Name: _____ Date: _____ Period _____

PROTEIN SYNTHESIS WORKSHEET

PART A. Answer the following questions using your book and lecture notes:

1. What are the three types of RNA involved in protein synthesis?
   1) 2) 3)

2. The first step of protein synthesis is _____. This step occurs in the _____ of the cell. During this step the enzyme _____ makes a copy of a gene out of RNA. This is called a _____ RNA or *mRNA*. Some parts of mRNA called _____ have to be cut out because they are not part of the code for the final protein. This is called mRNA *splicing*. The remaining parts which do code for the protein being built are called _____.

3. The second step of protein synthesis is _____. This step occurs in the _____ of the cell. During this step the mRNA is used by a _____ to build a polypeptide. Every three bases of the mRNA are called a _____ and code for one amino acid in the polypeptide.

4. Ribosomes are made up of a large subunit called 50S and a small subunit called 30S. These subunits are made out of two types of organic macromolecules: _____ and _____ RNA or *rRNA*.

5. _____ RNA or *tRNA* bring the amino acids to the _____. One end of each tRNA is attached to an amino acid and the other end is made up of three nucleotides, the bases of which form a triplet called an _____. This region recognizes its complementary sequence (codon) on the mRNA so that its amino acid can be added in the correct order.

6. Once the polypeptide is completed, it must be modified (sometimes sections are cut out and rearranged). Once this is done and it folds into its final shape, it is now called a _____. This process occurs in the _____.

7. How does mRNA get out of the nucleus? _____

8. What is the sequence of the start codon? _____

9. What are the sequences of all of the stop codons? _____

10. How many different codons are there? _____

11. How many different amino acids are there? _____

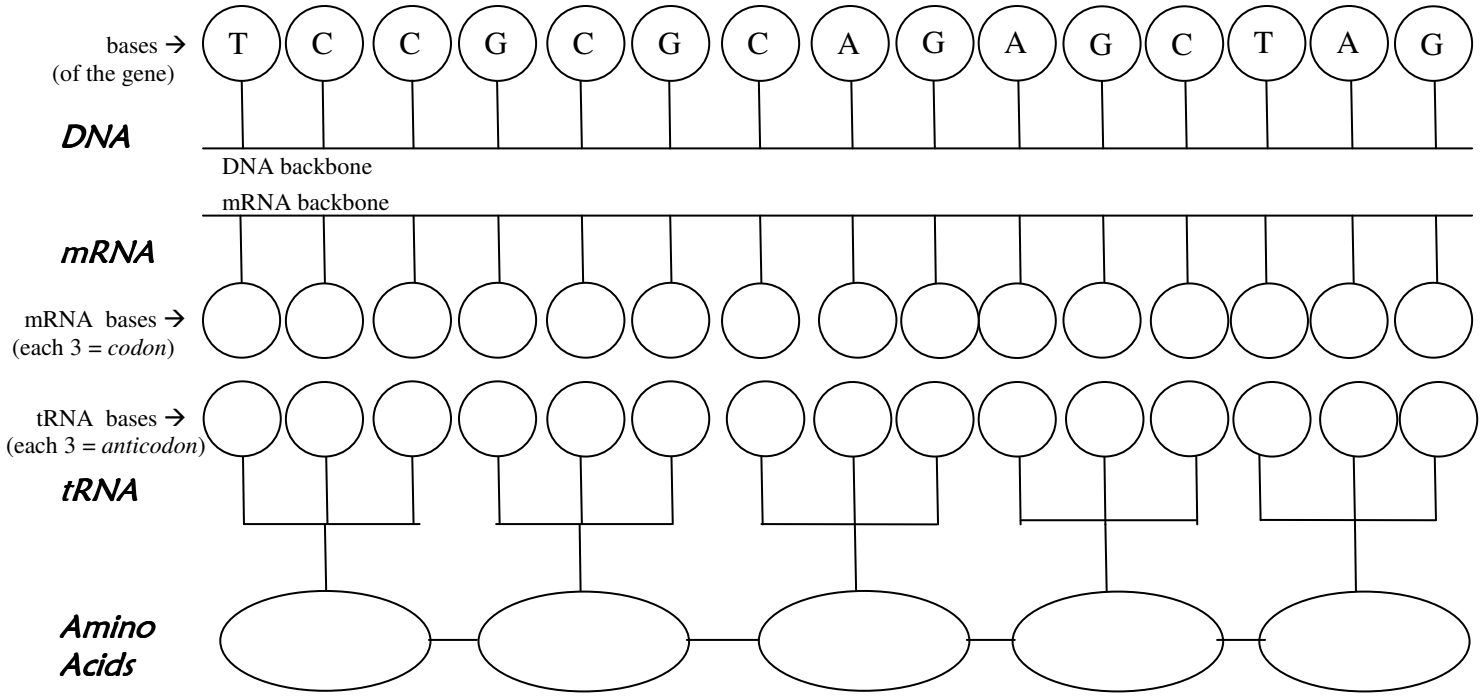
12. There are more codons than there are amino acids. So what do the "extra" codons do? _____

