TRANSCRIPTION & TRANSLATION WORKSHEET

Names: _____

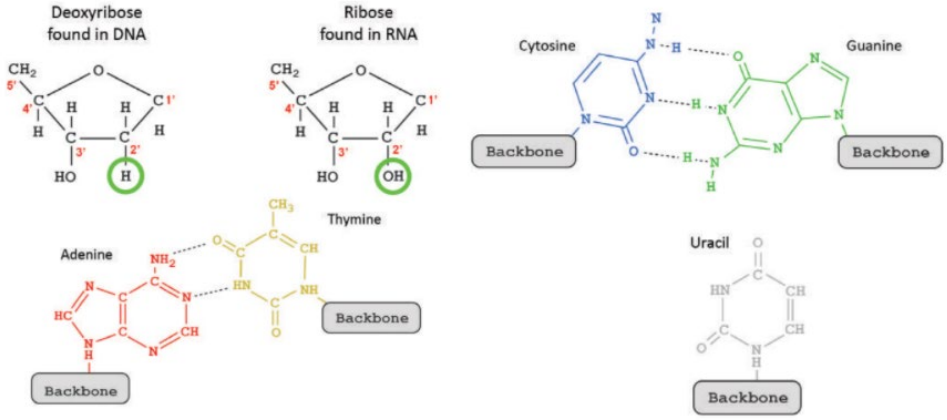
TRANSCRIPTION

1. How many possible triplet codes can be generated from the four base letters?

2. Given that there are more possible combinations for amino acids than amino acids themselves, what does this imply about the number of codes for each amino acid?

3. Why can't DNA leave the nucleus?

4. Compare the foam DNA and mRNA kit pieces. Identify any similarities and differences.



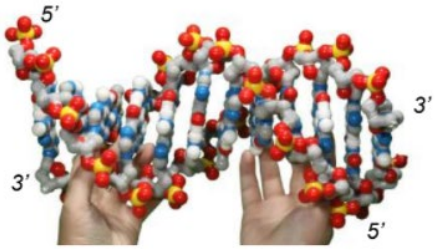
5. Which carbon contains the extra oxygen in the RNA molecule?

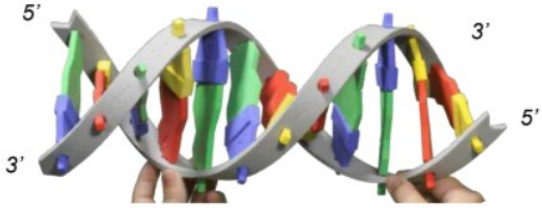
Names: _____

6. Complete the following chart by matching the correct RNA complementary base to the DNA base:

DNA Base	RNA Base
T	
G	
C	
A	
C	
A	

7. Recalling the lesson on DNA structure, identify the type of bond that holds the two strands of DNA together.





8. Identify two similarities and two differences between the above models.

Instructions: Feed the double stranded DNA made in the Replication exercise into RNA polymerase molecule on the transcription placemat.

9. Label the DNA template strand and non-template strand in the photo below.

TRANSCRIPTION & TRANSLATION WORKSHEET

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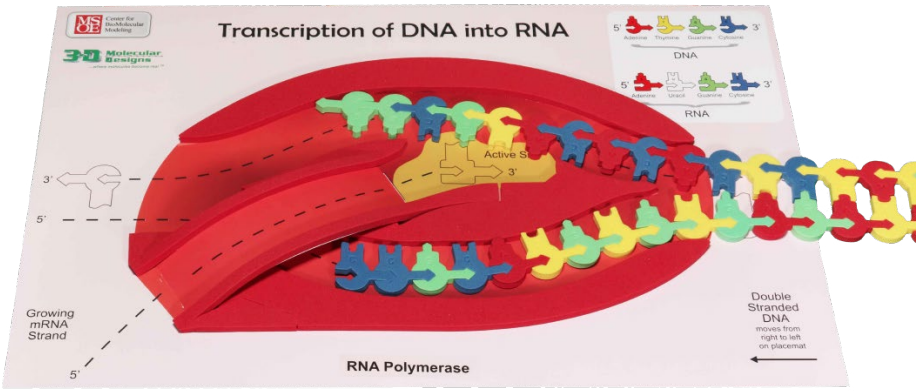


Instructions: Start adding complementary base pairs on Transcription placemat active site.

