KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES

COMMON TEST

MARCH 2023

MARKS: 50

TIME: 1 hour

This question paper consists of 10 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

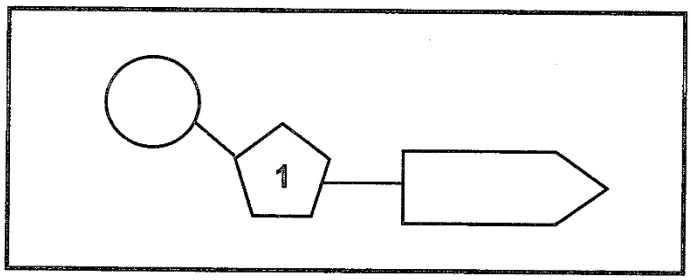
QUESTION 1

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 Which ONE of the following in a male reproductive system stores sperms temporarily?

A Vas deferens
B Seminal vesicle
C Urethra
D Epididymis

1.1.2 The diagram below shows the nucleotide of a tRNA molecule.



The correct label for part 1 is ...

A deoxyribose sugar.
B ribose sugar.
C phosphate.
D adenine.

1.1.3 Which ONE of the following is correct with regard to the biological importance of meiosis?

A Reduces chromosome number by half and ensures genetic variation in gametes
B Produces diploid gametes and ensures genetic variation
C Produces haploid gametes that are genetically identical
D Produces haploid gametes and is responsible for the development of the zygote into foetus.

(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 1.2.3) in the ANSWER BOOK.

1.2.1 The type of bond found between amino acids

1.2.2 The organelle in the cytoplasm on which protein synthesis occurs

1.2.3 A hormone that stimulates the maturation of sperms and puberty in males

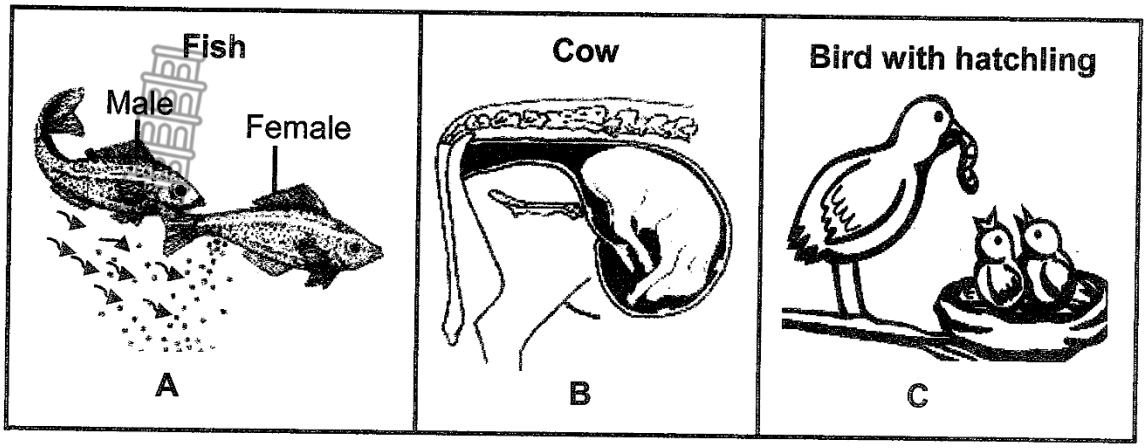
(3 x 1) **(3)**

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	Production of female gametes	A: Spermatogenesis B: Oogenesis
1.3.2	Location of DNA in a human cell	A: Nucleus B: Mitochondrion
1.3.3	The pair of chromosomes responsible for sex determination	A: Gonosomes B: Autosomes

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

1.4 The diagrams below show reproductive strategies in different organisms.



1.4.1 Which of the diagrams (**A**, **B** or **C**) belong/s to:

(a) Viviparous (1)

(b) Altricial development (1)

(c) Precocial development (2)

1.4.2 State the type of fertilisation shown by fish in diagram **A**. (1)
(5)

TOTAL SECTION A: [20]

