

DNA Mutation Activity:

1. Cut out the DNA sequence patterns and tape them together so that they read:

CTT TTA TAG TAG ATA CCA CAA AGG

2. You just built a part of the gene that can cause cystic fibrosis
3. Now build a strand of mRNA that matches your DNA pattern as a complementary strand.
4. Now the cell uses tRNA to bring the correct amino acids into position. You will model this by using the mRNA code to determine which amino acids tRNA should bring. The genetic code chart shows which bases code for which amino acids.
5. Please write the sequence of amino acids on your paper.
6. Now you will change the original DNA. A mutation!
Change the nucleotide in the 15th position (from the left) to cytosine.
7. Now follow the steps 3-5 to determine what affect this mutation would have on the protein made by the gene.
8. Please write the sequence of amino acids after the mutation on your paper.
9. Now you will change your DNA again! A mutation (from the original DNA strand)!
Remove the nucleotides in the 13th, 14th, and 15th position. Shift the rest of the pieces to close the gap.
10. Now follow the steps 3-5 to determine what affect this mutation would have on the protein made by the gene.
11. Please write the sequence of amino acids after the mutation on your paper.

Questions: Please answer all 5 questions on a separate piece of paper

1. Did changing the sequence of DNA always result in a different amino acid sequence? Are all mutations bad? Explain your answer.
2. If the adenine in the 15th position of the sequence is changed to a guanine, the person does not have CF. However, if the thymine in the 14th position is changed to cytosine the person does have CF. What are some reasons this might occur?
3. Where might the mutations in the original DNA come from? How does this happen in real life?
4. What do you think would happen if a single nucleotide were added somewhere in the sequence? Explain your answer.
5. Explain which kinds of mutations would result in a more serious form of CF. In your explanation write about why some mutations are worse than others. Be sure to show you understand how mutations affect the final protein!

Extension:

Digest your DNA using a restriction enzyme and put it on a paper gel!
Generate Sanger Sequencing Gels for your mutated DNA.