10. What will happen when RNA polymerase acts on DNA?

11. Note: The DNA template strand does NOT begin with the start codon of the mRNA. What 3' to 5' DNA nucleotide sequence functions as the start signal or initiation codon?

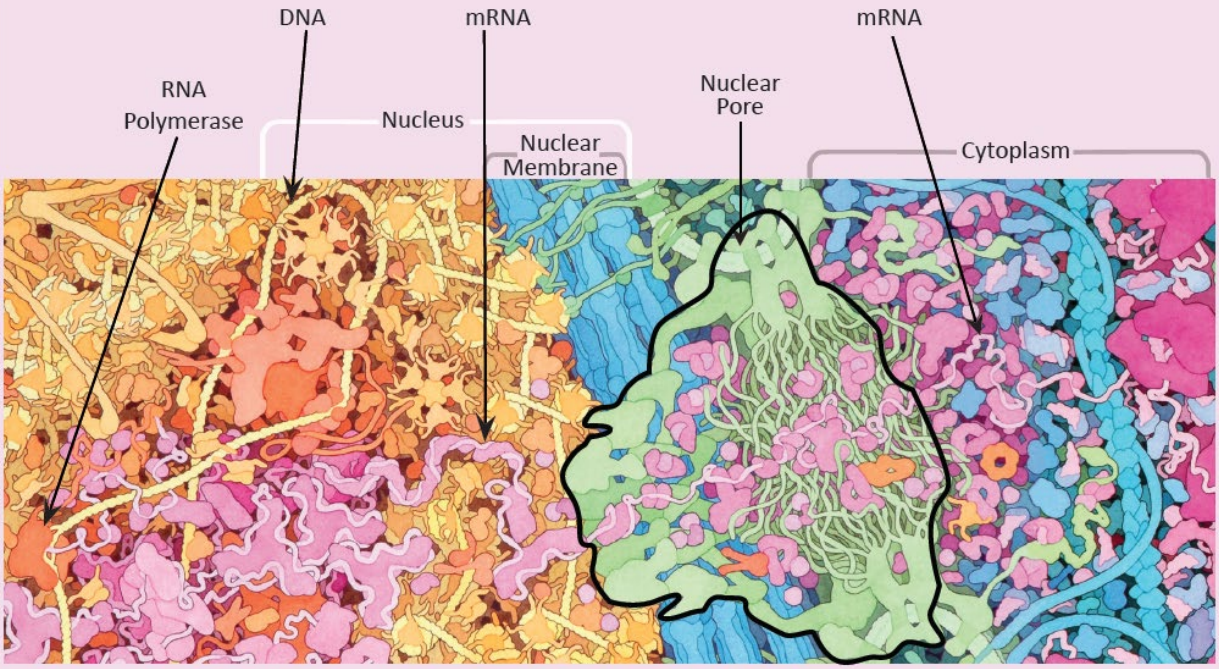
12. What is the mRNA complementary codon?

13. Using your mRNA model, record the correct sequence of mRNA base pairs:

14. What type of bond is broken when mRNA separates from DNA and what characteristic of this bond allows for this separation?

Names: _____

16. Trace the mRNA from the arrow point in the nucleus, through the nuclear pore and to the arrow point in the cytoplasm.



This image is an excerpt from Tour of a Human Cell by David Goodsell, as shown in 3D Molecular Designs' Tour of a Human Cell© poster and David Goodsell's book, ***The Machinery of Life.***

TRANSLATION

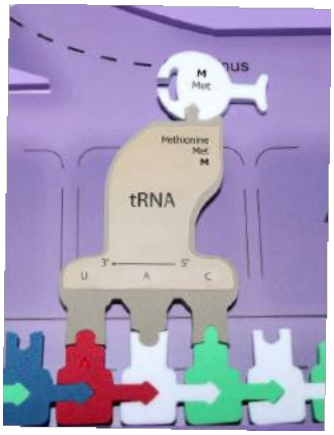
1. What part of the mRNA nucleotide contains the information to make a protein?

