

LIFE SCIENCES

PAPER 1 | GRADE 12 | 2024

Time: 2.5 hours

Total: 150 marks

Language: English

This paper is for PRACTICE purposes only. Not an official Department of Basic Education paper.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.

2. Write ALL

QUESTION 1: DNA, RNA and Protein Synthesis

[40 marks]

1.1 The diagram below represents a section of a DNA molecule (refer to the diagram described below).

Structure A: Double helix with base pairs T-A, G-C, C-G, A-T labeled.

(a) Name the bond between the complementary bases.

(2)

Answer:

1.2 (b) Name the process by which DNA makes an exact copy of itself.

(1)

Answer:

1.3 (c) During DNA replication, the two strands separate. Explain the significance of this.

(3)

Answer:

1.4 The table below shows a section of DNA:

DNA template strand: TAC-GGA-CTT-AAT

(a) Write the complementary mRNA strand.

(3)

Answer:

1.5 (b) Identify the anticodons for the first two codons. **(2)**

Answer:

1.6 (c) Using the genetic code table, identify the amino acids coded for by codons 1 and 2.
[AUG = Methionine; CCU = Proline; GAA = Glutamic acid; UUA = Leucine] **(3)**

Answer:

1.7 Explain the difference between transcription and translation. **(6)**

Answer:

1.8 A mutation occurs in which adenine is substituted by guanine in the 3rd position of the 2nd codon.
(a) Write the new mRNA codon for position 2. **(2)**

Answer:

1.9 (b) If CCA codes for Proline, explain the effect on the protein. (Assume CCU and CCA both code for Proline) **(3)**

Answer:

1.10 Differentiate between:
(a) Genotype and phenotype (4 differences) **(4)**

Answer:

1.11 In pea plants, round seeds (R) is dominant over wrinkled (r). Two heterozygous plants are crossed.
(a) Show the cross using a Punnett square. **(3)**

Draw Punnett square:

1.12 (b) Write the genotypic ratio. (1)

Answer:

1.13 (c) Write the phenotypic ratio. (1)

Answer:

1.14 In humans, colour blindness is X-linked recessive. A carrier female marries a normal male.

(a) Determine the probability that their son will be colour-blind. (4)

Answer:

1.15 (b) Can any daughters be colour-blind? Explain. (2)

Answer:

TOTAL FOR THIS QUESTION: 40

QUESTION 2: Evolution and Natural Selection

[35 marks]

2.1 Define the term "natural selection" in the context of Darwin's theory of evolution. (3)

Answer:

2.2 Explain the concept of "survival of the fittest" using an antibiotic-resistant bacteria as an example. (5)

Answer:

2.3 Distinguish between:
(a) Analogous and homologous structures (give an example of each) (4)

Answer:

2.4 The following is fossil evidence for human evolution:
Australopithecus (3.5 Mya) -> Homo habilis (2.5 Mya) -> Homo erectus (1.8 Mya) -> Homo sapiens (0.3 Mya)
(a) What does "Mya" mean? (1)

Answer:

2.5 (b) State TWO features that changed as humans evolved from Australopithecus to Homo sapiens. (4)

Answer:

2.6 (c) What is the significance of Homo habilis in human evolution? (3)

Answer:

2.7 Compare Lamarck's and Darwin's explanations for the long neck of the giraffe. (6)

Answer:

2.8 What is meant by "reproductive isolation" and why is it important in speciation? (4)

Answer:

2.9 Explain TWO types of evidence for evolution (other than fossils). (5)

Answer:

QUESTION 3: Human Reproduction and Development

[35 marks]

3.1 The diagram below represents the female reproductive system. (Diagram described: ovary, fallopian tube, uterus, cervix, vagina labeled 1-5)

(a) Identify structures 1 to 5. (5)

Answer:

3.2 Describe the process of fertilisation, from the release of the egg to implantation. (6)

Answer:

3.3 The menstrual cycle is regulated by hormones. Complete the table:

Hormone | Produced by | Function

(Fill in: FSH, LH, Oestrogen, Progesterone) (8)

Complete table:

3.4 Explain why progesterone levels fall at the end of the menstrual cycle if no fertilisation occurs. (4)

Answer:

3.5 Describe THREE ways in which the placenta functions during pregnancy. **(6)**

Answer:

3.6 Compare oogenesis and spermatogenesis in terms of:
(a) Number of functional gametes produced from one primary cell **(2)**

Answer:

3.7 (b) Timing (age at which the process starts) **(2)**

Answer:

3.8 Explain the role of the acrosome in fertilisation. **(2)**

Answer:

TOTAL FOR THIS QUESTION: 35

QUESTION 4: Ecology (Short Questions)

[20 marks]

4.1 Define: (a) Ecosystem (b) Biome (c) Niche **(6)**

Answer:

4.2 Explain the difference between a food chain and a food web. **(3)**

Answer:

4.3 In a grassland: Grass -> Rabbit -> Hawk
If rabbits are removed, predict and explain what happens to:
(a) The grass population **(3)**

Answer:

4.4 (b) The hawk population **(3)**

Answer:

4.5 Explain the greenhouse effect and its impact on ecosystems. **(5)**

Answer:

TOTAL FOR THIS QUESTION: 20