Name________________________________

Modeling the Flow of Genetic Information

Part I: Transcription

1. Fill in the correct base pairs in the non-template and template strands below.

Template strand: 3'←____5'

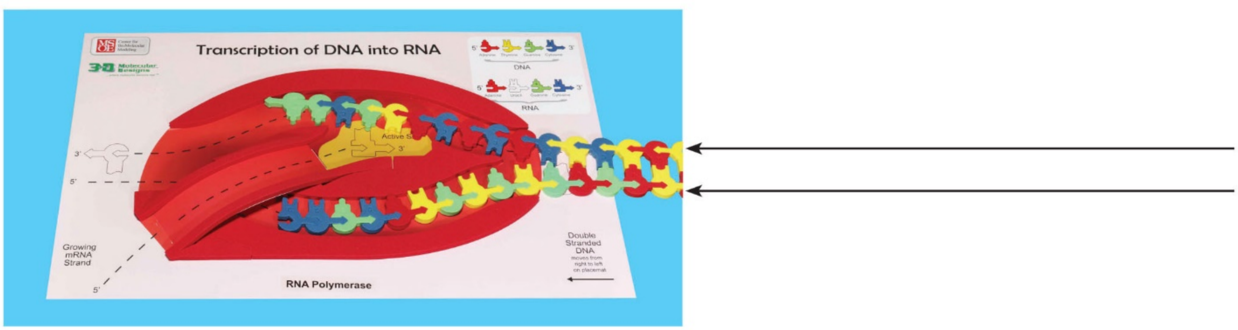
Non-template strand: 5'____→3'

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

3. Identify two similarities and two differences between these models.

Transcription: Initiation

4. Label the DNA template strand and non-template strand in the image below.



Transcription: Elongation and Termination

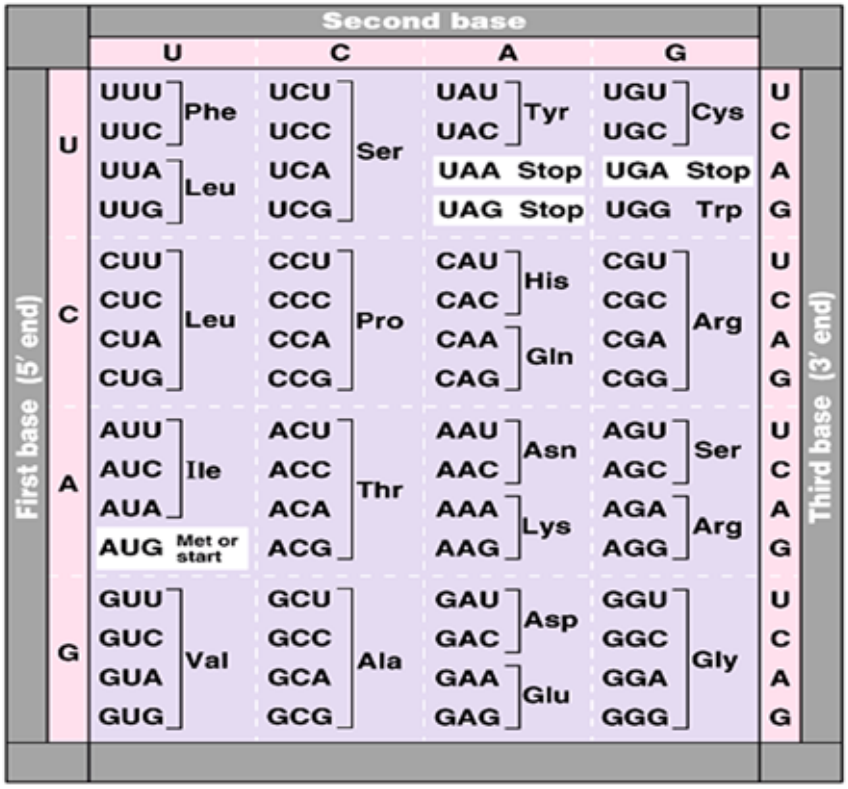
5. Using the mRNA model you just made record the correct sequence of mRNA base pairs:

5' _ → 3'

6. What type of intermolecular force (NOT bond) is broken when mRNA separates from DNA and what characteristic of this allows for this separation?