2. Identify the three-letter and one-letter abbreviation for each amino acid in the table below:

Codon	**AUG**	**UGU**	**GAG**	**AUA**	**CAU**	**UGG**	**CCA**	**AGA**	**CAC**	**UGU**	**UAG**
Amino Acid Abbreviations											

TRANSCRIPTION & TRANSLATION WORKSHEET

Names: _____

Use the Transcription & Translation #1 template as a guide for the following. 3. On the image to the right, label the amino acid that is joined to the 3' end of the tRNA. 4. Label the anticodon of the tRNA. 5. Label the translation start codon (AUG) of the mRNA. 6. What amino acid is associated with the tRNA that will bind to the mRNA start codon AUG?	

7. Record the tRNA anticodons in the table below:

mRNA Codons	**AUG**	**UGU**	**GAG**	**AUA**	**CAU**	**UGG**	**CCA**	**AGA**	**CAC**	**UGU**	**UAG**
tRNA anticodons											
Amino Acids											

Instructions: Match amino acids to the appropriate tRNAs. Slide mRNA into the Small Ribosomal Subunit. Attach tRNA to the mRNA in the P site. Don't forget to link amino acids at the C-terminal to form your polypeptide.

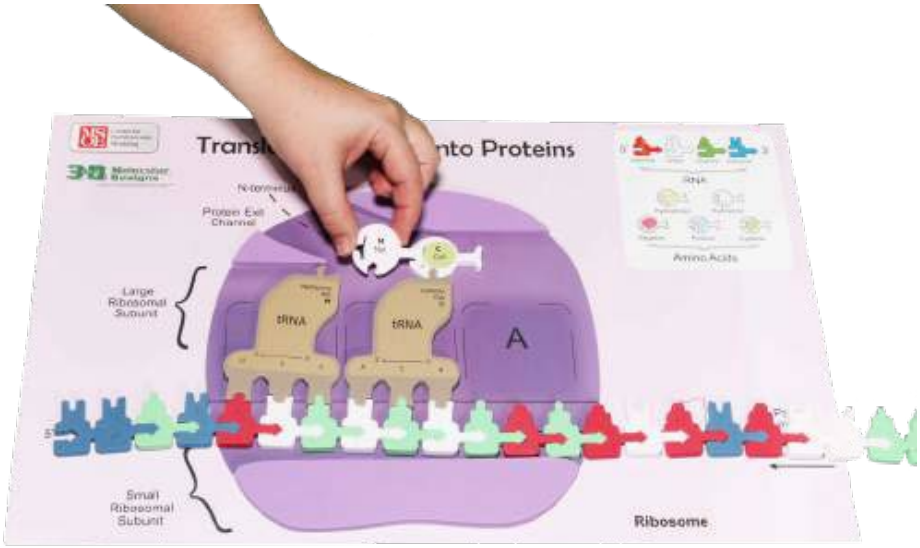
8. Which end of the mRNA strand is attached to the small ribosomal subunit?

9. Referring to the previous amino acid codon table you completed, record, which tRNA anticodon and accompanying amino acid will attach first in this P site.

10. Which tRNA-amino acid complex will attach into the A site at this time?

Names: _____

11. Label the peptide bond in the photo below.



12. What characteristic allows tRNA to separate from mRNA at the ribosome?

13. Why would tRNA get recycled for use in future translation?

14. Which mRNA codon is now located in the A site?

15. Which tRNA need to be “recycled”?

16. Why did the tRNA for the second histidine NOT need to be recycled?

17. What occurs at the mRNA codon UAG?

Names: _____

18. Using The Genetic Codon Chart© included in the kit or the one at the end of the handout, list the various stop codons.

19. What is the order of amino acids in your polypeptide?

MET M									

20. When you reach the end of the mRNA strand in your modeling of the translation process, describe what has happened to the polypeptide.

21. What will happen next to the polypeptide?

22. As you have followed this process of translation, what steps are now left to be completed? What will happen to the mRNA, tRNA and the ribosome at the end of this process?

27. Develop a new model summarizing the entire process of transcription and translation with your lab group. You will be asked to communicate and share your model with the class.