**Grade 12 BIOLOGY**

**Molecular Genetics Assignment - #{NAME}**

**/20K /30A /12C**

**Part A: Theory of Molecular Genetics**

**Answer True (T) or False (F**) by circling the answer. Correct any statements that are false. (5K; 3A)

T / F 1. TRUEFALSE0

T / F 2. TF1

T / F 3. TF2

T / F 4. TF3

T / F 5. TF4

**Part B: Explanatory Answer** – Choose **two** of the following questions to answer. Note that marks are scored based on the quality and depth of your response based on the indicated categories. (10K – ability to show understanding of the content related to the questions; 10A – application of the biochemistry, enzymes and metabolic processes related to the questions; 10C- use of terminology, structure of your answers)

6.

a) LONGANSWER0

or

b) LONGANSWER1

or

c) LONGANSWER2

or

d) LONGANSWER3

**Part C: Molecular Genetics Application (17A marks; 3K marks; 2C marks)**

**Instructions: Complete the following tasks and answer the questions. When finished, submit typed answers to Q 11, 13, 15, and 16 to the Google Form that you have received in your email from Mr. Dawn.**

5'#{CODINGSTRAND}3'

3'#{TEMPLATESTRAND}5'

1  10  20  30 40  50  60  70  80  90  100

Use the **eukaryotic** DNA sequence above to answer the following questions. Note that by convention all nucleic acids are written from 5' to 3' unless otherwise noted.

7. Complete the missing stretch of the DNA strand in the order that DNA polymerase would write the bases. Indicate the direction. (2A)

8. Identify (by number) the promoter region to which RNA polymerase II would bind. (1A)

9. **Where**, approximately, would transcription begin on this DNA, and **why**? (Give number of the base pair) (2A)

10. Where, approximately, would transcription end, and why? (2A)

11. Write out the code for the transcribed RNA. (2A) [Hint: To keep the rest of your work straight, number this RNA with the corresponding numbers from the original DNA.]

12. Assuming this RNA were transcribed as you have listed, without modification, where (by number) would translation begin? Why? (2A)

13. Use the genetic code to translate the polypeptide chain that would be produced by this mRNA. (2A)

14. At what position number would it stop (give the base number)? Why? (2A)

15. #{POINTMUTATION} (1A; 1C)

16. #{DELETIONMUTATION} (1A; 1C)

17. Describe three differences that would have occurred in this process if this were prokaryotic DNA. (3K)

TABLE 1.1

The Genetic Code

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***SECOND LETTER*** | | | | | | | | | |
| **First Letter** | **U** | | **C** | | **A** | | **G** | | **Third Letter** |
| U | UUU | rav32223_un0701Phenylalanine | UCU | rav32223_un0702Serine | UAU | rav32223_un0703Tyrosine | UGU | rav32223_un0704Cysteine | U |
| UUC | UCC | UAC | UGC | C |
| UUA | rav32223_un0705Leucine | UCA | **UAA** | “Stop” | **UGA** | “Stop” | A |
| UUG | UCG | **UAG** | “Stop” | UGG | rav32223_un0706Tryptophan | G |
| C | CUU | rav32223_un0707Leucine | CCU | rav32223_un0708Proline | CAU | rav32223_un0709Histidine | CGU | rav32223_un0711Arginine | U |
| CUC | CCC | CAC | CGC | C |
| CUA | CCA | CAA | rav32223_un0710Glutamine | CGA | A |
| CUG | CCG | CAG | CGG | G |
| A | AUU | rav32223_un0712Isoleucine | ACU | rav32223_un0713Threonine | AAU | rav32223_un0714Asparagine | AGU | rav32223_un0715Serine | U |
| AUC | ACC | AAC | AGC | C |
| AUA | ACA | AAA | rav32223_un0717Lysine | AGA | rav32223_un0718Arginine | A |
| **AUG** | rav32223_un0716Methionine, “Start” | ACG | AAG | AGG | G |
| G | GUU | rav32223_un0719Valine | GCU | rav32223_un0720Alanine | GAU | rav32223_un0721Aspartate | GGU | rav32223_un0723Glycine | U |
| GUC | GCC | GAC | GGC | C |
| GUA | GCA | GAA | rav32223_un0722Glutamate | GGA | A |
| GUG | GCG | GAG | GGG | G |