**CHAPTER 11: COMPLEX INHERITANCE and HUMAN HEREDITY FINAL EXAM REVIEW 2012**

**\**ALL OF THE QUESTIIONS SHOULD BE ANSWERED AS A TYPE II.***

**SECTION 1: Basic Patterns of Human Inheritance**

1. Compare and Contrast recessive and dominant genetic disorders. **BE SURE TO USE TO FOLLOWING TERMS and UNDERLINE THEM WHEN USED: homozygous dominant, homozygous recessive, heterozygous, carrier, genotype, phenotype, and include examples of both.**
2. Describe a pedigree and how one is interpreted. **BE SURE TO USE TO FOLLOWING TERMS and UNDERLINE THEM WHEN USED: male, female, carrier, generations, roman numerals, Arabic numerals, circle, square, filled/shaded, unfilled/unshaded, half shaded, and birth order.**
3. In viewing a pedigree how can you determine if the disorder is a dominant or recessive disorder? **BE SURE TO USE TO FOLLOWING TERMS and UNDERLINE THEM WHEN USED: carrier, genotype, phenotype, dominant, recessive, and allele. USE FIGURE 2 (P.299) AND FIGURE 3 (P. 300) TO HELP LEAD YOUR ANSWER.**

**Section 2: Complex Patterns of Inheritance**

1. Explain the difference between incomplete dominance and complete dominance. Give an example of each with the help of a Punnett Square. **BE SURE TO USE TO FOLLOWING TERMS and UNDERLINE THEM WHEN USED: heterozygous, genotype, phenotype, allele(s), expressed.**
2. Describe how blood type Punnett squares are example of multiple alleles and codominance. **BE SURE TO USE TO FOLLOWING TERMS and UNDERLINE THEM WHEN USED: Type A, Type B, Type AB, Type O, heterozygous, homozygous, dominant, recessive.**
3. Using a Punnett Square explain why men are more likely to be affected by sex linked traits. **BE SURE TO USE TO FOLLOWING TERMS and UNDERLINE THEM WHEN USED: hemizygous, X chromosome, Y chromosome, male, female, masked, gametes, and hemophilia.**

**Section 3: Chromosome and Human Heredity**

1. Describe what a karyotype is used for by genetic counselors. **BE SURE TO USE TO FOLLOWING TERMS and UNDERLINE THEM WHEN USED: autosomes, sex chromosomes, telomeres, DNA, Proteins, and homologous chromosomes.**
2. Describe nondisjunction in detail. **BE SURE TO USE TO FOLLOWING TERMS and UNDERLINE THEM WHEN USED: trisomy, monosomy, chromatids, cell division, meiosis, autosome, sec chromosome, and chromosome.**

**PRACTICE PROBLEMS**

1. In humans, the allele that produces Marfan’s syndrome is **dominant** to the allele that produces normal fibrillin. It is located on an **autosome.** People with Marfan’s syndrome are tall, long-limbed, loose-jointed, have dislocated eye lenses, and weak aortic walls. Please use the letter **M/m** when describing genotype.
   1. What is/are the **genotype(s)** of people with Marfan’s syndrome?
   2. What is/are the **genotype(s)** of people without it?
   3. What is the **phenotype** of a homozygous dominant man?
   4. What is the **phenotype** of a heterozygous woman?

\*\*\*If the man and the woman in questions c and d got married…

* 1. What is the chance their child will be born with Marfan’s syndrome?
  2. What is the chance their child will be born without it?

1. In humans, the gene for hemoglobin exhibits **codominance** – both the allele that produces normal hemoglobin and the allele that produces abnormal hemoglobin are equally dominant. It is located on an **autosome**. The red blood cells of a person with normal hemoglobin are round; those of a person with abnormal hemoglobin are sickle-shaped.
   1. What is the **phenotype** of the children of a man with round blood cells and a woman with sickle-shaped red blood cells?

\*\*\*If one of these children (in the previous question) married a person with round red blood cells…

* 1. What is the chance their child will be born with ONLY round red blood cells.

1. In humans, there are 3 alleles (IA , IB and i) that produce 4 different blood types (A, B, AB and O)
   1. What is the phenotype of a man who has the alleles IA and i ?
   2. What is the phenotype of a woman who inherited an i allele from her mother and an IB allele from her father?

\*\*\*If the man and the woman in questions a and b got married…

* 1. What is the chance their child will be born with blood type AB?
  2. What is the chance their child will be born homozygous for blood type B?

1. In humans, the allele that produces Icthyosis simplex (scaly skin) is **recessive** to the allele that produces normal muscle. It is located on the **X chromosome**. Please use the letter **I/i** when describing genotype.
   1. What is/are the **genotype(s)** of **males** with Icthyosis simplex?
   2. What is/are the **genotype(s)** of **females** without it?
   3. What is the phenotype of a woman who is a carrier?
   4. What is the phenotype of a man who is hemizygous recessive?

\*\*\*If the man and the woman in questions c and d got married…

* 1. What is the chance their **child** will be born with Icthyosis simplex?
  2. What is the chance their **son** will be born without it?

1. Pseudohypertrophic muscular dystrophy is a disorder that causes gradual deterioration of the muscles. It is seen only in boys born to normal parents and results in death in the early teens. It is obviously caused by a **sex-linked recessive** allele. Tom and Amanda have three children, Sarah, John, and Joel, after they graduate from medical school. Sarah and Joel are normal, but Tom has the disorder. Sarah marries Steve, a lawyer, while she is attending law school and they have four children – James, Jeff, Rachel, and Marissa. Jeff has the disorder, but the other three are normal. Marissa marries a teacher named Will, whom she met while teaching at the same school. They have a son, Nick, who has the disorder.
   1. Construct a pedigree for the above family
   2. Give the NAME each person who has Pseudohypertrophic muscular dystrophy
   3. give the NAME of each person who IS DEFINITELY a carrier
   4. give the NAME of each person whose genotype cannot be determined from this information
   5. If Rachel marries Jake, her Dad’s college roommate– what are the chances they will have a child with the disorder?