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Date: \_\_\_\_\_

Unit VIII  
Biology – Protein Synthesis  
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# VIII

## DNA Foldable (part 1)

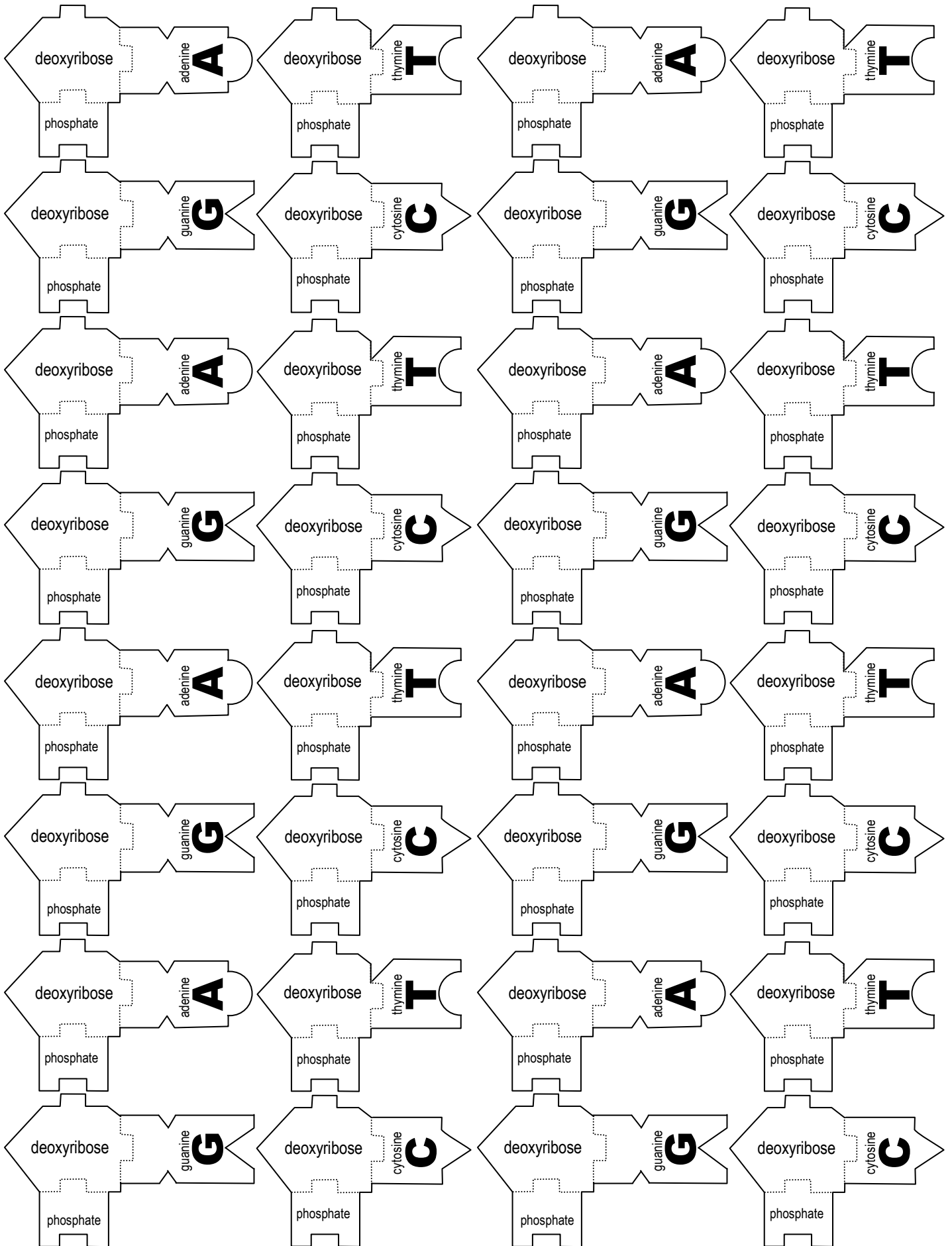
**Objective: To illustrate the base pairing that occurs between base pairs in DNA and the complementary strand.**

