TRANSCRIPTION TO TRANSLATION - PRACTICE

Below are the DNA Templates (anticoding DNA strand) used for Transcription of 2 make-believe genes from a eukaryotic cell. (Note that the **bolded** regions represent **exons** and the ***italicized*** regions represent **introns**). IF YOUR LAST NAME IS FROM A to K, YOU WILL DO # 1 DNA. THE REMAINDER OF THE ALPHABET WILL WORK WITH #2 DNA. The one you don't do now you can do for practice later.

1 DNA

3' – GAA CTA TAT ATA ACC TGG **TAC CGA** *TAG AAT CGG CAT GAA TTT* **ACA ACA CCA** *AGC GGC ATT AAC GGA TTC GGG ATC* **TAA TTT ATC** CTT AAC CGA TTG**– 5'**

#2 DNA

3' - CCG GAT ATA TAA ACC AGC **TAC CCC** *TAG ATT CGG CAT GAA TTT* **TAA TTT GTT** *AGC GGC ATT AAC GGA TTC GGG ATC* **ACA CAA ACT** AGC GGG ATT ACA**– 5'**

1) You are to rewrite the sequence on a blank piece of paper (**LANDSCAPE DIRECTION**). WRITE THE SEQUENCE SO THE ENTIRE LIST OF BASES CAN BE WRITTEN ON **ONE** LINE!

2) Since DNA is DOUBLE-STRANDED, show the complementary strand (ie. 5' → 3' reading left to right side). Label this strand as the anti-template strand/coding strand and the ORIGINAL SEQUENCE as the template or anti-coding strand.

   Eg. ***Anti-template*** *strand* → 5' CTT GAT 3' etc.
   Template strand → 3' GAA CTA 5'

3) From this double-stranded DNA, circle the promoter sequence (see course notes for what sequence to look for) *Use pencil if you are unsure!*

   What is the significance of this sequence?

4) To mimic transcription, you will be using the template strand. Begin to make a complementary RNA stand (reading 5' → 3') by writing complementary bases to this strand, **starting at the second triplet PRIOR to the first bolded one. (The start triplet is underlined above).** Please include the corresponding bases for both bolded and italicized sections!

5) Make the necessary modifications to this mRNA so that it can i) find the ribosome, and ii) avoid degradation (see course notes – post-transcriptional processing)

6) Rewrite this mRNA sequence with the modifications you made in #5 by cutting out the intron sequences (italicized sections ONLY!).

   What is an intron? Describe how the introns are normally cut out?

   What is an exon?

   Go back to the original DNA you have at the top of the paper and highlight in different colours the intron and exon regions.

   How many exons are originally present here?

   The exons are fused back together to make mature mRNA. Where does this mature mRNA head now?

7) Using the **MATURE mRNA** you created and the genetic code on p. 240 of your text, translate this into an amino acid sequence of a polypeptide. **FOR THIS, YOU WILL START AT THE START CODON (FIRST BOLDED TRIPLET) AND YOU WILL FINISH AT THE STOP CODON!**

   Eg. Mature mRNA

   5' AUG GCU etc. 3'

   Polypeptide Met - Ala - etc.

8) You will call this first amino acid sequence – Polypeptide #1. Now, rewrite the mature mRNA this time omitting EXON #2.

9) Translate this amino acid sequence. Call this Polypeptide #2.

Compare the two amino acid sequences. What is this last step designed to show you?