    _____

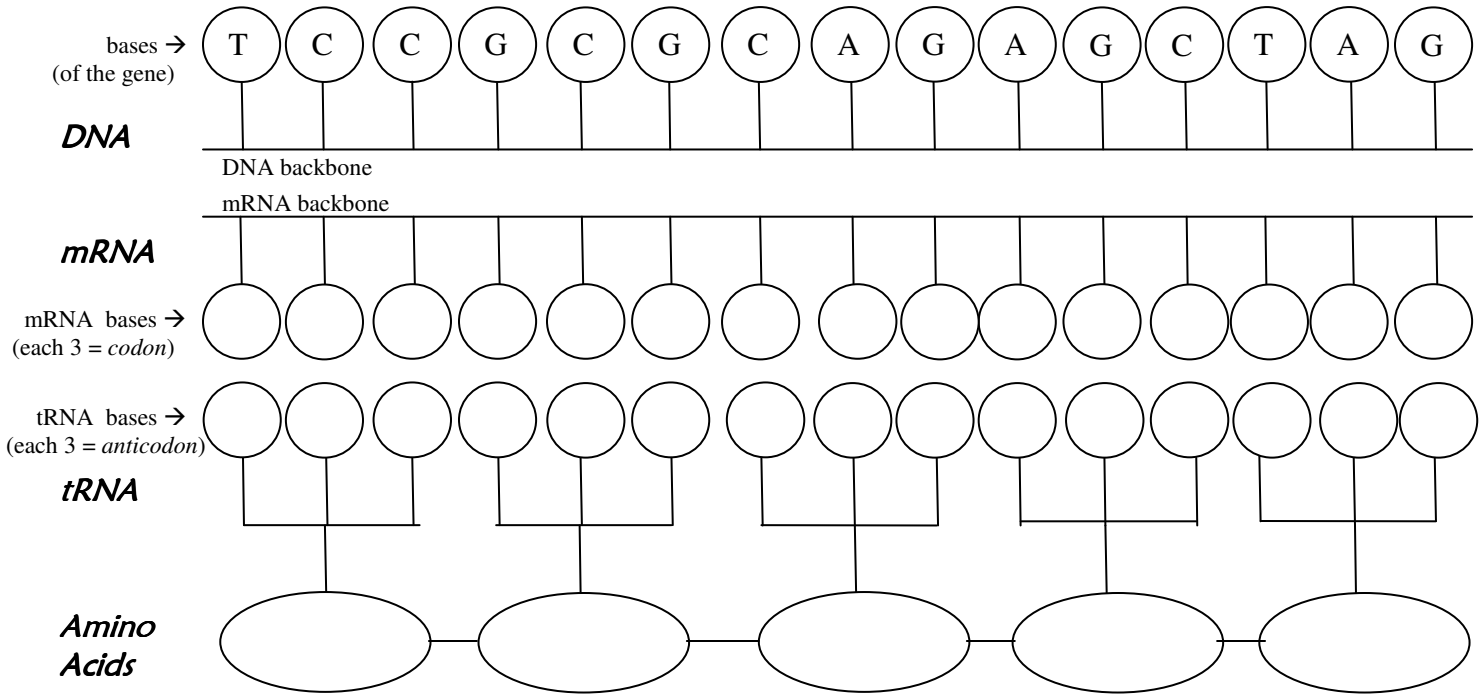
13. Create a graphic organizer for protein synthesis in the space below. For example, you can draw out each step or create a flow chart.

PART B: Use your codon chart (pg 303 in CP book, pg 237 in honors book) to complete Part B.
1) fill in the mRNA bases, 2) fill in the tRNA bases, 3) fill in the amino acids of the polypeptide

GENE 1



GENE 2



PART C. Use your codon chart (pg 303 in CP book, pg 237 in honors book) to determine the amino acid sequence of each polypeptide below. Remember to **ONLY start on AUG** and **STOP when you encounter a stop codon**. Follow the example below:

Example:

DNA → AGA CGG TAC CTC CGG TGG GTG CTT GTC TGT ATC CTT CTC AGT ATC

mRNA → UCU GCC AUG GAG GCC ACC CAC GAA CAG ACA UAG GAA GAG UCA UAG

protein → start - glu – ala –thre – hist – asp -glu-threo-stop
acid acid

Note: in real life, polypeptides are hundreds or thousands of nucleotides long.

1. DNA → CCT CTT TAC ACA CGG AGG GTA CGC TAT TCT ATG ATT ACA CGG TTG CGA TCC ATA ATC
   mRNA →
   protein →

2. DNA → AGA ACA TAA TAC CTC TTA ACA CTC TAA AGA CCA GCA CTC CGA TGA ACT GGA GCA
   mRNA →
   protein →

3. DNA → TAC CTT GGG GAA TAT ACA CGC TGG CTT CGA TGA ATC CGT ACG GTA CTC GCC ATC
   mRNA →
   protein →

4. DNA → TAA ACT CGG TAC CTA GCT TAG ATC TAA TTA CCC ATC
   mRNA →
   protein →

5. DNA → CTA TTA CGA TAC TAG AGC GAA TAG AAA CTT ATC ATC
   mRNA →
   protein →

6. DNA → TAC CTT AGT TAT CCA TTG ACT CGA ATT GTG CGC TTG CTG ATC
   mRNA →
   protein →

7. DNA → ACC CGA TAC CTC TCT TAT AGC ATT ACA AAC CTC CGA GCG
   mRNA →
   protein →

8. DNA → TAC AGA CGG CAA CTC TGG GTG CTT TGT TCT CTT CTC AGT ATC
   mRNA →
   protein →