SECTION B

QUESTION 2

2.1 The **table A** below shows part of the DNA sequence.

Table A

DNA BASE TRIPLET NUMBER	1	2	3	4	5	6
DNA SEQUENCE	ACG	TGC	ACA	ATG	TGC	CAT

2.1.1 Write down the tRNA base triplet that codes for DNA base triplet number **6**. (1)

2.1.2 Explain the role of a DNA sequence during protein synthesis. (2)

2.1.3 The **table B** below shows the mRNA base triplets that code for different amino acids.

Table B

mRNA BASE TRIPLETS	AMINO ACID
AAA	Lysine
GUG	Valine
CCU	Proline
UAC	Tyrosine
ACG	Threonine
UGC	Cysteine

With reference to **table A** of DNA sequence and **table B** of mRNA base triplets that code for different amino acids above:

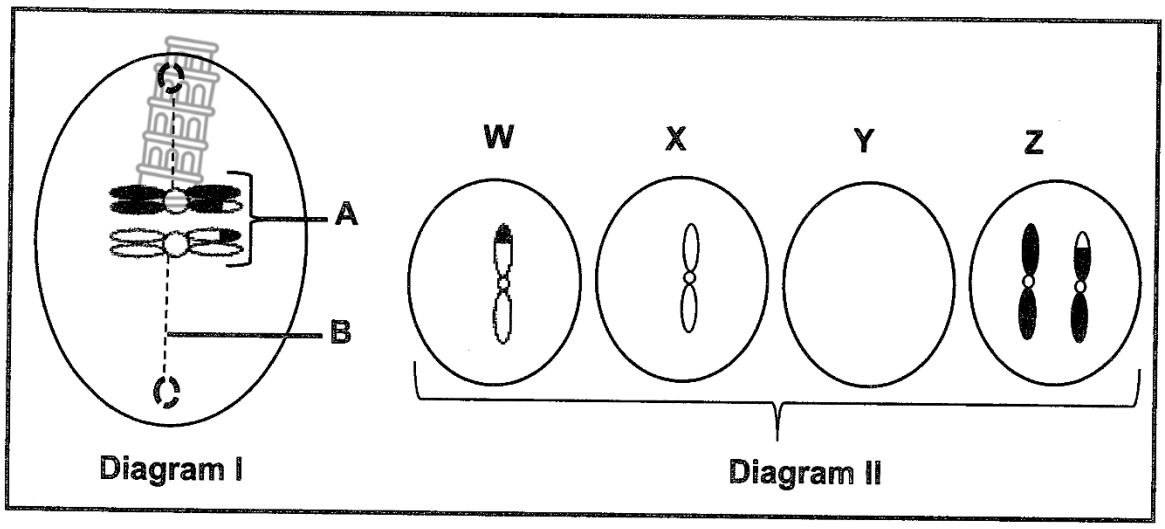
Write down the:

(a) Amino acid coded for by DNA base triplet number **5** (1)

(b) DNA base triplet that codes for tyrosine (1)
(5)

2.2 Describe the process of *DNA replication*. **(6)**

2.3 The diagrams below in no particular order show part of the phases in meiosis.



2.3.1 Identify structure:

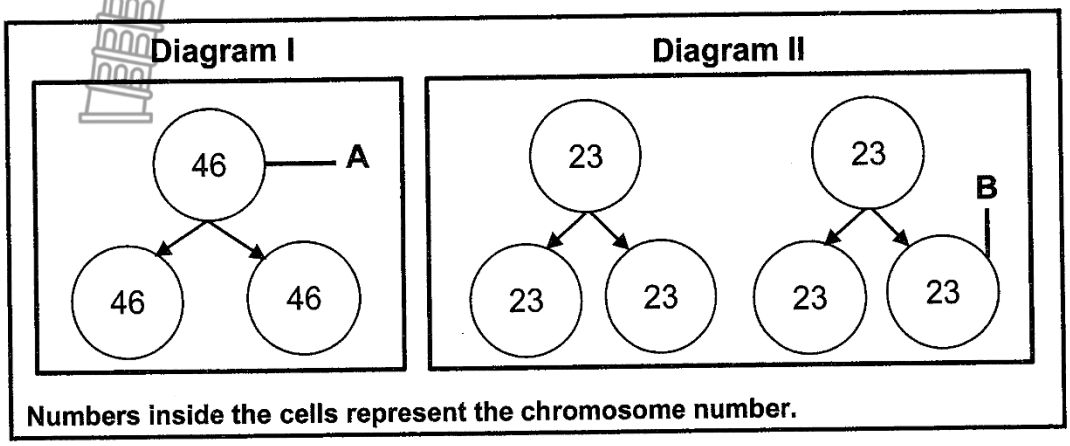
(a) A (1)

