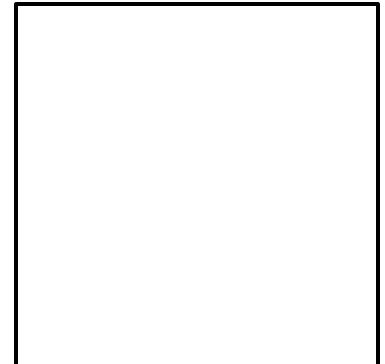


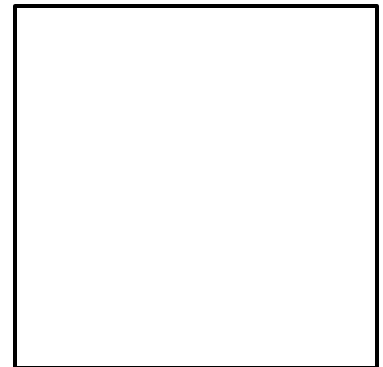
Concord Consortium – Mutations

Directions

1. Google “Concord Consortium Mutations” and click on the first link.
2. Click “Run Model”
3. Click “Transcribe” to synthesize mRNA from the DNA shown.
4. Click “Translate” to synthesize a protein from the mRNA.
5. Click “Stop” and draw the folded shape of the amino acid chain (protein) at right. Include the amino acid abbreviations.

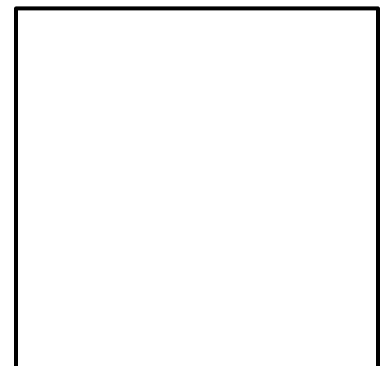


6. Click “Reset”
7. Click on the first “G” (pink) in the lower strand, choose “Substitution Mutation,” and choose “G – T”
8. Click “Show protein.”
9. Click “Stop” and draw the folded shape of the amino acid chain (protein) at right. Include the amino acid abbreviations.



10. Describe in words how the substitution mutation affected the amino acid sequence and the protein shape. Be as descriptive and detailed as possible, but if the shape is basically the same, you may write that. If the chain is a different length, include that. If there is no change, explain why.

-
11. Click “Reset”
 12. Click on the first “G” (pink) in the lower strand, and choose “Deletion Mutation.”
 13. Click “Show protein.”
 14. Click “Stop” and draw the folded shape of the amino acid chain (protein) at right. Include the amino acid abbreviations.



Name _____ Block _____ Date _____

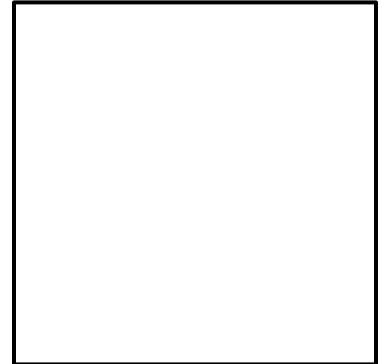
15. Describe in words how the substitution mutation affected the amino acid sequence and the protein shape. Be as descriptive and detailed as possible, but if the shape is basically the same, you may write that. If the chain is a different length, include that. If there is no change, explain why.

16. Click "Reset"

17. Click on the first "G" in the lower strand, choose "Insertion Mutation," and choose "Insert C."

18. Click "Show protein."

19. Click "Stop" and draw the folded shape of the amino acid chain (protein) at right. Include the amino acid abbreviations.



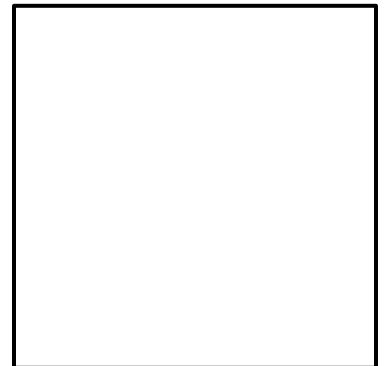
20. Describe in words how the substitution mutation affected the amino acid sequence and the protein shape. Be as descriptive and detailed as possible, but if the shape is basically the same, you may write that. If the chain is a different length, include that. If there is no change, explain why.

21. Click "Reset"

22. Click on the second "T" in the lower strand, choose "Substitution Mutation," and choose "T – G."

23. Click "Show protein."

24. Click "Stop" and draw the folded shape of the amino acid chain (protein) at right. Include the amino acid abbreviations.



25. Describe in words how the substitution mutation affected the amino acid sequence and the protein shape. Be as descriptive and detailed as possible, but if the shape is basically the same, you may write that. If the chain is a different length, include that. If there is no change, explain why.

Name _____ Block _____ Date _____

Analysis Questions

1. Rank the mutations in order of least (1) to most (4) disruptive effect on the amino acid chain.
 - Substitution Mutation, G – T
 - Deletion
 - Insertion, C
 - Substitution Mutation, T – G
2. Explain why you chose your #1 mutation and your #4 mutation.
3. For those mutations where the shape of the protein changed, is it likely that the new protein functions the same as the original protein? Explain your answer.
4. Research – What causes mutations to occur? Are mutations themselves random or not?
5. Cancer usually occurs because a protein that is supposed to control cell division stops working correctly. Based on the results of your research above:
 - a. Explain why cancer is more common in older people who have copied their DNA many more times than younger people.
 - b. Explain why certain activities such as smoking or tanning with UV light increases a person's risk of cancer.