Protein Synthesis Natural Selection Test

|  |  |  |
| --- | --- | --- |
| Test part | Possible mark | Your mark |
| Multiple choice | 14 |  |
| Short answer | 41 |  |
| Extended answer | 10 |  |
| Total | 65 |  |

HUMAN BIOLOGICAL SCIENCE. YEAR 12. 2013.

Protein Synthesis and DNA Test.

***Multiple choice answer sheet.***

**Use a ball point or ink pen to mark an X** on the letter that represents the best answer from the choice of answers . Marks are not deducted for wrong answers.

|  |  |
| --- | --- |
| Question | Answer |
| 1 | A B C D |
| 2 | A B C D |
| 3 | A B C D |
| 4 | A B C D |
| 5 | A B C D |
| 6 | A B C D |
| 7 | A B C D |
| 8 | A B C D |
| 9 | A B C D |
| 10 | A B C D |
| 11 | A B C D |
| 12 | A B C D |
| 13 | A B C D |
| 14 | A B C D |

Multiple Choice Questions

1. Transcription during protein synthesis can be described as:

a. the copying of the template for making a protein form DNA to RNA.

b. The movement of tRNA from the nucleus to the cytoplasm.

c. The joining of Amino acids into specific sequences.

d. the combination of different peptide chains to form polypeptide chains.

2. Translation during protein synthesis can be described as:

a. the copying of the template for making a protein form DNA to RNA in the cytoplasm of the cell.

b. The movement of tRNA from the nucleus to the cytoplasm.

c. The joining of Amino acids into specific sequences at the ribosome to produce peptide chains. A template held on mRNA allows the correct sequencing of the amino acids.

d. The movement of mRNA from the nucleus to the cytoplasm.

3. For a specific gene:

a. The promoter region of is the point where the RNA polymerase binds on.

c. The promoter region of DNA is located just before the inhibiter region.

d. The promoter region of DNA is located just after the point where the RNA polymerase disconnects after transcription.

4. Which of the following DOES NOT show a nitrogen base sequence for a strand of DNA?

a. AATTCTAGGTAG

b. TTCCGTAGCTGA

c. TTCGUCTCGATC

d. ACGTTACGCGCG

5. The formation of the bond holding two amino acids together during translation:

a. Requires the formation of one ATP molecule.

b. Requires the break -down of one ATP molecule.

c. Requires the formation of one glucose molecule.

d. Requires the break down on one glucose molecule.

6. After the production, a protein is further modified by the addition of sugar, sulphate, fatty acids, or other molecules. This occurs in the:

a. Ribosomes.

b. Mitochondria.

c. Golgi apparatus.

d. Cytoplasm.

7. In fruit flies with the curly wing mutation, the wings will be straight if the flies are kept at 16 degrees Celsius. The most probable explanation for this is that

1. fruit flies with curly wings cannot survive at high temperatures
2. the environment influences wing phenotype in these fruit flies
3. height temperatures increases the rate of mutations
4. wing length in these fruit flies is directly proportional to temperature

8. Mutations can be considered as one of the raw materials of evolution because they:

|  |  |  |
| --- | --- | --- |
|  | a. | contribute to new variations in organisms |
|  | b. | are usually related to the environment in which they appear |
|  | c. | are usually beneficial to the organism in which they appear |
|  | d. | usually cause species of organisms to become extinct   1. Two nucleotide sequences found in two different species are almost exactly the same. This suggests that these species:  |  |  |  | | --- | --- | --- | |  | a. | are evolving into the same species | |  | b. | contain identical DNA | |  | c. | may have similar evolutionary histories | |  | d. | have the same number of mutations |   Use the diagram below to answer question 10.  C:\Users\g.lafferty\Pictures\8564_nfg001.jpg   1. The diagram above is an example of: 2. Comparative embryology showing that some organisms have undergone natural selection. 3. Comparative anatomy showing that some organisms are adapted to different environments. 4. Comparative anatomy showing that some organisms share a common evolutionary ancestor. 5. How bats and birds are more closely related than Bats and humans. 6. Which of the following was not available to Charles Darwin as evidence of Natural Selection? 7. Fossil evidence. 8. Protein structure. 9. Comparative anatomy. 10. Both B and C.   12. The diagram below illustrates the change that occurred in the frequency of phenotypes in an insect population over 10 generations. A probable explanation for this change would be that over time there was:  http://regentsprep.org/regents/biology/graphics/Ju9844.gif   |  |  |  | | --- | --- | --- | |  | a. | a decrease in the adaptive(selective) value of gene a | |  | b. | an increase in the adaptive (selective)value of gene a | |  | c. | an increase in the population of this insect | |  | d. | a decrease in the mutation rate of gene A | |

1. Which of the following will have the most chance of adding variation to the gene pool of an organism?
2. Germline mutation.
3. Somatic mutation.
4. Lethal mutations.
5. Lethal mutagens.
6. A characteristic that is said to be selected for:
7. Gives an organism less chance of surviving in its environment.
8. Gives an organism a greater chance of surviving in its environments.
9. Is produced by a lethal allele.
10. A small island of the coast of Venezuela.

Short answer questions

1. The following is a sequence of nitrogen bases found in part of a human cell.

AUGGCCUCGAUAACGGCCACCAUG

(i) What type of substance do these bases belong to? (1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(ii) Give a reason for your answer.

(2 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(iii) How many amino acids could this piece code for? (1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(iv) Name the process by which mRNA is formed in the nucleus.

(1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. At transcription, the DNA with the gene to be copied unwinds. This divides the length of DNA into two single unwound strands. Name and describe these two strands.