(b) B (1)

2.3.2 Explain why cell Y in diagram II does not have any chromosome. (2)
(4)
[15]

QUESTION 3

3.1 The diagrams below show part of mitosis and meiosis in human cells.

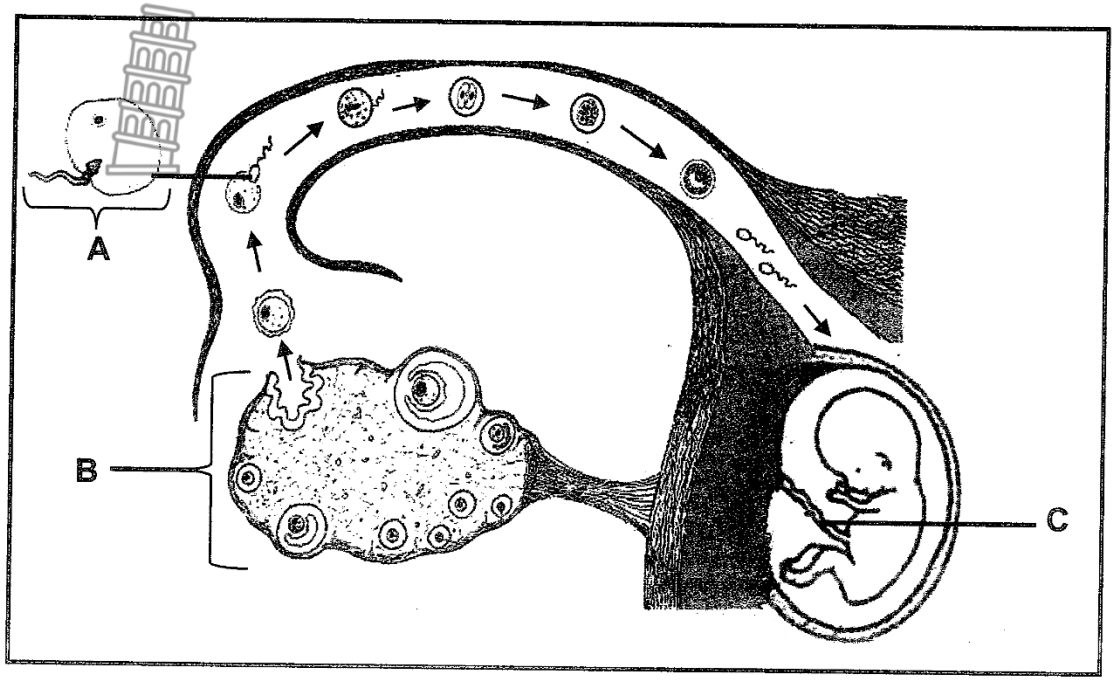


3.1.1 Name the type of cell division shown in diagram **I**. (1)

3.1.2 From the diagrams **I** and **II**, state ONE way in which mitosis is similar to meiosis II. (1)

3.1.3 Write down the LETTER only of the cell that represents the gamete. (1)
(3)

3.2 The diagram below shows the sequence of events that takes place in a part of the female reproductive system.



3.2.1 Identify process **A**. (1)

3.2.2 State ONE reason why the foetus would die if the vein in structure **C** was blocked. (1)

3.2.3 Explain the role of hormones produced by structure **B** during the menstrual cycle. (4)
(6)

3.3 An investigation was conducted to determine the effect of different amounts of progesterone on FSH level in the blood.

The procedure was as follows:

- 30 healthy, non-pregnant females of the same age were used.
- They were divided into three groups of 10 each (Group **A**, **B** and **C**).
- Their average FSH level was determined and recorded.
- Group **A** was given daily pills with progesterone which inhibits the production of FSH.
- Group **B** was injected monthly with trilostane (chemical substance) which decreases the production of progesterone more than under normal conditions.
- Group **C** was given no treatment.
- All three groups were exposed to the conditions above for 6 months.
- The average FSH level of all the groups were determined monthly.

