**Translation and Open Reading Frame Practice (KEY)**

**1.**  First identify the start codon in the open reading frame.  Then break the sequence into 3 base pair codons until you reach a stop codon.  Finally translate each codon into its corresponding amino acid.

GGGATCGATGCCCCTTAAAGAGTTTACATATTGCTGGAGGCGTTAACCCCGGA   DNA

                   AUG CCC CUU AAA GAG UUU ACA UAU UGC UGG AGG CGU UAA    mRNA

                   Met   Pro    Leu  Lys    Glu   Phe  Thr     Tyr   Cys   Trp   Arg   Arg   Stop           Protein

Notes:

The **sense** strand is the strand of DNA that has the same sequence as the mRNA, which takes the **antisense strand** as its template during transcription

N-Terminus: **nitrogen terminus**. The 5-prime (5') end of the polypeptide chain that has a nitrogen atom or a 'free amino group.

The mRNA is synthesized and read starting at the 5′ end and proceeding to the 3′ end, and it directs the synthesis of the protein starting at the N-terminal amino acid and ending with the C-terminal amino acid (although post-translational modification may snip off one or more amino acids from either end.

The codons of the mRNA reading frame are translated in the **5′→3′ direction** into amino acids by a ribosome to produce a polypeptide chain.

**2.**  First write the complementary strand of DNA.  Next look for the longest possible ORF in both strands, reading each in a 5´ to 3´ direction.  In this instance the longest open reading frame is in the reverse orientation (strand 2).  Strand 2 will be the sense strand and Strand 1 the antisense strand

Strand 1     5'  TCAATGTAACGCGCTACCCGGAGCTCTGGGCCCAAATTTCATCCACT  3'

Strand 2     3´  AGTTACATTGCGCGATGGGCCTCGAGACCCGGGTTTAAAGTAGGTGA   5´

1         S  M  \*  R  A  T  R  S  S  G  P  K  F  H  P

2          Q  C  N  A  L  P  G  A  L  G  P  N  F  I  H

3           N  V  T  R  Y  P  E  L  W  A  Q  I  S  S  T

4           \*  H  L  A  S  G  P  A  R  P  G  F  K  M  W

5          E  I  Y  R  A  V  R  L  E  P  G  L  N  \*  G

6         K  L  T  V  R  \*  G  S  S  Q  A  W  I  E  D

mRNA    5´ AGUGGAUGAAAUUUGGGCCCAGAGCUCCGGGUAGCGCGUUACAUUGA 3´

Protein    N- Met Lys Phe Gly Pro Arg Ala Pro Gly Ser Ala Leu His -C