



## Genomics to Proteomics

First, we'll discuss the Central Dogma in Biology:

**DNA → mRNA → tRNA with amino acids → proteins**

Empty all of the contents of your Genomics to Proteomics baggie. Group the contents by paying attention to word, placement of word, shape and color of the “molecules.”

In your Genomics to Proteomics baggie, locate three separate “Sense” DNA molecules. You will recognize these because they have the word “Top” written on the top of the molecule. Each student will be in charge of one “Sense” molecule. Place the “Sense” molecule in the Nucleus. With the class, discuss the sugar, phosphate and organic bases of the molecule.

For each “Sense” molecule, locate the appropriate “Template” molecule. (Each of these molecules should have yellow sugar molecules.) Move the template to the sense molecule to form the double helix. Adenine (Red) pairs with Thymine (Green) while Guanine (Blue) pairs with Cytosine (Yellow). Notice that the phosphate groups on the separate molecules show their antiparallel configuration. (The “P”s on the template are upside-down from the sense molecule.) *Get a signature from your professor: DNA Double Helix.*

For ease in this demonstration, we have made a separate identical “Template” molecule so that you can place it upright and separated from the double helix.

The “Template” codes for the formation of the mRNA which uses the sugar Ribose instead of Deoxyribose found in the DNA molecule. (Ribose is colored green instead of the yellow for deoxyribose.) Also, Thymine (green) is replaced with Uracil (brighter green). Match the appropriate mRNA with the upright Template DNA. *Get a signature from your professor: mRNA paired with DNA Template.*

Move your mRNA out to your ribosomes.

Move the appropriate tRNA anticodons (with amino acid attached) to your mRNA codons. Remember green goes with red and blue goes with yellow (A-T and C-G). *Get a signature from your professor: mRNA paired with tRNA.*

Every location in which an amino group (NH<sub>2</sub>) comes into contact with a carboxyl group (COOH), water is removed and a peptide bond forms. Place the peptide bond puzzle piece in the appropriate location. *Get a signature from your professor: Protein formation.*

Using the mRNA codon chart provided, verify that the correct amino acid was paired with your mRNA codon.