

DNA DRY LAB

Background: This lab illustrates how the order of nucleotides in DNA determines the order of amino acids in proteins. It reinforces the concept that any change in the order of nucleotides can change the order of amino acids in proteins.

To do this exercise, you will need a copy of the genetic code (page 237 in your text). The genetic code is the “language” of mRNA instructions. This code is written in a language that has only four “letters,” A, U, G, and C. These four “letters” carry instructions for 20 different amino acids. The genetic code is read three letters at a time, so that each “word” of the coded message is three bases long. Each three-lettered “word” in mRNA is known as a codon. A codon consists of three consecutive nucleotides that specify a single amino acid that is to be added to the polypeptide.

PROCEDURE:

The following is the base sequence on one strand of a DNA molecule:

1. Give the base sequence of the complementary DNA strand on the lines provided.

#1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21 #22 - OLD DNA
 G A T G T T A C G G T C A C C A A G C G T G

 #1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21 #22 - NEW DNA

2. Draw this DNA molecule (show sugar/phosphate backbone and nitrogen bases).

3. Give the base sequence of the strand of mRNA created from the NEW DNA strand.

 #1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21 #22 -RNA

4. Draw this RNA molecule (show sugar/phosphate backbone and nitrogen bases).

5. What protein fragment (amino acids) would this mRNA code for?

Name: _____ Class: _____

_____ -NEW DNA
#1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21 #22

6. If the 8th nucleotide in the NEW DNA strand were changed from **G** to **C**, what would the resulting mRNA be?

_____ -RNA
#1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21 #22

7. What protein fragment (amino acids) would this mRNA code for?

8. If a **G** were added to the NEW DNA strand between the 7th & 8th nucleotide (where the _ is), what would the resulting mRNA look like?

_____ -RNA
#1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21 #22

9. What protein fragment (amino acids) would this mRNA code for?

10. If the 12th nucleotide in the NEW DNA strand were changed from **G** to **C**, what would the resulting mRNA look like?

_____ -RNA
#1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21 #22

11. What protein fragment would this mRNA code for?

12. What would the changes in the DNA made in questions #6, #8, and #10 be called?

13. What effect did the changes have on the proteins made?

Answer Sheet:

The following is the base sequence on one strand of a DNA molecule:

CTACGATGAATGCCAGTGGTTCGCAC

1. Give the base sequence of the complementary DNA strand.
2. Draw this DNA molecule.
3. Give the base sequence of the strand of mRNA read from the original DNA strand.
 - GAUGUUA CCG UCA CCA AGC GUG
4. Draw this RNA strand.
5. What protein fragment would this mRNA code for ?
 - start leucine arginine serine proline serine valine
6. If the 8th nucleotide in the original DNA strand were changed from G to C, what would the resulting mRNA look like?
 - GAUGUUA **G**GG UCA CCA AGC GUG
7. What would the resulting protein look like?
 - start leucine glycine serine proline serine valine
8. If a G were added to the original DNA strand after the 3rd nucleotide, what would the resulting mRNA look like?
 - GAUGUUA CCG GUC ACC AAG CGU G
9. What would the resulting protein look like?
 - start leucine proline valine threonine lysine arginine
10. If the 8th nucleotide in the original DNA strand were changed from G to C, what would the resulting mRNA look like?
 - GAUGUUA CCG UGA CCA AGC GUG
11. What would the resulting protein look like?
 - start leucine arginine
12. What would the changes in the DNA made in questions #6, #8, and #10 be called?
 - Mutations
13. What effect did the changes have on the proteins made?
 - changed which amino acids were coded for, which changed the proteins.