromosomes and unique composition of alleles in daughter cells.**

**Statements & Objectives:**

**10.1.U1 Chromosomes replicate in interphase before meiosis.**

Identify tetrad, bivalent, sister chromatids and non-sister chromatids in diagrams of replicated chromosomes.

(I**dentify** Provide an answer from a number of possibilities. Recognize and state briefly a distinguishing factor or feature.)

**10.1.U2 Crossing over is the exchange of DNA material between non-sister homologous chromatids.**

State that crossing over occurs during prophase I.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

Define chiasmata.

(**Define:** Give the precise meaning of a word, phrase, or physical quantity.)

**10.1.U3 Crossing over produces new combinations of alleles on the chromosomes of the haploid cells.**

State two consequences of chiasmata formation between non-sister chromatids.​

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**10.1.U4 Chiasmata formation between non-sister chromatids can results in an exchange of alleles.**

Draw a diagram to illustrate the formation of new allele combinations as results of crossing over.

**(Draw**: Represent by means of a labeled, accurate diagram or graph, using a pencil. A ruler(straight edge) should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted (if appropriate) and joined in a smooth curve. )

Explain how crossing over between linked genes can lead to genetic recombinants.​

(**Explain**: Give a detailed account including reasons or causes)

**10.1.U5 Homologous chromosomes separate in meiosis I.**

Contrast meiosis I with meiosis II.​

**(Contrast** Give an account of the differences between two (or more) items or situations, referring to

both (all) of them throughout.)

**10.1.U6 Independent assortment of genes in due to random orientation of homologous chromosomes pairs in meiosis I.**

Describe random orientation and independent assortment.

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

Given a parent cell genotype, determine the allele combinations that are possible in the gametes due to independent assortment and random orientation.​

(**Determine** Obtain the only possible answer.)

**10.1.U7 Sister chromatids separate in meiosis II.**

Compare meiosis II with mitosis.​

(**Compare** Give an account of the similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.)

**10.1.S1 Drawing diagrams to show chiasmata formed by crossing over.**

Draw a diagram to illustrate the process and result of crossing over.​

**(Draw**: Represent by means of a labeled, accurate diagram or graph, using a pencil. A ruler(straight edge) should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted (if appropriate) and joined in a smooth curve. )

**10.1.NOS Making careful observations- careful observations and record keeping turned up anomalous data that Mendel’s law of independent assortment could not account for. Thomas Hunt Morgan developed the notion of linked genes to account for the anomalies.**

Describe the experiment of Bateson and Punnett that lead to results that did not support Mendel’s law of independent assortment

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

Describe the trends and discrepancies that led Morgan to propose the idea of linked genes.​

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

**Key Terms**

Meiosis

Allele

​Tetrad

chiasmata

​Bateson

chromosome

​random orientation

bivalent

homologous

Punnett

Variety

​independent assortment

​​sister chromatids

non-sister chromatids

genetic recombinant

crossing over

​

prophase I

haploid

​Mendell

chiasma

interphase

meiosis I

meiosis II

​