UNIT 2: GENETICS
Chapter 7: Extending Mendelian Genetics

I. Chromosomes and Phenotype (7.1)

A. ______ copies of each autosomal gene affect phenotype

1. Most human traits are result of ____________ genes

2. Many human genetic _____________ also caused by autosomal genes
   a. Chance of having disorder can be ____________
   b. Use same principles as ____________ did

B. Disorders Caused by ____________ Alleles

1. Some disorders caused by recessive alleles on autosomes

2. Must have ______ copies of ______________ allele to have disorder
   a. Disorders often appear in offspring of parents who are ______________
   b. __________ __________- recessive disorder that affects sweat glands and mucus glands.

3. A person who is heterozygous for disease is called a ______________- does not show disease symptoms

C. Disorders Caused by Dominant Alleles

1. Less _____________ than recessive disorders
2. Huntington’s Disease - damages nervous system and usually appears during adulthood.
   a. 75% chance if both parents ________________
   b. Since disease strikes later in life, person can have children before disease appears. Allele is passed on even though disease is __________

E. Males and Females can differ in ______-linked traits

1. Mendel figured out much about heredity, but did not know about _____________________
   a. Mendel only studied ______________ traits
   b. Expression of genes on sex chromosomes __________ from autosomal genes

2. Sex-linked Genes
   a. Genes located on sex-chromosomes called ______-________ genes
   b. Many species have specialized sex __________________

      1). In mammals and some other animals, individuals with XX are __________ and XY are ______
      2). X chromosome much __________ than Y

3. Expression of Sex-Linked Genes
   a. Males only have ______ copy of each chromosome (____)

   1). Express all __________ on each chromosome

   2). No second copy of another allele to mask effects of another allele (all recessive alleles ________________)
b. In each cell of female, one of two X-chromosome is randomly “__________ off”

1). Called X Chromosome ______________

2). Creates patchwork of two types of cells

II. Complex Patterns of Inheritance (7.2)

A. Phenotypes can depend on interactions of ____________

1. Many traits are result from alleles with range of dominance, rather than a strict ______________ and ______________ relationship

2. In many cases, phenotypes result from multiple ______

B. Incomplete Dominance

1. __________ allele completely dominant

2. Heterozygous phenotype somewhere between homozygous phenotypes (“______________ ”)

C. Codominance

1. Both traits are expressed ____________

2. Can sometimes look like “blending” of traits, but actually show ____________ of both

3. Human ________ type is example of codominance

   a. Also has _____ different alleles- trait also considered a ____________ -__________ trait

   b. When alleles are neither dominant of recessive (in both incomplete and codominance) use __________ case letters with either subscripts or superscripts

<table>
<thead>
<tr>
<th>PHENOTYPE (BLOOD TYPE)</th>
<th>GENOTYPES</th>
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<tbody>
<tr>
<td>A</td>
<td>A\textsuperscript{A} or A\textsuperscript{i}</td>
</tr>
<tr>
<td>B</td>
<td>B\textsuperscript{i} or B\textsuperscript{i}</td>
</tr>
<tr>
<td>AB</td>
<td>A\textsuperscript{i}B\textsuperscript{i}</td>
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D. Many genes may interact to produce one _________

1. __________ traits- two or more genes determine trait
   a. ________ color result of four genes that interact to produce range of colors
   b. Human eye color shows at least ____ genes (hypothesize that are still genes undiscovered as well)

2. Epistasis- when one gene ________________ all of the others. ___________ is caused by this type of gene

3. The ________________ interacts with genotype
   a. _________________ is more than sum of gene expression
   b. Sex of sea turtles depends on genes and environment. _________________ when eggs develop determine sex
   c. Human traits also affected by environment (__________ and ________ care)

III. Gene Linkage and Mapping (7.3)

A. Gene linkage was explained through _______ _________

   1. Thomas Hunt Morgan worked with fruit flies (_______________ melanogaster)

   2. Some traits seemed to be inherited together. Morgan called them __________ traits. (found on ________ chromosome)

   3. Morgan concluded that because linked genes were not inherited together every time that chromosomes must exchange homologous genes during ________ (crossing over)

B. Linkage maps estimate _____________ between genes

   1. Closer together- more ________ inherited together

   2. Further apart- more likely will be ______________ during ____________.
IV. Human Genetics and Pedigrees (7.4)

A. Human genetics follows the patterns seen in other organisms

1. Meiosis __________ assorts chromosomes when gametes are made for sexual reproduction

3. Human heredity involves same relationships between alleles (dominant/recessive, polygenic, sex-linked, etc)

B. Inheritance of some traits very _________

1. Multiple genes and alleles can _________

2. ________-gene traits can still be observed
   a. Many examples of single-gene traits (hairline-
      ________ ________)
   b. Many genetic __________ also caused by single-gene traits (Huntington’s disease, hemophilia, Duchenne’s muscular dystrophy)
   c. Much of what is known about human genetics comes from studying __________ __________

C. Females can carry a sex-linked genetic disorder

1. Both male and females can be carriers of ____________ disorders

2. Only females can be carriers of ___-linked disorders

3. Many genetic disorders carried on ___-chromosome
   a. Male who has gene for disorder on X-chromosome will have _________
   b. Males more __________ to have this disorder

D. A ____________ is a chart for tracing genes in a family

1. Phenotypes are used to infer ____________ on a pedigree

2. Autosomal genes show different ____________ on a pedigree than sex-linked genes.
a. **Autosomal genes**

<table>
<thead>
<tr>
<th>Parental generation</th>
<th>F₁ generation</th>
<th>F₂ generation</th>
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<tbody>
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<td><img src="image2" alt="Diagram" /></td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**E. Several methods help map human chromosomes**

1. Human _____________ so large difficult to map

2. Several methods used

   a. **Pedigrees** used for studying genetics in a _____________

   b. **Karyotypes**- _____________ of all chromosomes in a cell

      1). _____________ used to produce patterns of bands

      2). Used to identify certain genetic disorders in which there are extra or too few _____________ (i.e. Down syndrome)