KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES

COMMON TEST

MARCH 2024

MARKS: 50

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.

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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 1.1.4) in the ANSWER BOOK, for example 1.1.5 D.

1.1.1 Which ONE of the following chromosomes would be found in a normal human cell during metaphase I?

A Single thread chromosomes showing variation
B Double thread chromosomes showing no variation
C Double thread chromosomes showing variation
D Single thread chromosomes showing no variation

1.1.2 The following is a list of some functions that occur during gestation:

(i) Diffusion of oxygen from the mother to the foetus
(ii) Production of progesterone
(iii) Diffusion of excretory wastes from the mother to the Foetus
(iv) Diffusion of nutrients from the mother to the foetus

Which ONE of the following is a correct combination of the functions of the placenta?

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

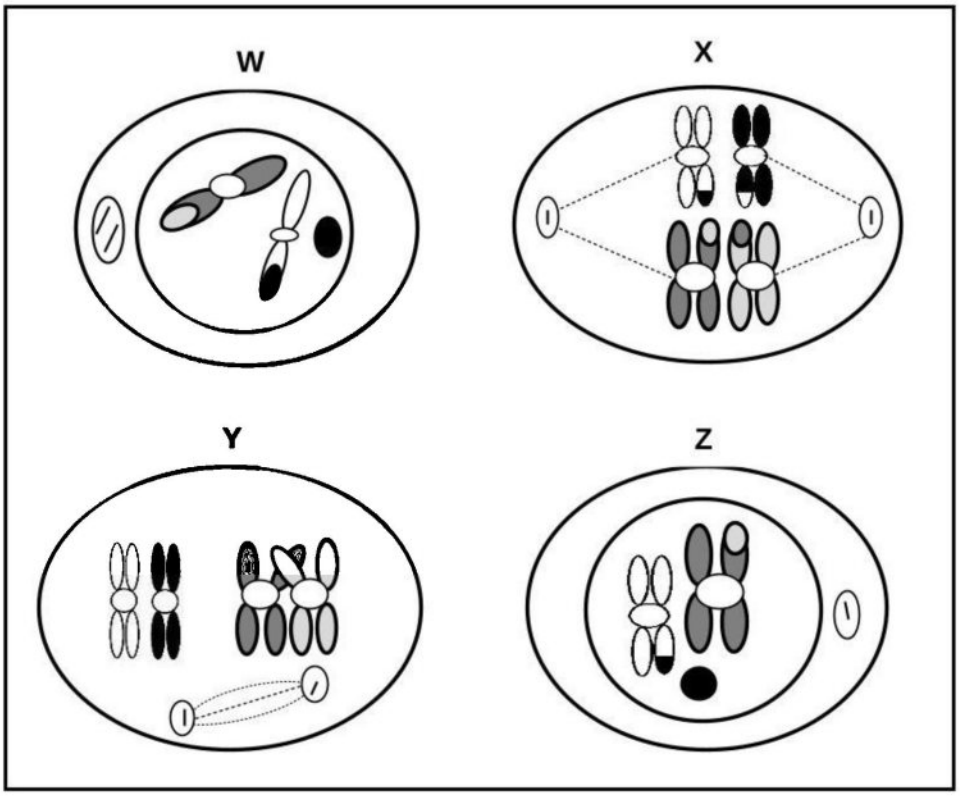
1.1.3 The Red kangaroo (Osphranter rufus) reproduces sexually and has a gestation period of 33 days. It then gives birth to an offspring.

Which ONE of the following is correct with regard to the Red kangaroo species?

A Internal fertilisation and viviparous
B Internal fertilisation and ovoviviparous
C External fertilisation and oviparous
D External fertilisation and viviparous

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1.1.4 The diagrams below show an animal cell in the various stages of meiosis in the incorrect order.



Which ONE of the following represents CORRECT diagram and phase?

	DIAGRAM	PHASE
A	**W**	Anaphase I
B	**X**	Metaphase II
C	**Y**	Prophase II
D	**Z**	Telophase I

(4 x 2) **(8)**

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 nitrogenous bases of a DNA molecule

1.2.2 The organelle in the cell that forms spindle fibres during meiosis

1.2.3 An extra embryonic membrane of the amniotic egg that is responsible for gaseous exchange and waste storage

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

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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 1.3.2) in the ANSWER BOOK.

	COLUMN I	**COLUMN II**
1.3.1	A reproductive strategy where the young is independent of their parents	A: Altricial B: Precocial
1.3.2	The importance of DNA replication	A: Doubles genetic material B: Formation of mRNA

(2 x 2) **(4)**

1.4 A short piece of the complimentary mRNA and DNA molecule that are 18 nitrogenous bases long each were analysed to determine the number of nitrogenous bases.

