Name _____ AP Biology Reading Guide

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Chapter 10: Meiosis and Sexual Life Cycles

10.2 Fertilization and meiosis alternate in sexual life cycles

1) What is a karyotype and what is it used for?

2) Explain what is meant by homologous chromosomes (homologs).

3) What is the difference between sex chromosomes and autosomes? How many of each is found in human cells?

4) The muscle cells of a dog have 78 chromosomes. Fill in the correct chromosome number in a:

Bone cell _____ sperm _____ haploid cell _____ somatic cell _____ zygote _____

5) In figure 10.4 label the following:

A. sister chromatids
B. homologous chromosomes
C. centromere
D. replicated chromosome

6) In the above cell:

How many chromosomes does it have? _____

How many homologous pairs? _____

How many chromatids? _____

Is this cell haploid or diploid? _____

7) Where are the gametes of humans produced?

Males produced in: _____

Females produced in: _____

8) What is the purpose of meiosis?

10.3 Meiosis reduces the number of chromosome sets from diploid to haploid

9) How many divisions does Meiosis go through? _____

Lets study the events of meiosis I.

10) Explain each of the following events that occurs during **Prophase 1**

synapsis

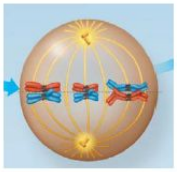
PROPHASE I

crossing over (and the resulting recombinant DNA)

chiasmata

11) In **Metaphase 1**. How is the arrangement of chromosomes different from metaphase of mitosis?

METAPHASE I



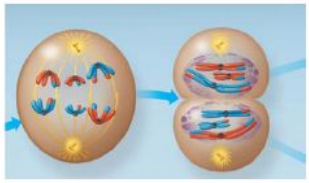
12) Now look at **Anaphase 1** and **Telophase 1.**

What separates and goes to the poles in Anaphase I? _____

What is the process after telophase called? _____

How many chromosomes are in each cell at the end of the first division?

_____



ANAPHASE I TELOPHASE I

Are the resulting daughter cells haploid or diploid? _____

13) During Meiosis I the homologous chromosomes separate. What separates during meiosis II?

14) **Recap:**

During which division is the chromosomes number reduced? _____

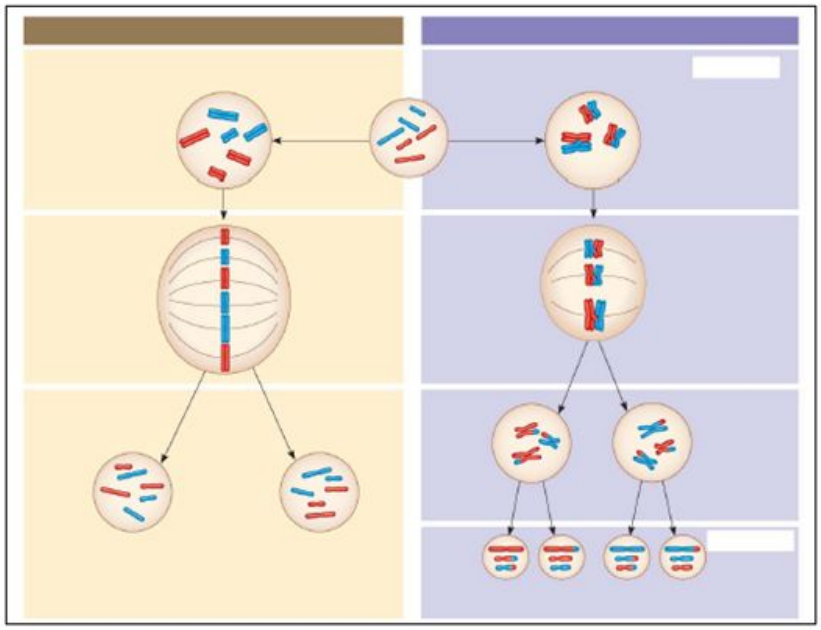
How many times do the chromosomes duplicate? _____

How many "daughter cells" are formed? _____

What is the chromosome number? 2n or n? _____

15) In figure 10.10 below compare mitosis and meiosis. Add the following labels to the picture:
Parent cell, Mitosis, Meiosis, Synapsis, Homologs, sister chromatids, daughter cells, Meiosis I, Meiosis II, Crossing over, 2n, and n

List the 3 events that occur during meiosis I that do not occur in mitosis.