1. Fold the paper into the shutter fold. Follow the directions on the back of this sheet.
2. Color the DNA molecules following these rules and keep in mind that you need to be able to see the words you are coloring over:
  - a. Choose one color for all the phosphate molecules.
  - b. Choose another different color for all the deoxyribose sugar molecules.
  - c. Choose a third color for Adenine
  - d. Choose a fourth color for Thymine
  - e. Choose a fifth color for Cytosine
  - f. Choose a sixth color for Guanine
3. Cut out the molecules and glue them onto the folded paper.
4. You must start your sequence: (left side) A – T – G
5. The rest of your sequence is up to you, however, **YOUR DNA MOLECULE MUST NOT BE THE SAME AS ANY ONE ELSE'S OR NO CREDIT WILL BE GIVEN.** Keep in mind that the base pairs must meet in the middle. Also, be careful not to glue the flaps of the paper shut since we will be doing something else on the inside.
6. **NEATNESS** is a huge factor.

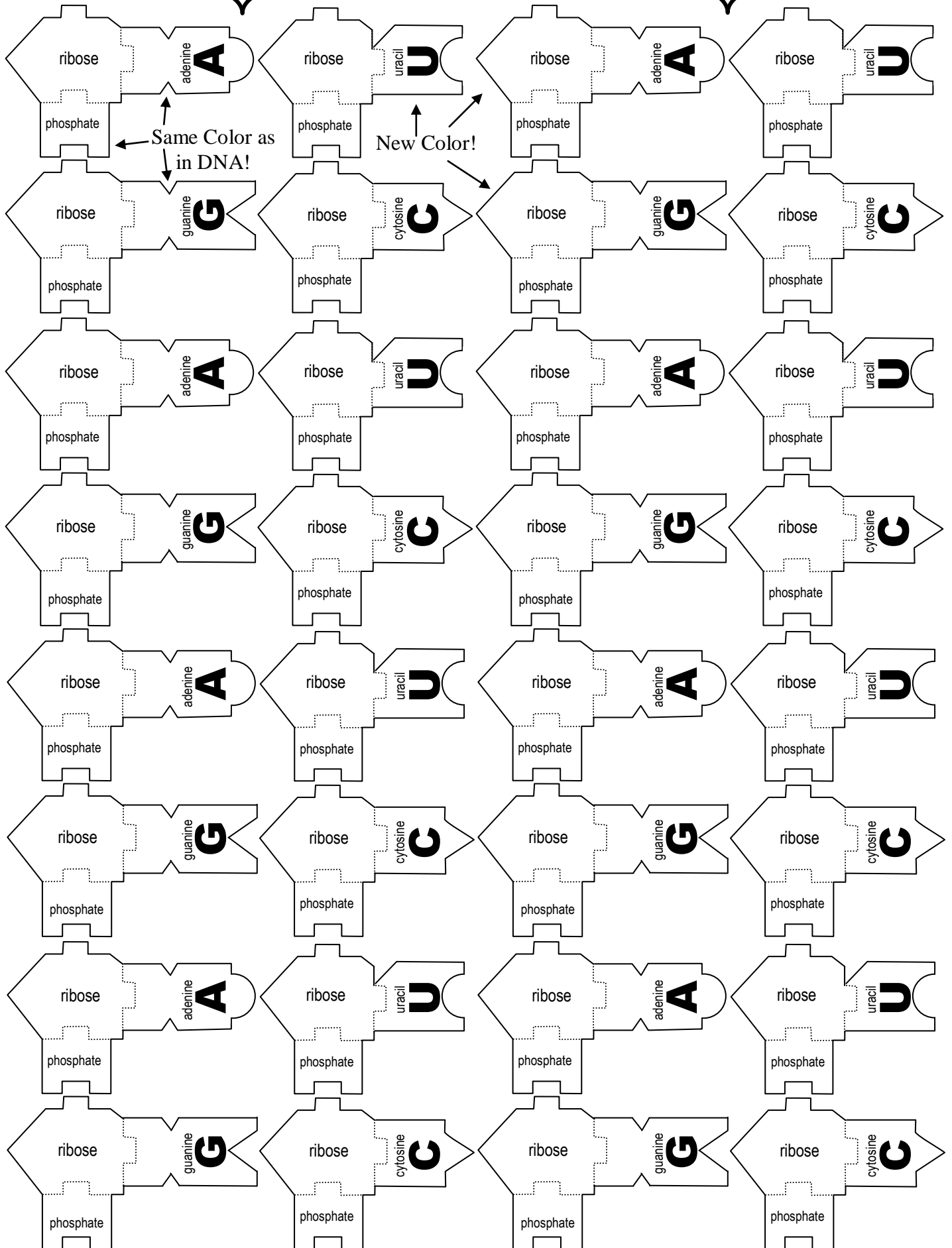
## Transcribe and Translate your DNA (part 2)