(5 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Complete this table.

|  |  |
| --- | --- |
| Structure | Function |
| Structural gene |  |
| Promoter region |  |
| RNA polymerase |  |
| mRNA |  |
| Codon |  |
| Anticodon |  |

(6 marks)

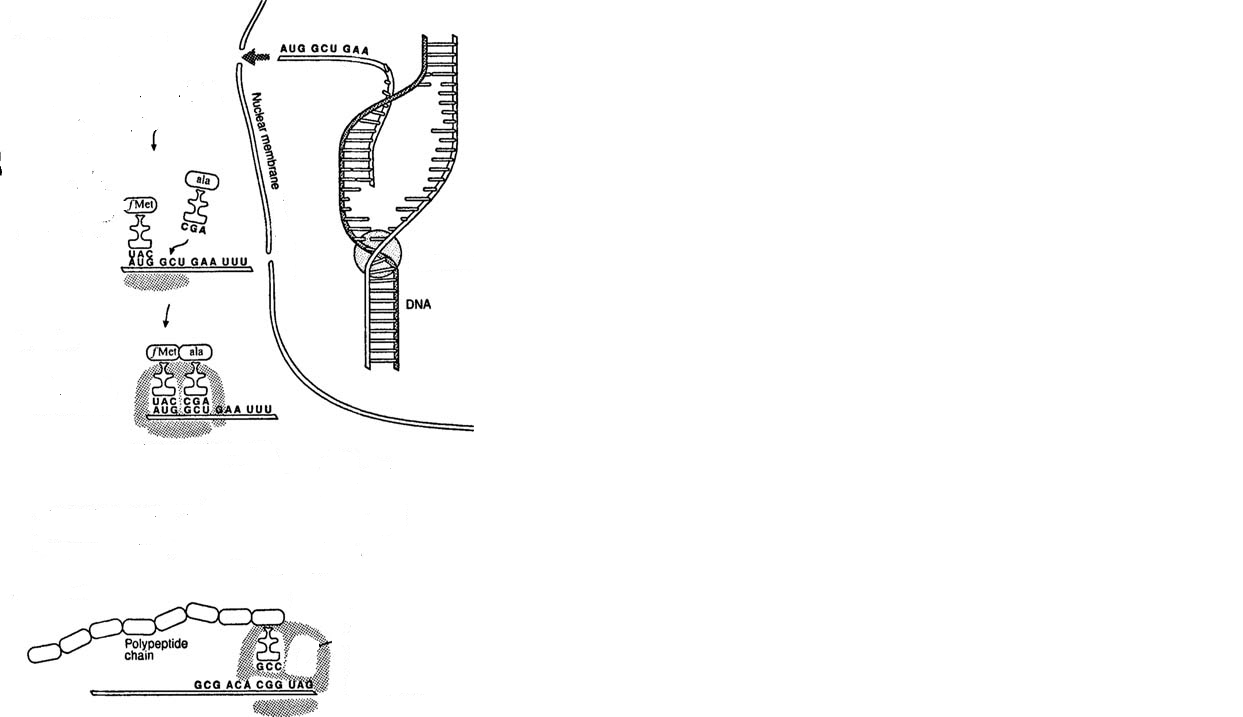
4. Complete the following steps in protein Translation.

In the cytoplasm are a kind of RNA molecule that are only 3 bases long . They are called \_\_\_\_\_\_\_\_\_ RNA . One end of these RNA molecules has a special site to which only one kind of \_\_\_\_\_\_ \_\_\_\_\_\_ can be attached. The other end of each of these RNA molecule carries a unique code which identifies it. The code is written in the usual code of a nucleic acid sequence of bases. Each amino acid carrying molecules has its own three letter code.

With the strand of \_\_\_\_\_\_\_\_ RNA bound to the ribosome and acting as a \_\_\_\_\_\_\_\_\_\_\_\_, the base pairs again are attracted to their partners. This time the attraction is between the complementary bases of the \_\_\_\_\_\_\_\_\_\_RNA and the \_\_\_\_\_\_\_\_\_ RNA. A sequence of three nucleotides in RNA bound to the ribosome, codes for each amino acid. This sequence is called a \_\_\_\_\_\_\_\_\_. There is one \_\_\_\_\_\_\_\_\_\_ for each of the twenty amino acids. The \_\_\_\_\_\_ RNAs carrying amino acids attach to the \_\_\_\_\_\_\_\_\_\_RNA by means of *base-pairing* between the \_\_\_\_\_\_\_\_\_ RNA and the \_\_\_\_\_\_\_\_\_\_\_ RNA “anticodons”. Each \_\_\_\_\_\_\_\_ RNA then donates its amino acid, in the proper order, to the growing chain of amino acids that will become a \_\_\_\_\_\_\_\_\_\_\_\_\_ chain. Special bonds called \_\_\_\_\_\_\_ bonds join the amino acids together. The \_\_\_\_\_\_\_\_\_\_\_ chains formed will in turn form \_\_\_\_\_\_\_\_\_\_\_\_\_ chains and finally \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

(9 marks)

5. Onto the diagram below use arrows to label the following: Codon, anticodon, amino acid, Nuclear pore, cytoplasm, ribosome, RNA polymerase, transfer RNA and messenger RNA.



(8 marks)

6. Which will give the greatest change to the genotype of an individual, a point DNA mutation or a chromosome mutation? Give a reason for you answer.

(2 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. Two types of mutation seen in DNA is base deletion and base substitution. Using suitable diagrams, explain both types of mutation, state which type has the potential to cause the most genetic change and give a reason for this choice.

(6 marks)

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EXTENDED ANSWER QUESTION

1. Describe the process of RNA splicing. This should be accompanied with a suitable diagram.

(10 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_