DNA Analysis Questions Name: _____

Directions: On a **separate sheet of paper**, answer the following 9 questions in the ***most*** detail you possibly can. ***The answer to each question should be more than one sentence and at least a minimum of one paragraph. This does not mean to stop after one paragraph. You may use your notes or any other worksheets Ms. Beels has provided for you.***

1. What is DNA? Why is DNA important? Be detailed.

2. Answer the following questions

    a. What is the monomer of DNA? Draw and label one.
    b. Draw and label a diagram of DNA. Be detailed.

3. Describe in detail the process of protein synthesis. Why is the process of making proteins important? (Be sure to include where each process takes place in the cell)

4. Sickle cell anemia is a genetic disorder that is the result of a change in the DNA code. Red blood cells are shaped like crescent moons instead of being spherical. Sickle shaped cells do not carry as much oxygen as normal red blood cells, resulting in low energy, anemic-like symptoms. They can also get caught on each other and within blood vessels creating blood clots.

    Study the chart below. Use the information to answer the questions.

	Normal Hemoglobin Gene	Sickle Cell Hemoglobin Gene
DNA Code	G G G C T T C T T T T T	G G G C A A C T T T T T
mRNA Transcript		
Order of Amino Acids		

    a. Fill in the chart above.
    b. What type of mutation causes the sickle cell trait? How do you know that it is this type of mutation? Explain in detail.

5. How can a mutation occur in a DNA sequence? What could this cause? Why can this be a potentially bad thing?

6. Are all mutations bad? Explain why or why not.

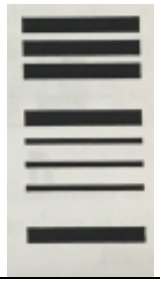
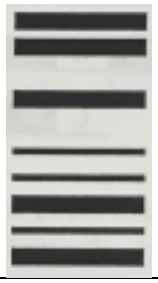
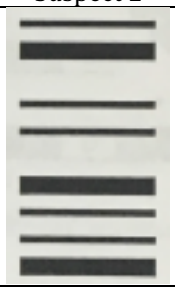
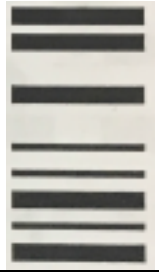
7. How can you tell the difference between DNA and RNA? What is the importance of DNA and RNA in protein synthesis?

8. Why is the shape of a protein important? What happens if the shape of the protein changes? Explain in detail.

There's More on the back!

9. Electrophoresis is a method used to identify organisms based on their unique genetic code. The process of electrophoresis uses restriction enzymes to cut up DNA sequences. Restriction enzymes recognize a specific sequence in the DNA pattern and when they find it, they cut the DNA in half. Once the DNA is digested, the resulting fragments are separated by size and a type of barcode or genetic fingerprint, results. Everyone's DNA contains several restriction enzyme sites but the sites are indifferent locations. Since the cut sites are different for each individual, the resulting fragments and barcode are also unique.

   DNA from a victim and several suspects was processed to form the genetic fingerprints below. If barcodes match, the DNA is that of the same person. Unlike DNA barcodes suggest that a second person's DNA is present. Use the fingerprints to answer the follow the following questions.

Victim	Skin Cells From Victims Fingernails	Suspect 1	Suspect 2	Suspect 3
				

   a. Do all of the skin cells from the victim's fingernails belong to the victim? Explain in detail how you know.

   b. Based off of the evidence, which suspect, if any, committed the crime? Explain in detail how you determined your answer.