The results are shown in the table below.

BASES	**DNA STRAND**	**mRNA STRAND**
Adenine	-	-
Cytosine	-	-
Thymine	2	-
Uracil	-	-
Guanine	5	8

1.4.1 Name the:

(a) Monomers of the DNA strand (1)

(b) Type of sugar in the mRNA strand (1)

1.4.2 How many:

(a) Adenine bases are present in the DNA strand (1)

(b) Cytosine bases are present in the mRNA strand (1)

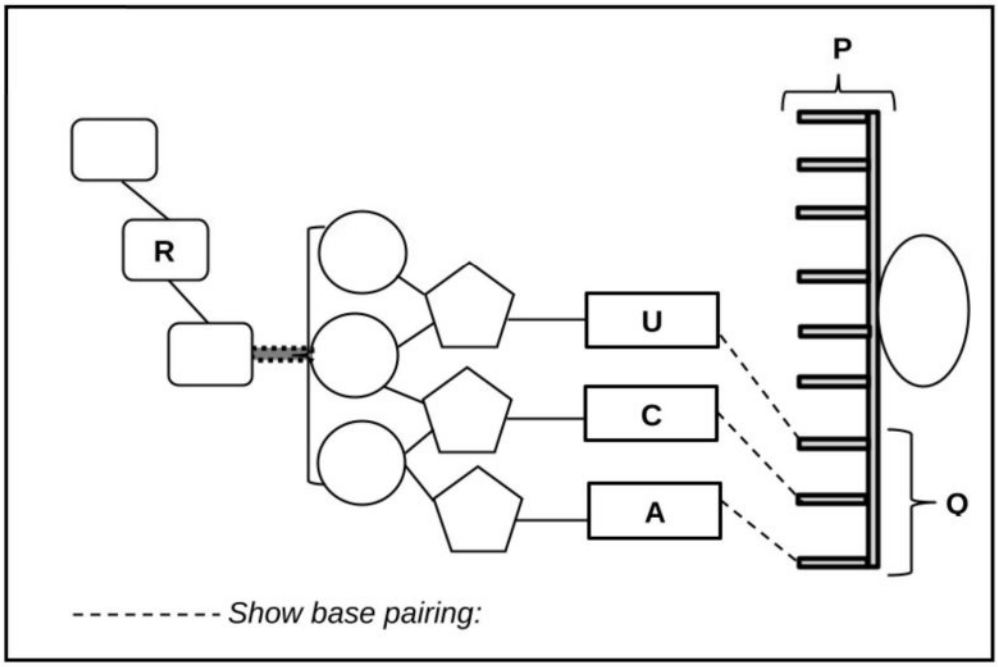
1.4.3 Give the percentage of uracil in the DNA strand from the table above. (1)
(5)

TOTAL SECTION A: 20

SECTION B

QUESTION 2

2.1 The diagram below shows part of the process of protein synthesis.



2.1.1 Identify molecule:

(a) **R** (1)

(b) **P** (1)

2.1.2 Write down the sequence of the DNA base triplet complimentary to the codon **Q**. (1)

2.1.3 State ONE significance of the nitrogenous base sequence on the mRNA molecule. (1)

2.1.4 Explain the effect if there was a change in the sequence of the DNA base triplet in QUESTION 2.1.2. (3)

2.1.5 Name the organelle where proteins are synthesised in a plant cell. (1)
(8)

2.2 Read the information below.

Down syndrome occurs in people of all races and economic levels. It occurs as a result of mutation during meiosis. Individuals with Down syndrome suffer from learning delays, distinct physical features and poor muscle development. The maternal age has an impact on the risk of Down syndrome.

The table below shows the relationship between the maternal age and risk of Down syndrome.

