Bio I
EOC Review #4: Mendelian Genetics, Human Genetics, and Special Crosses

Mendelian Genetics

1. Who is the father of genetics? (pg. 253)
2. In Mendel's studies, he examined three generations of the pea plant: the P, F_1 and F_2 generation. What is the difference between each of these generations? (pg. 254)
3. In cross-pollinating a purebred purple flower with a purebred white flower, Mendel found that the white characteristic disappeared in the F_1 generation and reappeared in the F_2 generation. Explain these results using the following terms: Law of Dominance, dominant and recessive. (pg. 256)
4. Explain the Law of Segregation (pg. 257)
5. What is the difference between the following words: homozygous/heterozygous and genotype/phenotype? (pg. 258)
6. Mendel performed another set of crosses in which he used peas that differed from each other in two traits rather than only one. What type of crosses are these? (pg. 261)
7. Explain how the Law of Independent Assortment relates to the crosses above? (pg. 260)
8. When crossing two heterozygous individuals in a dihybrid cross, what will ALWAYS be the phenotypic ratio? (pg. 261)
9. How many different gametes can a RRYy parent form? What are they?
10. In sheep, white (B) is dominant to black (b). Give the F_2 phenotypic and genotypic ratios resulting from the cross of a pure-breeding white ram with a pure-breeding black ewe.
11. Flat tail (F) is dominant to fuzzy tail (f), and toothed (T) is dominant to toothless (t). Give the results of a cross between two completely heterozygous parents.
12. If a pure breeding green skinned aardvark mates with a pure breeding yellow skinned aardvark, what will the expected genotypic and phenotypic ratios of their progeny be? (G = green skin and g = yellow skin)
13. If two heterozygous for skin color and teeth mate, what will be the phenotypic ratio of their progeny? (G = green skin, g = yellow skin, T = sharp teeth, and t = no teeth)

- pg. 279 – End-of-Course Test Practice #20-24 (ANSWERS: c,d,a,b,d)

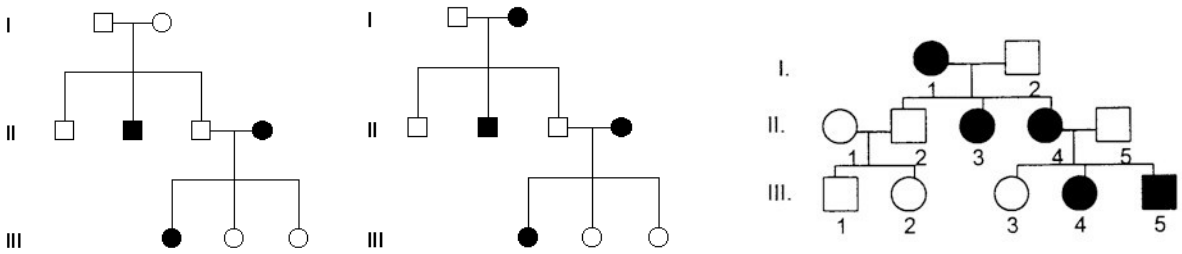
Complex Patterns of Inheritance/Genetic Disorders/Mutations

1. Explain incomplete dominance. (pg. 315)
2. If a yellow guinea pig is crossed with a white one, the offspring are cream-colored. What kinds of offspring are expected if two cream-colored guinea pigs mate?
3. Explain codominance. (pg. 316)
4. What is the difference between incomplete dominance and codominance?
5. In cattle, coat color is controlled by incompletely dominant genes RR for red, rr for white, and Rr for roan (red and white). If two roan cattle are mated, what kinds of offspring are expected?
6. Explain multiple alleles. (pg. 317)
7. Fill in the chart with the appropriate information pertaining to blood types: (pg. 325)

Blood Types	Genotypes
A	
B	
AB	
O	

8. Blood types can provide examples of multiple alleles and codominance. Explain.
9. A man is accused of fathering two children, one with type O blood and another with type A blood. The mother of the children has type B blood. The man has type AB blood. Could he be the father of one or both children? Explain your answer.
10. What is the difference between autosomes and sex chromosomes? How many autosomes and sex chromosomes do humans possess? (pg. 318)
11. Explain the sex chromosomes for both males and females. (pg. 318)
12. Explain sex-linked inheritance. Who was responsible for discovering this pattern of inheritance? (pg. 318)
13. In humans, colorblindness is the result of a recessive trait. Cross a female that is heterozygous for colorblindness with a male that is colorblind. What are the chances that this couple has an affected son and an affected daughter?
14. Most genetic disorders are caused by recessive alleles. Briefly explain some examples of these types of disorders? (pg. 311)
15. Cystic fibrosis is a disorder that causes thick mucus resulting in difficulty in breathing and often death for those affected. A phenotypically normal couple has three children. Two of those children have cystic fibrosis. What is the genotype of the parents? If the parents have another child what chance does it have of being born with this disorder?

16. Some genetic disorders are caused by dominant alleles. Briefly explain some examples of these disorders? (pg. 313)
17. Polydactyly is a human characteristic in which a person has extra digits (fingers and toes) on his or her hands or feet. The trait for polydactyly is dominant over the trait for five digits on the hands and/or feet. Suppose a man who is heterozygous for this trait marries a woman with the normal number of digits. What are the possible genotypes of their offspring?
18. A young man with normal vision, whose mother was colorblind and whose father had normal vision is engaged to marry a young woman who has a colorblind mother and a normal vision father. What is the genotype of the young man? Of his fiancé? If they marry and have a family, what are the chances of having the following: a normal vision daughter? A colorblind son? A colorblind daughter? A normal vision son?
19. In northeast Kansas there is a creature known as a wildcat. It comes in three colors: blue, red, and purple. A homozygous dominant individual is blue, a homozygous recessive individual is red, and a heterozygous individual is purple. What would be the genotypes and phenotypes of the offspring if a blue wildcat were crossed with a red one?
20. Parents with blood types B and A bring home a baby that has type O blood. They are convinced that their baby was switched at the hospital. Based on the blood type information of the three individuals, could this baby be theirs? Explain.
21. What is the difference between a point mutation and a frameshift mutation? (pg. 298)
22. How is a chromosomal mutation different from the mutations discussed above? What are some examples of chromosomal mutations? (pg. 299)
23. Examine the pedigrees below. Determine the type of inheritance being portrayed in each: (pg. 309)



24. What is a karyotype? (pg. 329) What type of disorders can be detected?
25. Examine the karyotype below. Identify the disorder detected.

26. What is a test cross?
27. Your pet guinea pig has black hair. This trait is dominant and can be represented by a B allele. Your neighbor has a white guinea pig. This trait is recessive and can be represented by a b allele. You want to breed the two guinea pigs but want all offspring from the mating to be black. You are not sure, however, of the genotype of your black guinea pig and want to find out before starting the breeding program. What may be the possible genotypes of your black guinea pig? What is the genotype of the white guinea pig? Use Punnett squares to show your work.

- If you would like more practice with the genetic problems, I will be more than happy to provide you with additional problems.
- pg. 334 - Understanding Main Concepts #6-12 (ANSWERS: a,b,d,c,b,d,b)
- pg. 335 – End-of-Course Test Practice #20-25 (ANSWERS: a,b,b,d,a,a)