16) Students often get confused about the differences between mitosis and meiosis. To help, work through the chart.

	Mitosis	Meiosis
Role in the animal body		
Number of DNA replications		
Number of divisions		
Number of daughter cells		
Chromosome number of daughter cells		

10.4 Genetic variation produced in sexual life cycles contributes to evolution

17) An important idea for you to understand is that new alleles arise by changes in the DNA or mutation, but genetic diversity occurs when the deck that is dealt is simply reshuffled. So, there are three ways that sexually reproducing organisms "shuffle the deck." They are listed below. Explain what occurs in each, and how this increases diversity/evolution.

independent assortment of chromosomes

crossing over

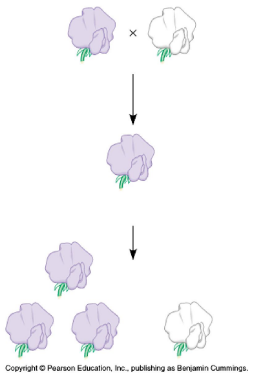
random fertilization

Chapter 11: Mendel and the Gene Idea

11.1 Mendel used the scientific approach to identify two laws of inheritance

1) Use figure 11.3 to label the generations: P, F_1, F_2, pure, hybrid, and make notes of Mendel's observations.

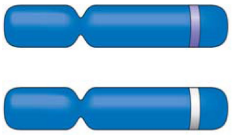
Which generation would your Mom's grandparents be? Your Mom? You?



2) What is the difference between an allele, a gene and a locus? On the figure 11.4 below, label the *allele* for both purple and white flower color, a *homologous pair*, and the *locus* of the flower color gene.

Allele:

Gene:



Locus:

Mendel's model consists of four concepts. Describe each concept in the appropriate space below. Indicate which of the concepts can be observed during meiosis by placing an asterisk by the concept.

Mendel's Four Concepts	**Description of Concept**
1st concept	
2nd concept	
3rd concept	
4th concept (*law of segregation*)	

3) When does the segregation of alleles occur? _____

4) Briefly define the following terms:

a. homozygous _____

b. heterozygous _____

c. phenotype _____

d. genotype _____

5) In humans the allele for albinism is recessive to the allele for normal skin pigmentation. If two heterozygotes have children, what is the chance that a child will have normal skin pigment? What is the chance that a child will be albino? Show all work and all percentages!!! (You may use "A" for normal pigmentation and "a" for albino.)

Genotype frequency phenotype frequency

6) What is the purpose of a testcross?

7) Explain the difference between a *monohybrid* cross and a *dihybrid cross*.

8) Complete the cross *YyRr* × *YyRr* by placing the gametes in a *Punnett square*. Then provide the phenotypic ratio of the offspring. (Where Y is the allele for yellow peas, y is for green, R is for round peas and r is for wrinkled.)

Phenotypes/Phenotypic Ratio

9) Explain Mendel's *law of independent assortment*.

11.2 Probability laws govern Mendelian inheritance

10) Look over the probability rules/concepts (independent event, multiplication rule, and addition rule). Make sure you understand them. What is the probability that a couple will have a girl, a boy, a girl, and a boy in this specific order? **Show All Work!!!!**

11.3 Inheritance patterns are often more complex than predicted by simple Mendelian genetics

11) Explain how *incomplete dominance* is different from *complete dominance*, and *codominance* and give an example of each.

12) How is blood type an example of multiple alleles?

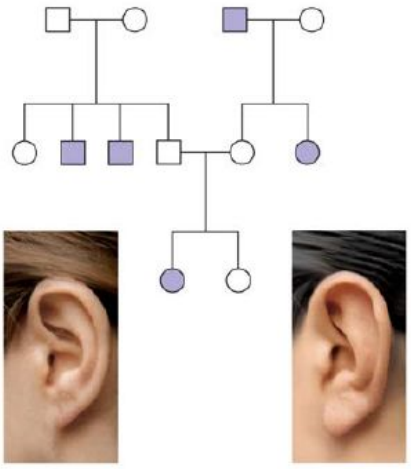
13) Review blood types (see figure 11.11). If a man with type AB blood marries a woman with type O blood, what blood types would you expect in their children? Include genotypic and phenotypic ratios **Show all work!!!**

14)Describe pleiotropy and epistasis.

