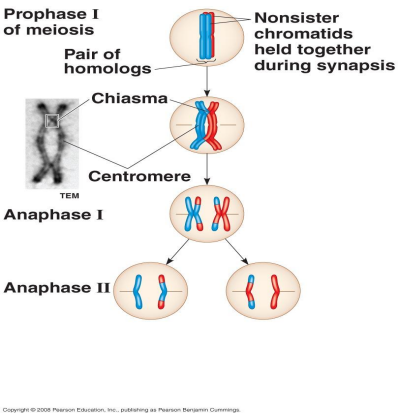
AP BIOLOGY

TOPIC REVIEW GUIDE:
DIVISION& INHERITANCE #2
MEIOSIS

KEY CONCEPTS:

- Offspring acquire genes from parents by inheriting chromosomes
- Fertilization and meiosis alternate in sexual life cycles
- Meiosis reduces the number of chromosome sets from diploid to haploid
- Genetic variation produced in sexual life cycles contributes to evolution
- Alterations of chromosome number or structure cause some genetic disorders



READ:

- Chapter 13 (pp. 248-260)
- Chapter 15.4 (pp 297-300)

KEY TERMS: Here is a list of key terms and concepts you will hear about and see during the chapter readings. Get to know them!

Heredity	*Karyotype*	*Haploid cell*	*Chiasma*
Variation	*Homologous chromosomes*	*Fertilization*	*Independent assortment*
Meiosis	*Sex chromosome*	*zygote*	*Recombinant chromosomes*
Genes	*Autosomes*	*Synapsis*	*Random fertilization*
Gametes	*Diploid cell*	*Crossing over*	*polyploidy*
Nondisjunction	*Aneuploidy*	*Monosomic*	*Trisomic*
Duplication	*Deletion*	*Inversion*	*Translocation*
Down syndrome (Trisomy 21)	*Turner Syndrome*	*Klinefelter syndrome*	*Cri du chat*

QUESTIONS FOR YOUR BILL:

The Basis of Heredity

1. Explain in general terms how traits are inherited from parents to offspring.
2. Distinguish between *gene, locus,* and *chromosome*.
3. Compare and contrast the processes of sexual and asexual reproduction.

The Role of Meiosis in Sexual Life Cycles

4. Distinguish between the following pairs of terms:
    a. *somatic cell* and *gamete*
    b. *sister chromatids* and *homologous chromosomes*
    c. *autosome* and *sex chromosome*
5. Explain how *haploid* and *diploid* cells differ from each other. State which cells in the human body are diploid and which are haploid.
6. Explain why *fertilization* and *meiosis* must alternate in all sexual life cycles.
7. Explain why meiosis is often called "reduction division."
8. Make a "cartoon strip" that illustrates the stages of meiosis. Start with a parent cell that has EIGHT homologous chromosomes. Use **EIGHT different colors** to represent each of the chromosomes. In your drawings list the phases of *meiosis I* and *meiosis II* and describe the events characteristic of each phase.
9. Explain how the chromosome number is reduced from diploid to haploid through the stages of meiosis.

10. Explain what happens during crossing over and when it occurs in meiosis. Use a drawing with labels to support your answer.
11. Describe THREE events that occur during Meiosis I but not during Mitosis.
12. If the mother or father's cell that produces a gamete has 12 pairs of chromosomes during G1 of interphase, how many chromosomes will the following cells have?
    a. after S phase of interphase.
    b. a daughter cell immediately following cytokinesis I of meiosis.
    c. a daughter cell during anaphase II of meiosis.
    d. a daughter cell immediately following cytokinesis II of meiosis

Origins of Genetic Variation

13. Explain how *independent assortment*, *crossing over*, and *random fertilization* contribute to genetic variation in sexually reproducing organisms.
14. Explain why heritable variation was crucial to Darwin's theory of evolution.

Errors and Exceptions in Chromosomal Inheritance

15. Define "non-disjunction". Why can this be a problem during meiosis?
16. Use a graphic organizer to define *monosomy*, *trisomy*, *triploidy*, and *polyploidy*, to explain how these major chromosomal changes occur, and to describe possible consequences.
17. Portions of chromosomes may also be lost or rearranged, resulting in mutations. Use a series of drawings with captions to distinguish among the following chromosomal mutations: *deletions, duplications, inversions*, and *translocations*.
18. Describe the type of chromosomal alterations responsible for the following human disorders:
    a. *Down syndrome*
    b. *Klinefelter syndrome*
    c. *Turner syndrome*
    d. *cri du chat syndrome*.
19. Explain why, genetically, we are all more like our mothers than our fathers.

SUPPLEMENTARY RESOURCES: Click the links below for more information to help you learn more about this lesson.

Interactives

- **McGraw-Hill 3D Animation**: Meiosis 3D
- McGraw Hill Animation: Meiosis with Crossing Over
- Pearson's Biocoach Activity: Meiosis
- Arizona Biology Project Activities: Meiosis and Nondisjunction
- Sumanas Inc: Meiosis Animation
- Sumanas Inc: Nondisjunction Animation
- Utah Learn Genetics: Genetic Disorders Library
- Arizona Biology Project: Karyotyping Activity
- Arizona Biology Project: New Methods for Karyotyping
- Nondisjunction in Humans: learn how gametes can end up with extra chromosomes
- PBS' The Evolution of Sex: learn why sexual reproduction is advantageous from an evolutionary standpoint
- Hillis et al.: Independent Assortment of Alleles Animation

Lectures

- Bozeman Biology's "Meiosis" video.
- Bozeman Biology's "Diploid vs. Haploid Cells" video.
- Bozeman Biology's "Mechanisms that Increase Genetic Variation" video.
- Crash Course Biology's video: Meiosis - Where the Sex Starts

HYPERLINK "http://www.youtube.com/watch?v=qCLmR9-YY7o&list=PL3EED4C1D684D3ADF&index=13&feature=plpp_video"