Pedigrees:

Genetic Family History

Pedigree 8. X-linked recessive inheritance.
- Women are represented with a _______.
- Men are represented with a ____________.
- Affected individuals are ________________ (individuals who express the trait).

If this is you who are
The other individuals, A, B, C, D?
Pedigree for attached ear lobes (shaded in).

- From the pedigree, can you tell if attached ear lobes is dominant or recessive? Explain.
- If so, label the genotypes for all individuals. For unknown genotypes, write the allele you do know and a question mark for the other allele.
What is the genotype of II-3?
What is the genotype of II-5?
What is the genotype of III-7?
Can’t always determine the genotype of an individual with the ________________ trait.
(In many cases could be homozygous dominant or heterozygous)

Must be heterozygous if:
Has a child with the ________________trait.
Has a parent with the ________________ trait.
Genetics: Beyond Mendel: Non-Mendelian Genetics

- Snapdragons
Incomplete Dominance:

- Neither ________ is dominant.
- “_________” of both alleles occurs to create a new ____________ for the heterozygous genotype.

Incomplete=In-between

Example: If snapdragons have a red flower allele and a white allele, flowers are ____________.
Representing Incomplete Dominance

• Since neither allele is dominant, alleles with incomplete dominance are often represented as a ______________ above a letter representing the ______________.

• Example: Red color – ______
  White color – ______

• Each Phenotype has a unique Genotype:
  • Red-_______, White-_______, Pink- _______
Incomplete Dominance Practice

Determine the phenotypic frequencies by completing a Punnett square for the following crosses in snapdragons:

1) Red X White

2) Red X Pink
Codominance

Both alleles are ________________ in a ________________, _________ “blended”.

Example: Roan cattle with mixed _______ and ________ hairs are heterozygotes for red and white hair color alleles.
Representing Codominance

As with incomplete dominance, codominance is represented with a _________________.
Example: red _____, white _____

Difference between incomplete dominance and codominance:
Incomplete dominance = ____________
(red + white = ______)
Codominance = both alleles are ____________
(red cow + white cow = cow with ________________)
Applying the Concepts

Which produces the greatest number of roan ($C^RC^W$) offspring?

Roan x Roan (_______ X _______)

OR

Red x White (_______ X _______)


Codominant Practice

In some chickens, feather color is codominant.
Black crossed with White = _____________________
Alleles: ____, ______

Determine the phenotypic frequencies for:
Checkered X Black
________  X  ________

Phenotypic frequency:
Multiple Alleles

For some traits, more than two possible _________ exist for a __________ gene. Although more than two alleles exist in the population, each individual still only has ______ alleles to determine the trait.

Example: 3 Blood Type Alleles

____,_____, _____

• “____” and “____” are codominant
  “____” acts ______

• The “I” stands for “isoagglutinogen”- an antigen on red blood cells. Blood being “+” or “-” is determined by a different antigen, an Rh factor, being present or not.
___________ are specifically shaped ____________ on the outside of cells used by your white blood cells to determine your cells from ______________.  

The ABO blood type gene codes for two different types of antigens- _______ and _______ antigens.
<table>
<thead>
<tr>
<th>Blood Type (Phenotype)</th>
<th>What antigens are present on the outside of the cells</th>
<th>Possible Genotype(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Paternity Tests

A mother has blood type A, and her child has blood type O. Can a man with blood type B be the father?

A mother has blood type B and her child has blood type O. Can a man with blood type AB be the father?
Write genotypes. Could the last child be from the father?
Gender Determination

• In humans, the 23\textsuperscript{rd} pair of chromosomes (_______) are the sex chromosomes which determine the gender.

Men are _______

• (X and Y are the only nonhomologous pair-which means that the pair does not contain the same type of _______.)

• Woman are _______

• The other 22 pairs of chromosomes are called __________________________ chromosomes.
Sex Linked Traits

• Traits for which the gene is found on the ______ chromosome or the_______chromosome.

• Very little information is on the Y chromosome so most sex-linked traits are carried on the ________.

• Since men are XY, they have only __________________of sex-linked genes, either on the _____ or _______.

Examples:
  - Red-Green Colorblindness (____)
  - Hemophilia (____)
Colorblind Test

Ishihara Test For Color Blindness

What People With Regular Vision See

What Red-Green Color Blind People See
Can it be determined from this pedigree if the non tasters for PTC tasting gene is recessive sex-linked or autosomal?

For a recessive sex-linked trait, females can only inherit __________ trait if father exhibits_________.

For a sex-linked trait, if female has __________ trait, all __________ must exhibit trait.
Colorblindness is caused by a recessive allele on the X chromosome ($X^b$).

For males, they have only 1 allele ($X^b$ or $X^B$).

If a colorblind woman ($X^bX^b$) marries a man with normal vision ($X^BY$), what is the probability of a daughter being colorblind? A son being colorblind?
Inheritance of Sex-Linked Traits

- A male can inherit colorblindness if his _________ is a carrier of colorblindness.
  (Doesn’t matter father’s color vision, because males inherits_______from dad).

- A female must inherit the colorblindness allele from both parents.
  - Mother must be at least a ________________.
  - Father must be ________________.
Polygenic Traits

Traits that are controlled by _____________ genes.

Examples:
Human Height
Skin Color

Traits exhibit a greater range of __________ due to having many __________ determine the trait.
• Is the trait that is followed (shaded trait) dominant or recessive or can you not tell from the pedigree? Use the letter “T” to write the genotypes if you can.
Write genotypes.
Could the last child be from the father?