

SECTION 11-1 REVIEW

INTRODUCTION TO GENETICS

VOCABULARY REVIEW Distinguish between the terms in each of the following pairs of terms.

- 1. F₁ generation, F₂ generation _____

- 2. dominant factor, recessive factor _____

- 3. gene, allele _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. Mendel obtained plants that were pure for particular traits by
 - a. growing plants from the seeds of other plants that showed that trait.
 - b. discarding plants that showed other traits
 - c. allowing plants to self-pollinate for several generations.
 - d. allowing plants to cross-pollinate for one generation
- _____ 2. When Mendel crossed a strain of tall pea plants with a strain of short pea plants, he observed that all of the plants in the F₁ generation were tall. This suggests that
 - a. the tall trait was controlled by a dominant factor.
 - b. the short trait was controlled by a dominant factor.
 - c. both traits were controlled by a recessive factor.
 - d. the strain of short plants was not capable of pollinating the strain of tall plants.
- _____ 3. A cross between pure green-podded pea plants and pure yellow-podded pea plants produces only green-podded plants. When the F₁ generation is allowed to self-pollinate, the F₂ consists of
 - a. only green-podded plants.
 - b. only yellow-podded plants.
 - c. about three-quarters yellow-podded plants and one quarter green-podded plants.
 - d. about three-quarters green-podded plants and one quarter yellow-podded plants.
- _____ 4. When alleles for different characteristics are on homologous chromosomes, they are distributed to gametes equally. This observation is summarized by the law of
 - a. cross-pollination.
 - b. dominance.
 - c. segregation.
 - d. molecular genetics.

SHORT ANSWER Answer the questions in the space provided.

1. What does the term *true-breeding* mean as it is used in genetic crosses? (p.263) _____

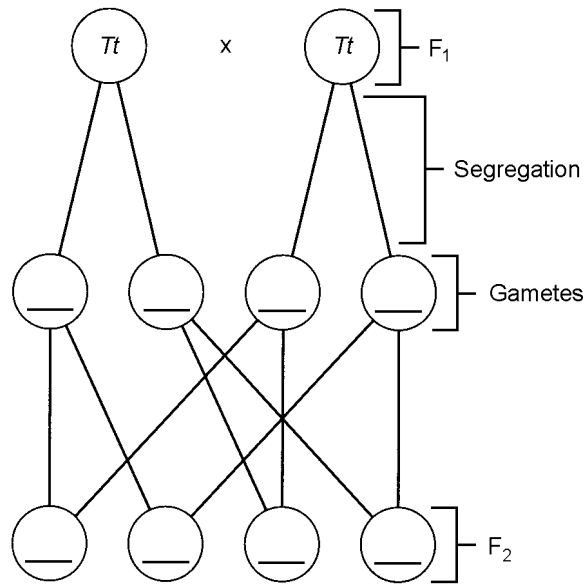
2. What are gametes? (p.266) _____

3. If orange flower color in a plant is controlled by an allele *F* and red flower color is controlled by an allele *f*, which flower color is dominant? (p.266) _____
4. Explain the difference between cross-pollination and self-pollination. (pp.263-264) _____

5. If a plant with *TT* alleles were crossed with another plant with *Tt* alleles, would you expect any of the offspring to show the recessive appearance? Build a Punnett square to prove your point. (p.268) _____

	T	T
T		
t		

STRUCTURES AND FUNCTIONS Complete the following diagram to show how alleles segregate during the formation of gametes. (p.266)



1. In the diagram above, the dominant allele is represented by _____ and the recessive allele is represented by _____.

SECTION 11-2 REVIEW

PROBABILITY AND PUNNETT SQUARES

VOCABULARY REVIEW Define the following terms, and provide one example of each.

- 1. **homozygous** _____

- 2. **heterozygous** _____

- 3. **phenotype** _____

- 4. **genotype** _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. The appearance of an organism is its
a. genotype. b. phenotype. c. genotypic ratio. d. phenotypic ratio.
- _____ 2. A genetic cross performed many times produces 1200 roses of which 900 were long-stemmed roses and 300 were short-stemmed roses. The probability of obtaining a short-stemmed plant in a similar cross is
a. 1/4. b. 1/3. c. 3/1. d. 3/4.
- _____ 3. A cross of two individuals that are heterozygous (Tt) for a trait would probably result in a phenotypic ratio of
a. 4 dominant:0 recessive. c. 3 dominant:1 recessive.
b. 1 dominant:3 recessive. d. 1 dominant:1 recessive.
- _____ 4. To determine the genotype of an individual that shows the dominant trait, like brown eyes, you would cross that individual with a person who is
a. heterozygous dominant (Bb). c. homozygous dominant.
b. hybrid. d. recessive (bb).
- _____ 5. The chance that a particular event will occur is called
a. heredity. b. genetics. c. probability. d. crossing-over.
- _____ 6. A person with an allele for brown eyes and an allele for blue eyes is
a. homozygous. b. heterozygous. c. pure-breeding. d. true-breeding.

