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KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

LIFE SCIENCES

COMMON TEST

APRIL 2021

MARKS: 60

TIME: 1 hour

This question paper consists of 9 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to each question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and a compass.
11. Write neatly and legibly.

SECTION A**QUESTION 1**

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.3) in the ANSWER BOOK, for example 1.1.4 D.

1.1.1 The amniotic fluid in the amniotic egg ...

- A removes waste products
- B provides nutrition to the developing embryo
- C protects the embryo against mechanical injuries
- D allows gaseous exchange

1.1.2 The following combination of characteristics represent precocial development.

- (i) Offspring capable of moving around soon after hatching
- (ii) Offspring with eyes closed and unable to move after hatching
- (iii) Offspring capable of feeding themselves soon after hatching
- (iv) Offspring nests usually on top branches of the tree

- A (i), (ii), (iii) and (iv)
- B (ii), (iii) and (iv) only
- C (iii) and (iv) only
- D (i) and (iii) only

1.1.3 The phase of meiosis where chromatids are pulled to the opposite poles.

- A Anaphase I
- B Anaphase II
- C Metaphase I
- D Metaphase II

(3 x 2) **(6)**

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.4) in the ANSWER BOOK.

- 1.2.1 The original strand of DNA used to form another strand of DNA
- 1.2.2 A pattern of black bars representing DNA fragments that can be used to identify dead bodies
- 1.2.3 The type of RNA that attaches to the ribosome during protein synthesis
- 1.2.4 Type of fertilisation where a sperm cell fuses with an ovum outside the female body (4 x 1) **(4)**

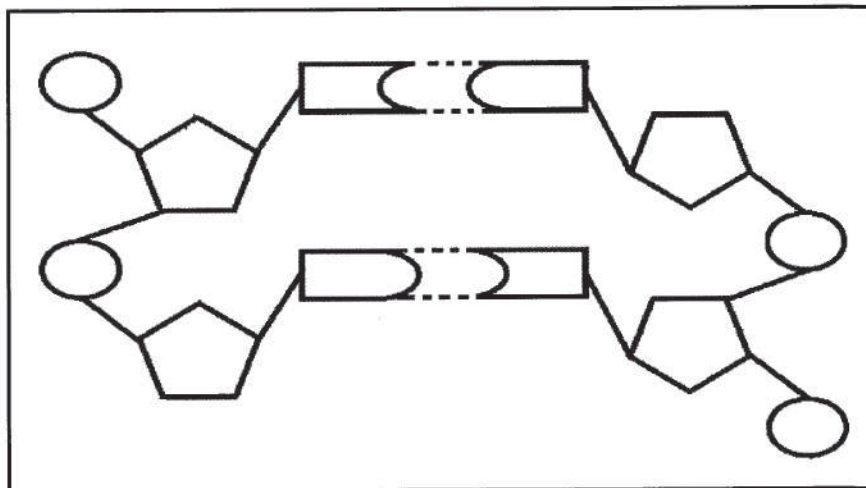
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY, B ONLY, BOTH A AND B or NONE** of the items in COLUMN II. Write **A only, B only, both A and B, or none** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Chromosomes arranged along the equator in a single row	A: Metaphase I B: Metaphase II
1.3.2	Embryo is nourished with yolk found in the egg	A: Ovipary B: Vivipary
1.3.3	Chromosome number in gametes	A: Haploid B: Diploid

(3 x 2)

(6)

1.4 The diagram below represents a part of the structure of a nucleic acid.



- 1.4.1 Identify the molecule above. (1)
- 1.4.2 Give an observable reason for your answer in QUESTION 1.4.1. (1)
- 1.4.3 Name TWO locations where the above molecule is found in animal cells. (2)
- (4)

TOTAL SECTION A: 20

SECTION B**QUESTION 2**

- 2.1 Albumin is a single chain globular protein made up of 585 amino acids. A small section of the DNA sequence coding for the formation of albumin is shown below.

TABLE A

1	2	3	4	5	6
TGC	GAG	GTG	GAT	AAG	CGT

- 2.1.1 Write down the anticodon of the DNA base triplet **6**. (1)
- 2.1.2 Describe the role of tRNA in protein synthesis. (2)
- 2.1.3 How many nitrogenous bases are found in the mRNA molecule coding for the formation of the albumin protein? Show ALL working. (2)
- 2.1.4 The table below shows the base triplets in mRNA that code for different amino acids found in albumin.

