Name: _____ Date: _____ Period: _____

Notes: DNA to Protein

AST 1.4 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

I. Nucleic Acids

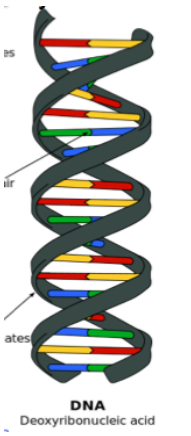
A. The two nucleic acids are DNA and RNA.

B. What do you know about DNA?

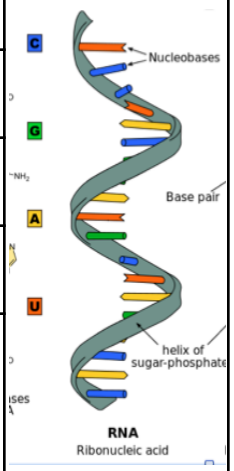
- Where did your DNA come from? _____
- What role does DNA play in your cells, your body?_____
- Which part of the cell is the DNA stored in? _____

**** DNA and RNA Structure: what do you notice about the molecules?

How are they similar? How are they different?



DNA Structure	RNA Structure
_____	_____
_____	_____
_____	_____
_____	_____



C. A nucleic acid is a polymer (chain) of _____.

D. A nucleotide is made from three parts: _____, _____, and _____

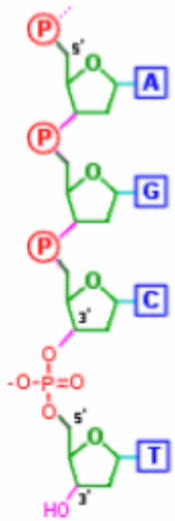
E. There are _____ kinds of nucleotides, which are linked in chains. The types are: _____, _____, _____, and _____

F. The order of the nucleotides (A, C, T, and G) in the DNA strand is the "code" of life, containing all of the _____

G. What is the "backbone" made of? _____

H. How many nucleotides are there in the strand to the right? ___

I. Circle a nucleotide in the Google Drawing AND label the three parts of 1 nucleotide:



J. Describe the pattern in the "Relative Amounts of Bases in DNA" chart:

_____

K. Why do you think this pattern exists? (Think about what you already know about DNA structure.

_____

L. Helix means_____, and it is double because there are _____ of _____ linked in chains.

M. The bases _____ and _____ always pair up. And the bases _____and _____ always pair up.

N. Nucleic Acids - Two Types:

DNA	RNA
•	•
• Bases:	• Bases:
• Contains the programing (genetic code) for cellular activity.	• Helps synthesize proteins: (_____ gene and transports the info to site of protein manufacture, the _____.)
• Location	• Location:

_____ _____

O. The Central Dogma:

_____ → _____ → _____

- The order of amino acids in protein is determined by the order of nucleotides in DNA.
- RNA carries the message of DNA to the ribosome (which makes the protein based off that information).

II. Protein

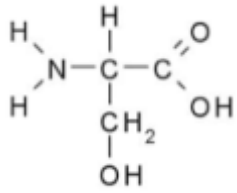
A. Protein carries out the _____

- Protein is made up of building blocks called _____
- The order of amino acids in a chain is determined by the order of A, T, C, and G in DNA.
- The order of amino acids determines the _____ of the protein.
- The shape of the protein determines its _____ **(form=function)**

B. Protein Composition

- Amino Acids (_____) link together in a chain and then fold into a specific shape.

- There are ____ different amino acids.
- General Structure of an Amino Acid (double-click on Google Drawing to label): Be careful! The diagram in the Slides has a slightly different orientation!



C. The Diverse Functions of Protein (note: you do not need to memorize these, but it is a good idea to think about how important protein functions are to every part of you, from cells to organs and organ systems!)

• **Structural** – provide_____. Ex. keratin and collagen in things like tendons, cartilage, hair, _____

• **Contractile** – responsible for _____. Ex. muscles

• **Carrier** – ____ molecules from one place to another around the body. Ex. hemoglobin

• **Hormones** - _____ proteins that help to coordinate certain body activities. Ex. insulin, growth hormone

• **Enzymes** – catalyzes (_____) reactions in cells.. Ex. Lactase and pepsin

• **Receptor-** located on cell membranes, responsible for receiving cell to cell _____

D. Effect of DNA Mutation on Protein

- If DNA is _____ (the _____is changed), then that could change the order of amino acids in the protein, which could cause the protein's____ _____to change.
- If the shape of the protein changes, its _____might also change. (either improved or ruined)
- Example: A receptor protein's shape determines which messenger molecule binds to it (they fit together like a lock and a key). If the receptor protein's gene (on the DNA) were mutated, the protein would have a different shape and the messenger might not fit anymore.
- Ex: Testosterone – some people have mutation protein receptors for _____ _____

- What other differences do you think people with this mutation might have? (Hint: how might a person's body function differently without their cells being able to receive the messages from the hormone testosterone?)

E. DNA, Protein, and Cells
   - Different cells "express" or "turn on" different genes, which cause the production of that gene's protein
   - For example, hair cells express the gene for keratin, causing the cell to make keratin protein which makes your hair strong.
   - Gene → Gene turned on → Protein is made → Cell has a trait (strong hair)
   - Liver cells have the keratin gene, but do not turn it on (they don't need keratin protein!)