SHORT ANSWER Answer the questions in the space provided.

1. What is the difference between a homozygous individual and a heterozygous individual? (p.268)

2. If the probability that a specific trait will appear in the F₂ generation is 0.25, how many individuals would be expected to show that trait in an F₂ generation of 80 individuals? (p.267)

3. A homozygous dominant individual (AA) is crossed with an individual that is heterozygous for the same trait (Aa). What are the possible genotypes of the offspring, and what percentage of the offspring is likely to show the dominant phenotype? (p.268)

4. How do geneticists use Punnett squares? (p.268)

5. How can two plants that have different genotypes have the same phenotype? (p.268)

STRUCTURES AND FUNCTIONS For questions 1 - 4, fill in the genotype and percentage expected on the lines provided. (p.268)

		Tt	
		T	t
Tt	T	1. _____ _____ %	2. _____ _____ %
	t	3. _____ _____ %	4. _____ _____ %

5. What is the name of the table that is used to predict the offspring of a genetics cross? _____

SECTION 11-3 REVIEW

EXPLORING MENDELIAN GENETICS

VOCABULARY REVIEW Define the following terms, and provide one example of each.

1. **independent assortment** _____

2. **incomplete dominance** _____

3. **multiple alleles** _____

4. **codominance** _____

5. **polygenic traits** _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. A Punnett square shows all of the following except
 - a. all possible results of a genetics cross.
 - b. the genes in the gametes of each parent.
 - c. the genotypes of the offspring.
 - d. the actual results of a genetic's cross.
- _____ 2. How many different genetic combinations could be produced by a pea plant whose genotype was TtPp?
 - a. 2
 - b. 4
 - c. 8
 - d. 16
- _____ 3. Since the ABO blood group genes are codominant, an individual with the genotype AO will have blood type
 - a. A.
 - b. B.
 - c. AB.
 - d. O.
- _____ 4. Which of the following human traits is not a polygenic trait?
 - a. skin color.
 - b. eye color.
 - c. height.
 - d. widow's peak hair.
- _____ 5. Two pink flowering plants are crossed. The offspring flower as follows: 25% red, 25% white, and 50% pink. What pattern of inheritance does this cross represent?
 - a. codominance
 - b. polygenic trait
 - c. multiple alleles
 - d. incomplete dominance

SHORT ANSWER Answer the questions in the space provided.

1. How is independent assortment related to the process of segregation? (p.271) _____

2. Are an organism's characteristics determined only by its genes? Explain your answer. (p.274) _____

3. How do multiple alleles and polygenic traits differ? (p.273) _____

4. Do polygenic traits or single gene traits have more variation in the phenotypes they produce? Explain your answer. (p.273) _____

STRUCTURES AND FUNCTIONS Write the possible genotypes of the offspring in the Punnett square below. Then answer the questions in the spaces provided. (pp.270-271)

A plant with the genotype $RrYy$ is crossed with another plant with the same genotype. Both parents are hybrid and have seeds that appear round (R) and yellow (Y), not green (y) and wrinkled (r).

	RY	Ry	rY	ry
RY				
Ry				
rY				
ry				

1. What proportion of the offspring will be dominant for both traits?

2. What proportion of the offspring will have the same genotype as their parents?

3. What proportion of the offspring will be homozygous dominant for both traits?

4. What proportion of the offspring will be homozygous recessive for both traits?

5. Which two traits are dominant in this genetics cross? _____

SECTION 11-4 REVIEW

MEIOSIS

VOCABULARY REVIEW Define the following terms.

1. **homologous** _____

2. **tetrad** _____

3. **crossing-over** _____

4. **polar bodies** _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. What type of cell has two sets of chromosomes?
 - a. a diploid cell
 - b. an egg cell
 - c. a haploid cell
 - d. a sperm cell
- _____ 2. During crossing-over, portions of sister chromatids
 - a. double the amount of DNA in each chromosome.
 - b. move from autosomes to sex chromosomes.
 - c. break off and attach to adjacent chromatids on the homologous chromosome.
 - d. separate from each other and move to opposite poles of the cell.
- _____ 3. In which phase of meiosis do tetrads form and crossing-over occurs?
 - a. meiosis I
 - b. mitosis I
 - c. meiosis II
 - d. mitosis II
- _____ 4. Meiosis II
 - a. produces genetically identical cells.
 - b. separates chromatids into opposite poles of the cell.
 - c. separates homologous chromosomes into opposite poles of the cell.
 - d. produces diploid offspring cells.
- _____ 5. In the development of an egg, a cell in the ovary divides by meiosis to produce
 - a. one diploid egg and three polar bodies.
 - b. four diploid eggs.
 - c. one haploid egg and three polar bodies.
 - d. four haploid eggs.

