Section 12–4 Mutations (pages 307–308)

This section describes and compares gene mutations and chromosomal mutations.

Introduction (page 307)
1. What are mutations? Mutations are changes in the DNA sequence that affect genetic information.

2. Is the following sentence true or false? Chromosomal mutations result from changes in a single gene. ________false________

Kinds of Mutations (pages 307–308)
3. Mutations that occur at a single point in the DNA sequence are ________point________ mutations.

4. A mutation involving the insertion or deletion of a nucleotide is a(an) ________frameshift________ mutation.

5. Complete the compare-and-contrast table of types of chromosomal mutations.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deletion</td>
<td>The loss of all or part of a chromosome</td>
<td>ABC•DEF → AC•DEF</td>
</tr>
<tr>
<td>Duplication</td>
<td>A segment of a chromosome is repeated</td>
<td>ABC•DEF → ABBC•DEF</td>
</tr>
<tr>
<td>Inversion</td>
<td>Part of a chromosome becomes oriented in the reverse of its usual direction</td>
<td>ABC•DEF → AED•CBF</td>
</tr>
</tbody>
</table>
| Translocation | Part of one chromosome breaks off and attaches to another chromosome | ABC•DEF → ABC•JKL  
                                          | GH•IJKL → GH•IDEF |
6. Circle the letter of each sentence that is true about gene mutations.
   a. Point mutations affect just one nucleotide.
   b. The substitution of one nucleotide for another in the gene never affects the function of the protein.
   c. Point mutations that involve the insertion or deletion of a nucleotide change the reading frame of the genetic message.
   d. Frameshift mutations affect every amino acid that follows the point of the mutation.

Significance of Mutations (page 308)

7. Mutations that cause dramatic changes in protein structure are often ____________.
8. Mutations are a source of ____________ in a species.
9. What is polyploidy? Polyploidy is a condition in which an organism has extra sets of ____________.