Allele A: Normal Hemoglobin

5’ GTTGAGCCGATTTCAATGGTGCACCTCACTCCTGAGGAGAAGTCTGCCGTTTACGACCTGACCTAGCCGA 3’

3’ CAACTCGGCTAAAGTTACCACGTGGAGTGAGGACTCCTCTTCAGACGGCAAATGCTGGACTGGATCGGCT 5’

Allele S: Sickle Cell Hemoglobin

5’ GTTGAGCCGATTTCAATGGTGCACCTCACTCCTGTGGAGAAGTCTGCCGTTTACGACCTGACCTAGCCGA 3’

3’ CAACTCGGCTAAAGTTACCACGTGGAGTGAGGACACCTCTTCAGACGGCAAATGCTGGACTGGATCGGCT 5’

**Part 1: Transcription**

Using the table for the genetic code provided, translate these two DNA sequences into polypeptides. Remember that the sequence has an mRNA intermediate on which the code table is based. Remember that nucleic acids, including mRNA, must be copied from a template in a 5’ to 3’ direction.

*mRNA for Allele A:*

*mRNA for Allele S:*

**Part 2: Translation**

To begin, find the first codon (or “start” codon) in the sequence. Then write in the amino acid sequence (use 3 letter abbreviations) encoded either above or below the corresponding codons until you find a stop codon. The first amino acid, Met, has been provided below.

*Amino acid sequence for Allele A:*

NH3+-Met(M)-

*Amino acid sequence for Allele S:*

NH3+-Met(M)-

Questions:

1. Circle the mutation in Allele S in the DNA. What kind of mutation is this? How do you know?
2. Predict what impact this mutation would have on the protein.

**Part 3: Protein Folding**

Using the polypeptide you transcribed in part 2, use the table of amino acid properties provided to decide a “tertiary” form in a mostly aqueous environment (i.e. blood) of the amino acid based on the hydrophilic/hydrophobic affiliation of each amino acid.

*Normal Hemoglobin:*

*Sickle-cell Hemoglobin:*