SHORT ANSWER Answer the questions in the space provided.

1. Describe the two ways that genetic recombination occurs during meiosis. (p.276) _____

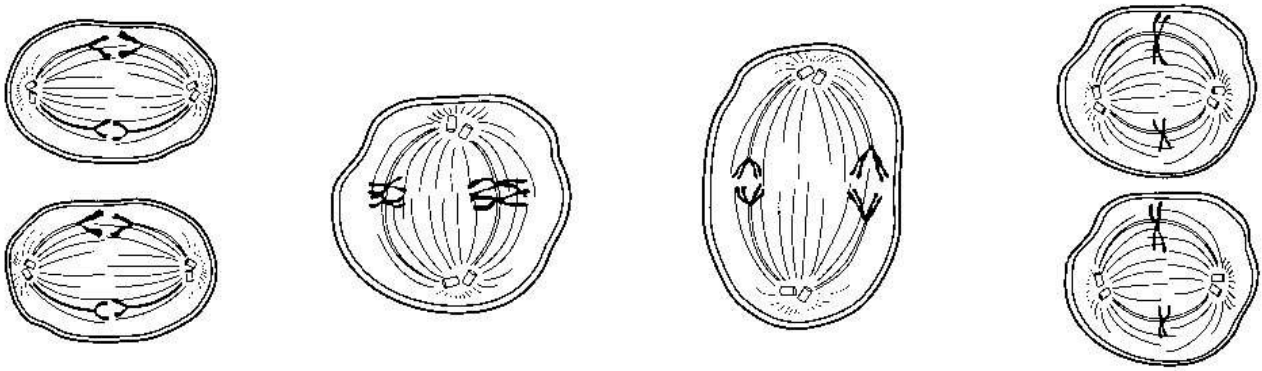
2. Describe the events that occur during prophase I of meiosis. (p.276) _____

3. How do the number of cells of meiosis I differ from those of meiosis II? (pp.276-277) _____

4. Compare mitosis to meiosis. (p.278) _____

5. Why is meiosis described as the process of reduction division? (p.275) _____

STRUCTURES AND FUNCTIONS In the space provided below, label each figure with the phase of meiosis that it represents. Use the following terms: anaphase I, anaphase II, metaphase I, and metaphase II. (pp.276-277)



- a. _____ b. _____ c. _____ d. _____

SECTION 11-5 REVIEW

LINKAGE AND GENE MAPS

VOCABULARY REVIEW Define the following terms.

1. linked genes _____

2. linkage groups _____

3. **gene map** _____

4. *Drosophila* _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. A gene map shows
 - a. the number of possible alleles for a gene.
 - b. where chromosomes are located in a cell.
 - c. the relative location of genes on a chromosome.
 - d. how crossing-over occurs.
- _____ 2. Genes that belong to the same linkage group tend to be
 - a. located on different chromosomes.
 - b. inherited together unless crossing-over occurs.
 - c. found only in males.
 - d. found only in females.
- _____ 3. Two genes that are twenty map units apart are separated by crossing-over
 - a. 1% of the time.
 - b. 20% of the time.
 - c. 50% of the time.
 - d. 100% of the time.
- _____ 4. Linked genes
 - a. are never separated.
 - b. are on the same chromosome.
 - c. assort independently.
 - d. are always recessive.
- _____ 5. If two genes are located on the same chromosome and rarely separate, then
 - a. crossing-over never occurs between the genes.
 - b. crossing-over always occurs between the genes.
 - c. the genes are probably located far apart from each other.
 - d. the genes are probably located close to each other.

SHORT ANSWER Answer the questions in the space provided.

