SECTION 12-1 REVIEW

CHROMOSOMES AND INHERITANCE

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

1. sex chromosome, autosome

2. germ-cell mutation, somatic-cell mutation

3. translocation, nondisjunction

4. deletion, inversion

5. substitution, frameshift mutation

MULTIPLE CHOICE  Write the correct letter in the blank.

1. Genes that belong to the same linkage group tend to be
   a. located on different chromosomes.  
   b. inherited together.  
   c. found only in males.  
   d. found only in somatic cells.

2. Two genes that are one map unit 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.

3. Mutations that can be inherited arise in
   a. somatic cells.  
   b. body cells.  
   c. germ cells.  
   d. skin cells.

4. Which of the following sequences could result from an inversion of the sequence GAGCATT?
   a. GAGCATT  
   b. GTGACATT  
   c. CTCTGATT  
   d. GATACAGT

5. Which of the following is a point mutation that does not produce a frameshift?
   a. substitution  
   b. insertion  
   c. deletion  
   d. inversion
SHORT ANSWER Answer the questions in the space provided.

1. In humans and fruit flies, which parent determines the sex of the offspring? Explain why. 

2. How did Morgan determine that red-eye color in *Drosophila* is an X-linked trait? 

3. Explain why traits that are controlled by genes on the same chromosome do not always appear in the expected ratio in offspring. 

4. **Critical Thinking** Would a frameshift mutation have a more serious effect if it occurred near the beginning of a gene or the end of a gene? Explain your answer. 

STRUCTURES AND FUNCTIONS Use the data in the table below to indicate the position of these genes on the chromosome map shown below. Assuming that the gene for white eyes has a chromosome map unit number of 1, write the map unit numbers above each gene's position on the chromosome map.

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

<table>
<thead>
<tr>
<th>Genes</th>
<th>Frequency of crossing-over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vermilion eyes and miniature wings</td>
<td>3%</td>
</tr>
<tr>
<td>White eyes and vermilion eyes</td>
<td>30%</td>
</tr>
<tr>
<td>White eyes and miniature wings</td>
<td>33%</td>
</tr>
</tbody>
</table>

![Chromosome map diagram]
VOCABULARY REVIEW Name a trait or genetic disorder that is caused by each of the following patterns of inheritance.

1. polygenic inheritance  
2. multiple alleles  
3. autosomal dominant  
4. sex-influenced trait  
5. incomplete dominance

MULTIPLE CHOICE Write the correct letter in the blank.

1. Which individual(s) in the pedigree shown below must be a carrier?
   a. 1 only  
   b. 4 only  
   c. 3 only  
   d. both 1 and 4

2. Since the ABO blood group alleles are codominant, an individual with the genotype $I^A I^B$ will have blood type
   a. A.  
   b. B.  
   c. AB.  
   d. O.

3. Which of the following human traits is not a polygenic trait?
   a. skin color  
   b. eye color  
   c. height  
   d. ABO blood type

4. A trait whose expression is affected by the presence of sex hormones is said to be
   a. sex-influenced.  
   b. sex-linked.  
   c. X-linked.  
   d. Y-linked.

5. In humans, PKU can be treated by
   a. insulin injections.  
   b. diet.  
   c. gene therapy.  
   d. surgery.
SHORT ANSWER. Answer the questions in the space provided.

1. Why is pattern baldness more common in men than in women?

2. Briefly describe how amniocentesis and chorionic villi sampling are used in genetic screening.

3. Explain the difference between a sex-linked trait and a sex-influenced trait.

4. Critical Thinking A couple has four children, and each child has a different ABO blood type. What are the blood types and genotypes of the children and the parents?

STRUCTURES AND FUNCTIONS In the two pedigrees below, indicate all possible offspring in generation II by correctly filling in the male and female symbols for generation II. Use a completely filled symbol to represent an individual who displays the trait and a half-filled symbol to represent a carrier.
Inheritance Patterns and Human Genetics

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

____ 1. When several genes influence a trait, the trait is said to be
   a. polygenic.        c. codominant.
   b. incompletely dominant.  d. completely dominant.

____ 2. Which of the following genetic disorders is caused by an autosomal dominant allele?
   a. sickle cell anemia  c. hemophilia
   b. Huntington's disease d. Tay-Sachs disease

____ 3. The sex of an offspring is determined by the
   a. mother only.  c. offspring only.
   b. both mother and father.  d. father only.

____ 4. Which type of mutation is likely to cause the least harm in an individual?
   a. frameshift mutation  c. substitution
   b. deletion  d. addition

In the space provided, write the letter of the description that best matches the term or phrase.

____ 5. sickle cell anemia
   a. determine the different ABO blood types
   b. caused by a mutated allele that causes red blood cells to change shape
   c. caused by a dominant allele located on an autosome
   d. changes in DNA that can cause genetic disorders
   e. informing people about genetic problems they or their offspring might have
   f. replacing defective genes with copies of healthy genes, using gene technology

____ 6. breast cancer

____ 7. gene therapy

____ 8. genetic counseling

____ 9. mutation

____ 10. multiple alleles