**Protein Synthesis Race**

**Directions**: Google “biomanbio Protein Synthesis”. Complete the game by going through the process of protein synthesis and trying to get the best score (which is actually the lowest score). The top 3 scorers in each class will receive extra credit on their DNA test!

**Transcription**

Transcription is the copying of a gene (a section of DNA) to make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It is the first process that must happen in order to make a protein. In order for transcription to occur DNA must first \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Notice that the DNA molecule has unzipped to make \_\_\_\_\_\_\_\_\_\_\_\_\_\_ strands. Only one strand is used for transcription. You will use the top strand. Click on it!

An enzyme called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is used to add new RNA \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to make mRNA. Click on RNA polymerase!

Now RNA polymerase is ready to add on new nucleotides. RNA polymerase is touching the fist nucleotide of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sequence. Find the RNA nucleotide that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

This is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Keep adding the rest of the nucleotides by tapping them in the correct order (as specified by the DNA). Be careful as too many wrong clicks results in score penalties. When you are done with transcription you will have made a molecule of \_\_\_\_\_\_\_\_\_\_\_\_.

DNA: TAC AGT TAC AGT TTT CTG GCT TTT CTG GCT AGT TAC TTT ACT

mRNA:

Transcription is done! You have made mRNA (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RNA). Messenger RNA carries the information needed to make your protein!

Now the DNA can zip back up to form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Messenger RNA must now leave the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and travel to the site of protein synthesis ( the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).

Did you get it? Write the correct answer as a letter (A, B, C, D)

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Translation**

In order to understand translation, you must understand that a protein is a chain of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_! The order of the amino acids in the chain and the length of the chain determine what kind of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it will be and what it will do!

You must also understand that mRNA carries the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for how to make a protein as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. A codon is a triplet of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on mRNA. Each codon codes for \_\_\_\_\_\_\_\_\_\_\_\_\_ specific amino acid! For instance, the codon \_\_\_\_\_\_\_\_\_\_ codes for the amino acid methionine (met).

Look at the mRNA! The first codon is located in the P site of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. What is the first codon? Click on it!

Use the CODON chart to decide which amino acid you need to pick up first. Remember to look at the mRNA codon in the P site to decide which amino acid to pick up!

Move your \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to pick up the correct amino acid at the amino acid attachment site (the black line at the top of tRNA)!

Carry the attached \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the ribosome and match it with its complementary codon (in the P site). Important note: The first amino acid (\_\_\_\_\_\_\_\_) is the only one that arrives at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. All other amino acids will first go to the \_\_\_\_\_\_\_\_\_\_\_\_\_ site.

Repeat this process for the rest of the codons until the protein is done but be sure to bring the rest of the amino acids to the A site! You will notice that each tRNA molecule will move from the A site to the P site to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (A-P-E).

Move the correct tRNA to pick up the correct amino acid and then take them to the A site. Fill the in amino acid sequence below when you are finished.

A.A. Seq:

mRNA: AUG UCA AUG UCA AAA GAC CGA AAA GAC CGA UCA AUG AAA UGA

Notice that you have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of amino acids. Also notice that each amino acid is connected to the next by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. For this reason, chains of amino acids are sometimes called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. A polypeptide is a simple protein.

Once the polypeptide chain is made, it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to make a 3 dimensional shape. This shape is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to one specific protein and gives it its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Did you get it? Click on the word that corresponds to each part of the protein synthesis process.

Did you get it? Write the correct answer as a letter (A, B, C, D)

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Number Correct: \_\_\_\_\_\_\_\_ % Correct: \_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Number Incorrect: \_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Your Time Score: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_