Part II: Translation

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



First base (5′ end)	Second base: U	Second base: C	Second base: A	Second base: G	Third base (3′ end)
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	UAA Stop	UGA Stop	A
	UUG Leu	UCG Ser	UAG Stop	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met or start	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

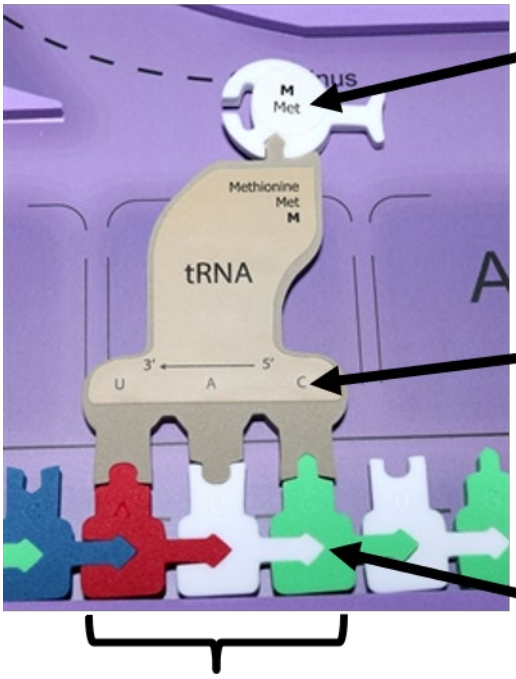
Translation: Initiation

8. Translation begins at a specific codon on the mRNA. What is the three base sequence of the initiation codon?

9. What amino acid is associated with the tRNA that will bind to the mRNA codon AUG?

10. What would be the anticodon for the mRNA codon AUG? Label the 5' and 3' ends of the anticodon.

11. Label the codon, anticodon and the amino acid on the figure below.



1. _____

2. _____

3. _____

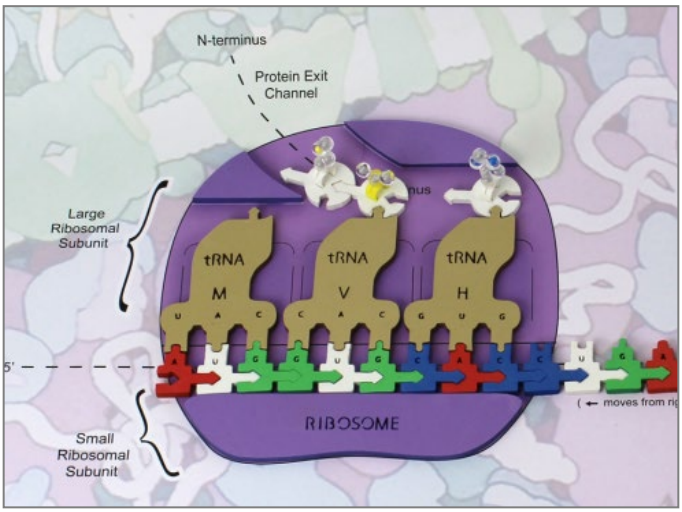
12. Does the 5’ end or the 3’ end of the mRNA strand attach to the small ribosomal subunit?

13. Which tRNA anticodon and accompanying amino acid will attach first in this P site?

Translation: Elongation

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

15. Circle and label the peptide bond in the photo below.



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

Translation: Termination

17. Using the mRNA Codon/Amino Acid Chart list all stop codons.

18. What was the stop codon in the mRNA sequence that you translated?

19. What is the order of amino acids in your polypeptide? (Use the three letter and one letter abbreviations for each amino acid.)

Met M										

20. When you reach the end of the mRNA strand 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?

23. What will happen to the mRNA, tRNA, and the ribosome at the end of this process?

24. How long did this process of translation take for you and your lab group?

25. Do you think the cell could operate at this rate?

26. At this rate, how long would it take to make a protein such as actin which is 375 amino acids long?