Protein Regulation & Mutations Lab C. Kohn, Waterford WI

Partner Names (F&L): Hour Date: Score: + ✓ -

Directions: in this lab, you will be transcribing a section of DNA (your “gene”) into mRNA, and then you will translate that mRNA into an order of amino acids. Once you have determined your order of amino acids, you will create your chain of amino acids on a strip of paper. These amino acids will be colored-coded based on whether they are hydrophobic, hydrophilic, or if they are cysteine amino acids (which will form disulfide bonds). You will then fold your chain of amino acids/strip of paper into a specific shape based on these properties (you can tape or staple your cysteine amino acids together to create the disulfide bonds).

You will then repeat these steps with a mutated version of this gene and compare the results between your normal protein and mutated protein. To begin, answer the questions below. If you are working with a partner, alternate who writes each answer.

1. In your own words, describe what a mutation is:
2. There are three main kinds of mutations. Please list and summarize each kind of mutation using the spaces below.   
     
   *Type Summary*  
    -   
     
    -   
     
    -
3. There are also frameshift and silent mutations. Use the space below to describe what these types of mutations are.   
     
    -   
     
    -
4. How could the change of just one base (out of billions of bases in the DNA of an organism) affect the function of an entire organism?
5. In the space below, transcribe the mRNA copy of the sequence of DNA (using the lower half of the double-stranded DNA). Then translate the mRNA codons into the amino acids that they code for (use the codon/amino acid chart on the back of the last page).
6. Use the attached sheet to create the ‘chain’ of amino acids that you will fold into a protein.
7. Color code each amino acid for whether it is hydrophilic, hydrophobic, or a cysteine. You may assign any color you choose for this. Complete the blanks below. Use the chart on the attached sheet to determine which amino acids are hydrophilic and which are hydrophobic.   
     
    Hydrophilic color: Hydrophobic color: Cysteine color:
8. Cut out your amino acid chain and fold it so that all of the hydrophilic amino acids are on the outside and all of the hydrophobic amino acids are on the outside. Connect the cysteine amino acids to each other using tape or staples.
9. In the space below, transcribe the mRNA copy of the sequence of the mutated DNA (using the lower half of the double-stranded DNA). Then translate the mRNA codons into the amino acids that they code for. Repeat the steps you used for the normal DNA to create your mutated protein.   
     
   **Directions**: use the information from your DNA sequences to fill in the amino acids as they correspond to each codon in the mRNA copies you transcribed (you can use the 3-letter codes for each amino acid instead of the full names). Color code each amino acid depending on whether it is hydrophilic or hydrophobic (or a cysteine) using the colors you chose. Then cut out each chain of amino acids and fold into a shape so that the hydrophobic amino acids are on the inside, the hydrophilic are on the outside, and the cysteines are connected (using tape or staples).