**Part II Objective: To illustrate the processes of transcription and translation.**

1. Open the left flap of your DNA foldable keeping the right side closed.
2. Now simulate the process of transcription by sequencing the mRNA strand that will be formed. Your mRNA nucleotides will be glued down on the inside, and to the left of your DNA strand.
3. Just like before your nucleotides must be colored. This time you will keep the colors the same for the adenine, cytosine, guanine, and the phosphate groups. You will need new colors for the ribose sugar and the uracil.
4. Make sure that your mRNA strand connects with the DNA strand so that the bases are truly 'paired' up.
5. Once your mRNA strand is complete you will need to start translation. You will need to construct a strand of tRNA that is complementary to your mRNA.
6. Starting at the top you need to draw a bracket connecting each of the anti-codons of tRNA that will be carrying the amino acids.
7. Finally use the genetic code to determine the amino acid sequence that has been formed. Write the amino acid to the side of your bracket.



Use this half of the sheet to transcribe mRNA on the left inside of the foldable. Use these nucleotides with the tRNA to translate the code in the mRNA.



## tRNA or Transfer RNA

Once you have completed steps 1 (DNA outside) and 2 (mRNA inside left) it is time to construct and match your Transfer RNA. Transfer RNA carries the amino acids that will be linked in a chain polymer according to the instructions provided by the DNA in nucleus of the cell that has been transcribed into mRNA and transported out of the nucleus where it encounters the Ribosome. The ribosome will do the work to match the code provided by the mRNA with various tRNA anticodons. As you can see from the drawings below, these tRNA anticodons come in triplets. Three of the nucleotides are bonded to the tRNA and an amino acid is bonded to the other side. Once these anticodons are in place, the amino acids are linked to form a protein. This protein is the substance which will do the work of the cell, whatever that is. The beginning anticodon has been set up for you. After cutting out the anticodon, paste the matching nucleotides in their proper places. Then, paste the entire anticodon onto your model at the top of the chain. This will fit right into place if your DNA was first constructed properly and then the mRNA was transcribed properly. Once you have that done you will need to determine which nucleotides go next. Yours should be different from everyone else's so follow the code that you have created to complete this model.

The final step to the model is to use page 303 (Figure 12-17) to determine which amino acid is being called for by the codon (the three letters on the left hand side). Don't use the letters that you have affixed to the anticodon for this. Use the model provided below to see how this works. Label your model this way.

Paste the nucleotides here to complement your mRNA strands (creating a tRNA triplet). Then, determine which amino acid that triplet codes for. Write that to the right of the tRNA strand.

phosphate

**U** uracil

ribose

phosphate

**A** adenine

ribose

phosphate

**C** cytosine

ribose

phosphate

phosphate

**UAC** Anti-Codon

**AUG** Codon

Amino Acid **Methionine**

Amino Acid

Amino Acid

Amino Acid