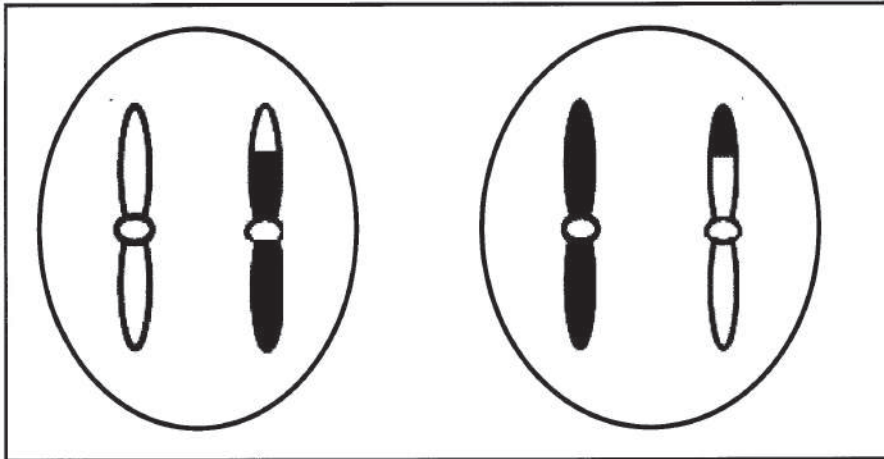
TABLE B

AMINO ACID	mRNA
Arginine	GCA
Cysteine	ACG
Lysine	UUC
Aspartic acid	CUA
Histidine	CAC
Glutamic acid	CUC

Using **TABLE B** above, name the amino acid coded for by the DNA base triplet as shown in **TABLE A**:

- (a) **1** (1)
- (b) **4** (1)
- 2.1.5 Describe the process of *transcription*. (6)
(13)

2.2 The diagrams below represent cells in a phase of meiosis.



- 2.2.1 Which phase of meiosis is represented by the diagrams above? (1)
- 2.2.2 State TWO processes that resulted in the appearance of chromosomes in the diagram above. (2)
- 2.2.3 Draw a labelled diagram to show the cell before the phase shown in the diagrams above. (4)
(7)
[20]
-

QUESTION 3

- 3.1 An investigation was conducted to determine the effect of high amounts of progesterone on FSH production in human females.

The procedure was as follows:

- 20 healthy women who are not pregnant were used.
- The women are all of the same age.
- They were divided into 2 groups (Groups **A** and **B**).
- Each group had 10 participants.
- Their FSH levels were determined and recorded before the investigation.
- Group **A** was injected with the progesterone injection which takes 13 weeks to metabolise in the body.
- Group **B** was not treated with the progesterone injection.
- Both groups were exposed to the same environmental conditions for 3 months.
- Their FSH levels were recorded on day 3 of every menstrual cycle for the duration of the investigation.
- The average FSH levels of both groups was calculated.

The results are shown in the table below.

GROUP	AVERAGE FSH LEVEL IN THE BLOOD (mIU/mL)
A	3.1
B	9.5

- 3.1.1 Identify the independent variable in the investigation. (1)
- 3.1.2 Name TWO factors that were kept constant during the selection of participants. (2)
- 3.1.3 Explain why Group **B** was included in the investigation. (2)
- 3.1.4 Explain why the average FSH level in the blood in group **A** is low. (2)
- (7)

- 3.2 The table below shows the testosterone levels in the blood of male in different ages.

AGE (YEARS)	TESTOSTERONE LEVELS (ng/dl)
35-44	667
45-54	606
55-64	562
65-74	523
75-84	470

- 3.2.1 Name the part of the male reproductive system that:
- (a) Secretes testosterone (1)
 - (b) Stores sperm cells (1)
- 3.2.2 According to the table above, what is the testosterone level in a 57 year old male? (1)
- 3.2.3 Describe the relationship between the age and the testosterone levels shown in the table above. (2)
- 3.2.4 Explain what will be the effect on reproduction if the testosterone levels of 35 year old male is 0 ng/dl? (2)
(7)
- 3.3 Describe the process of *oogenesis*. (6)
[20]

TOTAL SECTION B: 40

GRAND TOTAL: 60