1. What is a linkage group? (p.279) _____

2. What does a gene map show? (p.280) _____

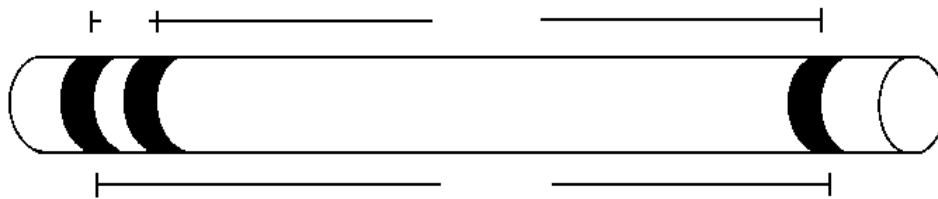
3. Why didn't Mendel observe gene linkage when he worked with the genetics of pea plants? (p.279) _____

4. How is a gene map constructed? (pp.279-280) _____

STRUCTURES AND FUNCTIONS Use the data in the table to indicate the position of three genes on the chromosome map shown below. Label each of the genes with the correct trait - white (w), red (r), and miniature (m). Place the map unit percentages above each gene's position on the chromosome map. (p.280)

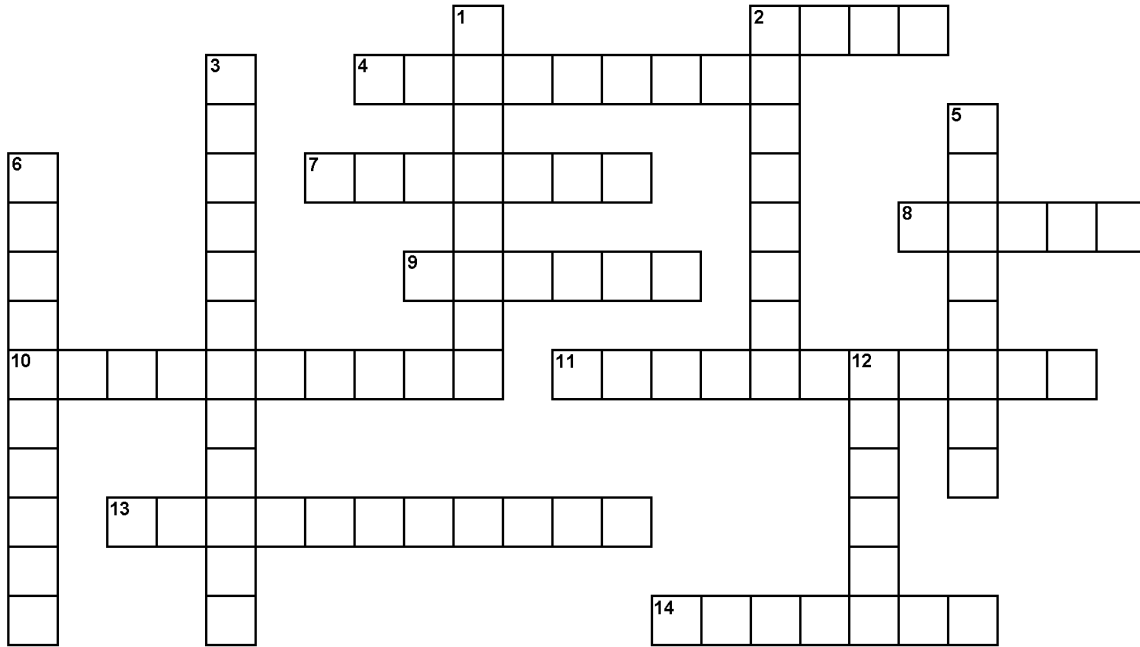
The *Drosophila* genes for white eyes, red eyes, and miniature wings are located on the same chromosome. The table shows how often these genes are separated by crossing-over.

Genes	% Cross-over or Map Units Apart	
red eyes and miniature wings	3%	3
white eyes and red eyes	30%	30
white eyes and miniature wings	33%	33



VOCABULARY - CHAPTER 11

The crossword puzzle is a simple way to master some of the more important vocabulary terms in this chapter.



Across

- 2. a segment of DNA that controls a particular hereditary trait
- 4. the physical outward appearance of an organism
- 7. the P generation stands for the individuals called _____ who begin a genetics cross
- 8. a characteristic
- 9. the children of the P generation are called the first _____ generation
- 10. having two identical genes for a trait
- 11. first law of genetics; the separation of a single pair of homologous chromosomes during meiosis
- 13. the chance of an event occurring
- 14. a _____ square is used to predict the offspring in a genetic cross

Down

- 1. the study of how traits are passed from generation to generation
- 2. the genetic makeup of an organism
- 3. an organism having two different alleles for a trait
- 5. the transmission of characteristics from parents to offspring
- 6. a cross involving one pair of contrasting traits
- 12. an alternate expression for a gene

The following term is **not** used in this chapter but is found in this puzzle. Use a reference source and look up its meaning so you can complete this vocabulary puzzle. **monohybrid**.