

**Genetics Test Review: Work must be done on another sheet of paper for credit!**

1. Compare meiosis and mitosis.
2. The ability to roll your tongue (R) is dominant over not being able to roll it. Explain the following, giving the genotype of each individual. Diagram a pedigree to represent each situation below.
  - a) a child cannot roll his tongue, his mother can and his father cannot
  - b) both parents can roll their tongue, but a child cannot
  - c) a child can roll his tongue, his mother cannot, but his father can
3. Explain Mendel's Law of Segregation and the Law of Independent Assortment. Explain Mendel's experiment and what he found.
4. What is the p53 gene?
5. Explain phenotype and genotype. Give an example of each.

Use the following key to answer problems 6 - 8:

**D = curly fur**                      **E = speckly fur**  
**d = straight fur**                      **e = solid color fur**

6. What is the genotype of a guinea pig with:
  - a) curly speckly fur?
  - b) curly solid colored fur?
  - c) straight solid colored fur?
7. What is the ratio of the phenotypes of the F1 generation for a cross between a heterozygous curly fur and homozygous recessive fur color with homozygous recessive for both traits?
8. What are the gamete possibilities for:
  - a) heterozygous for both traits?
  - b) homozygous dominant for curliness and heterozygous for fur color?
  - c) homozygous recessive for both traits
9. What is the relationship between genes, DNA, and chromosomes?
10. What is DNA? What is its purpose? What is DNA composed of?
11. What is a nucleotide? What is its subunit of?
12. Compare DNA and RNA.
13. Compare/Contrast *Transcription* and *Translation*.
14. Why do cells divide instead of continuing to grow larger?
15. What determines an individual's gender? What is the probability of having a female offspring?
16. What is a mutation? Identify the three main types of mutation. What kind of mutation causes diseases like Trisomy 18, when chromosomes fail to separate in meiosis?
17. Identify and explain the four variations of inheritance covered in class. Give an example of each.
18. What is a karyotype? How are the chromosomes arranged? Of what benefit is it?
19. When the dominant and recessive traits are known, why is it not necessary to use the term homozygous when referring to the genotype of an individual with a recessive phenotype?
20. Colorblindness is rare among females. Explain.

21. Explain the importance of *DNA replication*. When does it occur?
22. Two black female mice are crossed with the same brown male mouse. Based on the information shown in the table below, answer the following questions:
- What are the genotypes of each parent?
  - Which trait is dominant?
  - Is the dominance of the trait in (b) completely dominant, incompletely dominant, or codominant? Explain your answer.

Parents	F1 generation
female A x male A	9 black, 7 brown
female B x male A	14 black, 0 brown

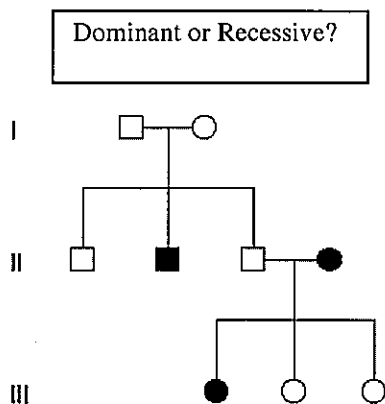
23. Identify the parts of the cell cycle and the key outcome of each.
24. What is the significance of crossing over? When does it occur?
25. A segment of DNA has the following sequence:

$\begin{matrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ \text{AAC TAC GGT CTC AGC ACT CCC.} \end{matrix}$

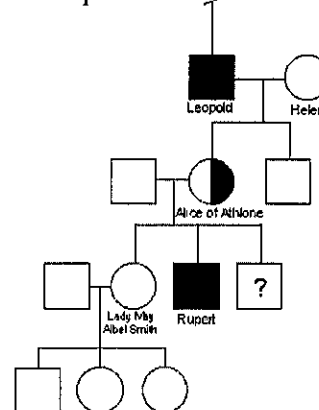
- Write the DNA complementary base pairs
- Write the mRNA sequence that would be formed from the **original** DNA strand
- Find the amino acid sequence from the mRNA strand
- In codon #3, if the 1<sup>st</sup> "G" was changed to a "C", what affect would that have on the amino acid sequence?
- In codon #5, if the middle "g" was deleted and every nitrogen base from that point shifted up one space, what affect would that have on the amino acid sequence?

- For 26 and 27:
- Properly label each generation.
  - Label the genotype of each individual when possible.

26.



27. Hemophilia: Sex-Linked Trait



28. In mice, the ability to run normally is a dominant trait. Mice with this trait are called running mice (R). The recessive trait causes mice to run in circles only. Mice with this trait are called waltzing mice (r). Hair color is also inherited in mice. Black hair (B) is dominant over brown hair (b). For the following problem:
- a. **Cross a heterozygous running heterozygous black mouse with a homozygous running, homozygous black mouse.**

- Write the parent cross
- Complete a Punnett Square
- Find the phenotype ratio