**Unit 3: Genetics Study Guide**

**SB2a (DNA & RNA)**

1. What is the sequence (order) of monomers called in a DNA molecule that determines the proteins to be produced?
2. What shape is the DNA molecule? Name the parts that make up the sides and steps.
3. Why is DNA so important to living things?
4. What are the 3 parts of the monomer that makes up nucleic acids?
5. Name the 4 nitrogenous bases that make up DNA and write the complimentary pair for each.
6. Which of the following is the process whereby genes from one organism are cut out and placed into the genome of another organism?
7. What types of genetic code can be found in RNA? What bases are found in RNA?
8. Name and describe the 3 types of RNA.
9. What type of RNA acts like a delivery truck, delivers amino acids to the ribosome for protein synthesis, and then leaves empty again, to go collect another amino acid?
10. What are the characteristics of RNA?
11. How are DNA & RNA different? DRAW a DNA and RNA molecule and LABEL the differences and similarities.
12. What base is found in RNA but not in DNA?

SB2b (Transcription, Translation, DNA Replication):

1. What chromosomes determine the sex of a child and which parent passes on the gender to the child?
2. What is the structure and function of a chromosome? DRAW and label the parts.
3. What happens when there is a simple change in a cell’s DNA? What is this called and how does it cause changes in organisms?
4. How are traits passed on from parents to offspring? Where is the genetic information found?
5. What is the segment or part of the DNA molecule that is responsible for the inheritance of a trait called?
6. Where is DNA found in a eukaryotic cell?
7. Name and describe the 4 steps of DNA Replication.
8. What is responsible for unwinding and unzipping the DNA molecule?
9. Why does DNA have to be replicated?
10. Name and describe the 2 steps of Protein Synthesis. Where does each step take place?
11. Describe the roles of mRNA and tRNA in the process of protein synthesis.

SB2c (Mendelian Genetics):

1. If two heterozygous plants are crossed, what is the probability that the offspring will be short? Draw a Punnett square and give the genotypic and phenotypic ratios.
2. What is Mendel’s law of segregation?
3. What is the process of alleles being passed down to offspring from its mother and father? What process creates the gametes that allows parents to pass on these alleles?
4. Complete the following dihybrid cross. One dog who has white (b) fur and a short (t) tail and the other parent who was homozygous black(B) fur with a heterozygous long(T) tail.

SB2d (Mutations, Genetics Disorders):

1. How does Turner’s syndrome and other genetic disorders occur?
2. What are the circumstances that can produce a new combination of genetic traits in sperm and eggs? HINT: What causes changes in DNA and genetic variation?
3. What are the different chromosomal mutations?
4. How do mutations cause changes in organisms?
5. Are all mutations bad? Explain why or why not.
6. How are mutations passed from parent to offspring?
7. What are the effects of a point mutation in the mRNA sequence?
8. What types of changes do transcription and translation errors cause in organisms?

SB2e (Meiosis):

1. Compare the number of chromosomes in a body cell to those in a sex cell.
2. If the organism has 12 chromosomes, what is its diploid number?
3. What are the advantages to meiosis?
4. What are the differences between mitosis and meiosis?
5. What is the goal of meiosis?
6. What are the disadvantages of asexual reproduction (mitosis)?
7. Which process accounts for species diversity?

SB2f (Genetic Technology):

1. What is gel electrophoresis used in?
2. What is DNA technology used for?
3. How can you read a graph and identify who matches a DNA sample given?
4. Explain how to read a pedigree.
5. Describe the process of cloning.
6. How is a DNA fingerprint made?