MATERNAL AGE	DOWN SYNDROME RISK
25	1 in 1250
31	1 in 1000
35	1 in 400
40	1 in 100

2.2.1 State TWO symptoms of Down syndrome from the information above. (2)

2.2.2 Identify the maternal age (**25**, **31**, **35** or **40**), which is expected to have the greatest risk of having a child with Down syndrome? (1)

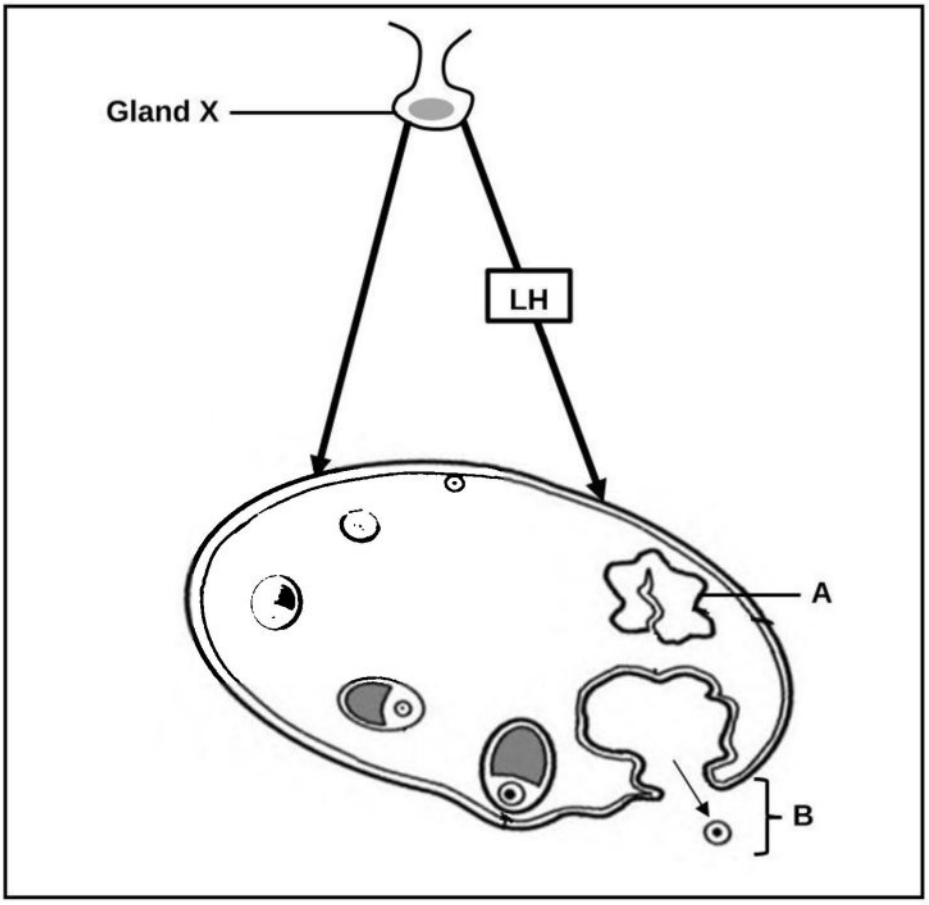
2.2.3 Calculate, how many times did the risk of Down syndrome in females increase between the age 35 and 40? Show ALL working. (2)

2.2.4 Describe the events of the phase of meiosis II that results in an abnormal gamete that leads to Down syndrome. (2)
(7)
[15]

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QUESTION 3

3.1 The diagram below shows the gland **X** and its influence within the ovary.



3.1.1 Identify:

(a) Gland **X** (1)

(b) Part **A** (1)

3.1.2 Apart from process **B**, state ONE function of Luteinizing hormone. (1)

3.1.3 Explain the effect that the *corpus luteum defect* (unable to produce enough progesterone) will have on the developing embryo. (3)

3.1.4 Central hypogonadism is a condition that happens when a pituitary gland does not release enough LH and FSH.

Explain the effect that the central hypogonadism may have on the uterus. (3)
(9)

3.2 Anastrozole medicine is used to treat subfertility in men with low testosterone level in the blood. Subfertility refers to the low number of sperm cells present in the semen.

An investigation was done to determine the effect of anastrozole medicine on the level of testosterone in men with subfertility.

Methods:

- Thirty men between 25 and 30 years affected by subfertility participated in the investigation.
- Thirty men were divided into two equal groups (**A** and **B**).
- Group **A** was not given any medicine.
- Group **B** was given 1 mg anastrozole medicine daily for five months.
- Testosterone level of each group was measured at the beginning and after the investigation.
- The average testosterone level was calculated in each group.

The results are shown in the table below.

GROUP	AVERAGE TESTOSTERONE LEVEL (ng/dL)	
	At the beginning	After five months
A	271.3	271.1
B	270.6	412

3.2.1 Identify the independent variable in the investigation. (1)

3.2.2 State ONE way in which the reliability of the results was ensured for this investigation. (1)

3.2.3 Group **A** was the control.

Explain the importance of group **A** in this investigation. (2)

3.2.4 State a conclusion for this investigation. (2)
(6)
[15]

TOTAL SECTION B: 30

GRAND TOTAL: 50

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