15) Why is height a good example of *polygenic inheritance*?

11.4 Many human traits follow Mendelian patterns of inheritance

16) Pedigree analysis is often used to determine the mode of inheritance (dominant or recessive, for example). Be sure to read the "Tips for pedigree analysis" in Figure 11.14; then complete the unlabeled pedigree by indicating the genotypes for all involved. What is the mode of inheritance for this pedigree? (First decide if it is recessive or dominant, then autosomal or sex-linked). Show work on the pedigree chart.



17) Explain why you know the genotype of one female in the third generation, but are unsure of the other.

18) Briefly describe each of the following recessively inherited genetic disorders:
a. Cystic fibrosis

b. Tay-Sachs (described in section 11.3)

c. Sickle cell anemia

e. Explain how Huntington's disease can be passed on even though it is a lethal dominant allele.

Chapter 12-The Chromosomal Basis of Inheritance

1) What is the *chromosome theory of inheritance*?

2) What is the difference between the *law of segregation* and the *law of independent assortment* (see figure 12.2)?

12.1 Morgan showed that Mendelian inheritance has its physical basis in the behavior of chromosomes
3) Describe Thomas Hunt Morgan's first mutant fruit fly. Why was this fly so significant?

4) What unusual result suggested that the eye-color trait is located on the X chromosome?

12.2 Sex-linked genes exhibit unique patterns of inheritance
5) What is meant by a trait being sex-linked?

6) Why are sex-linked recessive traits more common in males than females?

7) What is a *Barr body*? Why do human females show a Barr body in their cells?

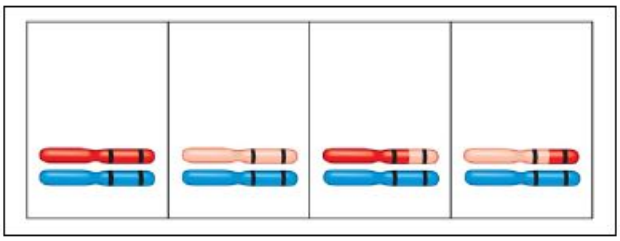
12.3 Linked genes tend to be inherited together because they are located near each other on the same chromosome

8) What are *linked genes*? Do linked genes sort independently?

9) What is meant by parental types and recombinants in a genetic cross?

10) What is a *linkage map*? What is a *map unit*?

11) Use the figure below, which is from Figure 12.10. It shows the results of a cross between a fruit fly that is heterozygous for gray body with normal wings, and a fruit fly that has a black body with vestigial wings. Because these genes are linked, the results are not what might have been predicted. Show the phenotypes and number of each type of offspring on the chart. Indicate which offspring are the recombinants and which are the parental type. Finally, calculate the map distance between the two genes. Show all your work here.



12.4 Alterations of chromosome number or structure cause some genetic disorders

12) What occurs in *nondisjunction*?

13) Explain each of the following terms and give a specific example of each:

aneuploidy

monosomy

trisomy

polyploidy

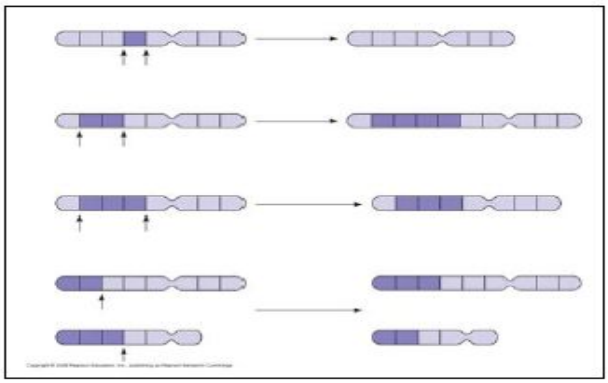
14) Chromosome structure can be altered in several ways. Label each type of alteration shown in this figure, and explain what occurs.

deletion

duplication

inversion

translocation



The following questions can be answered from your review book p. 117.

15) A number of genes will cause a variation in phenotype, depending on whether the gene came from the father or the mother. This variation occurs because of *genomic imprinting*. Explain genomic imprinting.

16) Although you inherited one chromosome of each pair from your mother and your father, you have inherited a group of genes from your mother only. What genes are these and why are they called extranuclear genes?