3.3.1 Identify the dependent variable in the investigation. (1)

3.3.2 State ONE reason why the investigation was done for 6 months instead of 2 months. (1)

3.3.3 Give ONE factor that was kept constant during the investigation. (1)

3.3.4 Which group of females (**A**, **B** or **C**) would be expected to have the highest level of FSH for the duration of the investigation? (1)

3.3.5 Explain your answer in QUESTION 3.3.4. (2)
(6)
[15]

TOTAL SECTION B: [30]

GRAND TOTAL: [50]

FINAL

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GRADE 12

LIFE SCIENCES

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MARCH 2023

MARKING GUIDELINES

MARKS: 60

This memorandum consists of 6 pages

PRINCIPLES RELATED TO MARKING LIFE SCIENCES SEPTEMBER 2022

1. **If more information than marks allocated is given**
   Stop marking when maximum marks are reached and put a wavy line and 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for and descriptions are given**
   Accept if differences / similarities are clear.

5. **If tabulation is required but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognized abbreviation but credit the rest of answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognizable accept provided it does not mean something else in Life Sciences or if it is out of context**.**

13. **If common names given in terminology**
    Accept provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**
    No credit

15. **If units are not given in measurements**
    Candidates will lose marks. Memorandum will allocate marks for units separately

16. Be sensitive to the **sense of an answer, which may be stated in a different way**.

17. **Caption**
All illustrations (diagrams, graphs, tables, etc.) must have a caption

18. **Code-switching of official languages (terms and concepts)**
A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

SECTION A

QUESTION 1

1.1 1.1.1 D✓✓
1.1.2 B✓✓
1.1.3 A✓✓

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

1.2 1.2.1 Peptide✓bond
1.2.2 Ribosome✓
1.2.3 Testosterone✓

(3 x 1) **(3)**

1.3 1.3.1 B only✓✓
1.3.2 Both A and B✓✓
1.3.3 A only✓✓

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

1.4 1.4.1 (a) B✓ (1)
(b) C✓ (1)
(c) - A✓ (1)
- B✓ (1)

1.4.2 External✓fertilisation (1)
(5)

TOTAL SECTION A: 20

SECTION B

QUESTION 2

2.1 2.1.1 CAU✓ (1)

2.1.2 - Determines the sequence of mRNA bases✓
- to provide coded message✓/sequence of amino acids
- for the formation of a particular protein✓ Any (2)

2.1.3 (a) Threonine✓ (1)
(b) ATG✓ (1)
(5)

2.2
- The double helix DNA unwinds✓
- The double-stranded DNA unzips✓/weak hydrogen bonds break to form two separate strands
- Both strands are used as templates✓
- to form complimentary DNA strands✓
- using free DNA nucleotides from the nucleoplasm✓/Adenine pairing with thymine and cytosine pairing with guanine
- Two identical DNA molecules are formed✓
- Each molecule consists of one new strand and one original strand✓ Any **(6)**

2.3 2.3.1 (a) Homologous chromosome✓pair (1)
(b) Spindle fibre✓ (1)

2.3.2 - Due to non-disjunction during Anaphase II✓
- Two chromatids moved to one pole in one cell✓
- and none moved to the other pole of the cell✓ Any (2)
(4)
[15]

QUESTION 3

3.1 3.1.1 Mitosis (1)

3.1.2 No halving of chromosome number✓ (1)
(Mark the first ONE only)

3.1.3 B✓ (1)
(3)

3.2 3.2.1 Fertilisation✓ (1)

3.2.2 Foetus will not receive nutrients and oxygen✓ from the placenta (1)
(Mark the first ONE only)

3.2.3 - Oestrogen✓
- thickens the endometrium✓
- in preparation for the implantation✓

- Progesterone✓
- Further thickens endometrium✓
- to maintain pregnancy✓ Any (2 x 2) (4)
(6)

3.3	3.3.1	FSH level✓		(1)
	3.3.2	To increase reliability✓ **(Mark the first ONE only)**		(1)
	3.3.3	- Only non-pregnant females were used✓ - Females of the same age✓ - Groups of equal number✓/10 - Duration of the treatments was 6 months **(Mark the first ONE only)**	Any	(1)
	3.3.4	B✓		(1)
	3.3.5	- Trilostane decreases the production of progesterone✓ - and no inhibition of pituitary gland✓ - from producing FSH✓	Any	(2) **(6)** **[15]**

TOTAL SECTION B: 30

GRAND TOTAL: 50