education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 12

LIFE SCIENCES

CONTROLLED TEST 1

13 MARCH 2026

MARKS: 150

TIME: 2 ½ hours

This question paper consists of 16 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, flow charts or tables 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 must use a non-programmable calculator, protractor and a compass where necessary.
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–D) next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, e.g. 1.1.8 D.

1.1.1 The normal site of fertilisation in a human female is the …

A uterus.
B ovary.
C vagina.
D fallopian tube.

1.1.2 Which of the following events takes place during oogenesis?

A Four daughter cells from meiosis will degenerate
B The diploid germinal epithelial cells lining the seminiferous tubules go through meiosis
C One daughter cell forms a mature ovum
D Two daughter cells will mature into an ovum

1.1.3 The amniotic fluid that surrounds the developing embryo in an egg…

A produces oxygen for the embryo.
B transports carbon dioxide to the embryo.
C protects the embryo from mechanical injury.
D transport nitrogenous waste substances to the embryo

1.1.4 The muscular layer that expands during pregnancy:

A Uterus
B Cervix
C Endometrium
D Fallopian tube

1.1.5 A chemical used in laboratories prevents spindle fibres from forming in cells undergoing meiosis. As a result, meiosis cannot start on the completion of interphase.

In an investigation, this chemical was added to cells in the anthers of the flowers of rice plants. Each cell in the anther has 24 chromosomes.

What is the expected number of chromosomes in each cell at the end of the investigation?

A 12 replicated chromosomes
B 24 replicated chromosomes
C 24 unreplicated chromosomes
D 48 unreplicated chromosomes

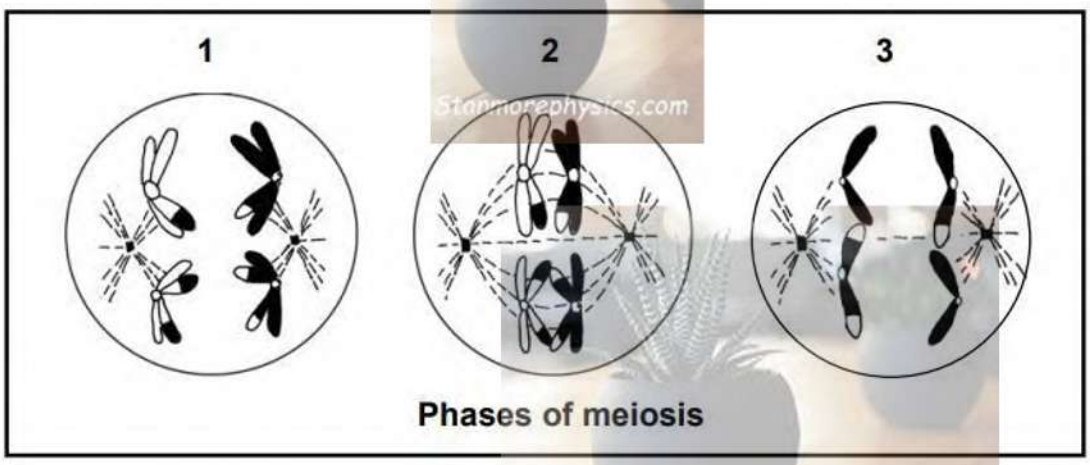
1.1.6 Study the following mRNA nitrogenous base sequence:

UGCGUGUCCAAUAGCCUU

How many amino acids will be present in the polypeptide that eventually forms from this mRNA strand?

A 3
B 6
C 18
D 1

1.1.7 The diagram shows phases of meiosis.



The correct order of the phases is:

A 2, 3 and 1
B 2, 3 and 1
C 3, 1 and 2
D 2, 1 and 3

(7 x 2) **(14)**

1.2. Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers (1.2.1 to 1.2.7) in the ANSWER BOOK.

1.2.1 Production of offspring that are born helpless, unable to move and feed themselves

1.2.2 A condition in which the cell contains two sets of chromosomes

1.2.3 The type of egg produced by reptiles that has extra-embryonic membranes

1.2.4 The release of an ovum from the ovary

1.2.5 A change in the sequence of nitrogenous bases

1.2.6 The process where chromosomes fail to separate in anaphase

1.2.7 The division of the cytoplasm

1.2.8 The bond formed between two amino acids

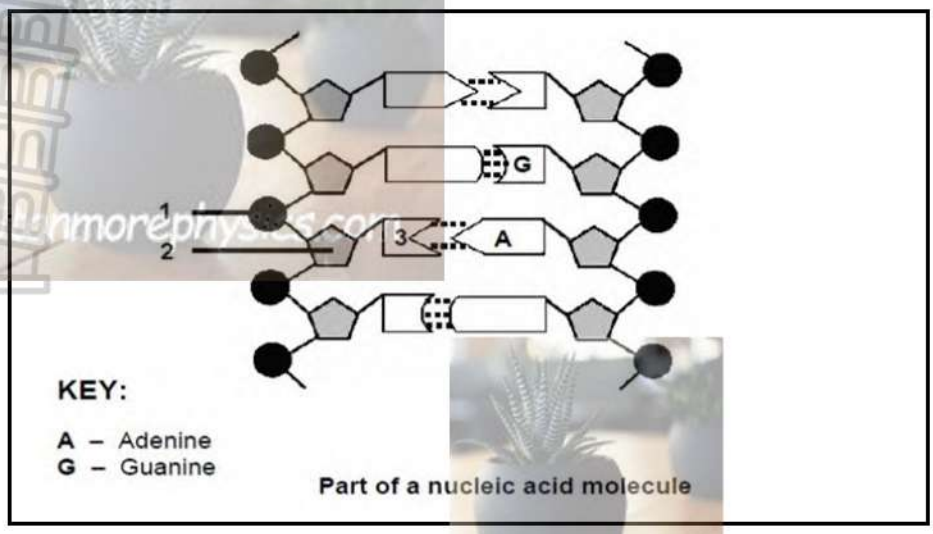
(8 x 1) **(8)**

1.3 Indicate whether each of the descriptions in COLUMN I apply 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 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	The hormone responsible for the development of secondary sexual characteristics during puberty	A: Oestrogen B: Testosterone
1.3.2	Visible during interphase:	A: Chromatin network B: Chromosomes
1.3.3	Eggs incubated in nests	A: Ovovivipary B: Viviparous
1.3.4	A section of a DNA molecule that codes for a specific characteristic	A: Genome B: Gene

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

1.4. Study the diagram of a nucleic acid.



1.4.1 Identify the type of nucleic acid shown in the diagram. (1)

1.4.2 Give ONE visible reason for your answer in QUESTION 1.4.1. (1)

1.4.3 Identify the following:

(a) **1** (1)
(b) **2** (1)
(c) **3** (1)

1.4.4 What is the collective name for the parts numbered 1, 2 and 3? (1)

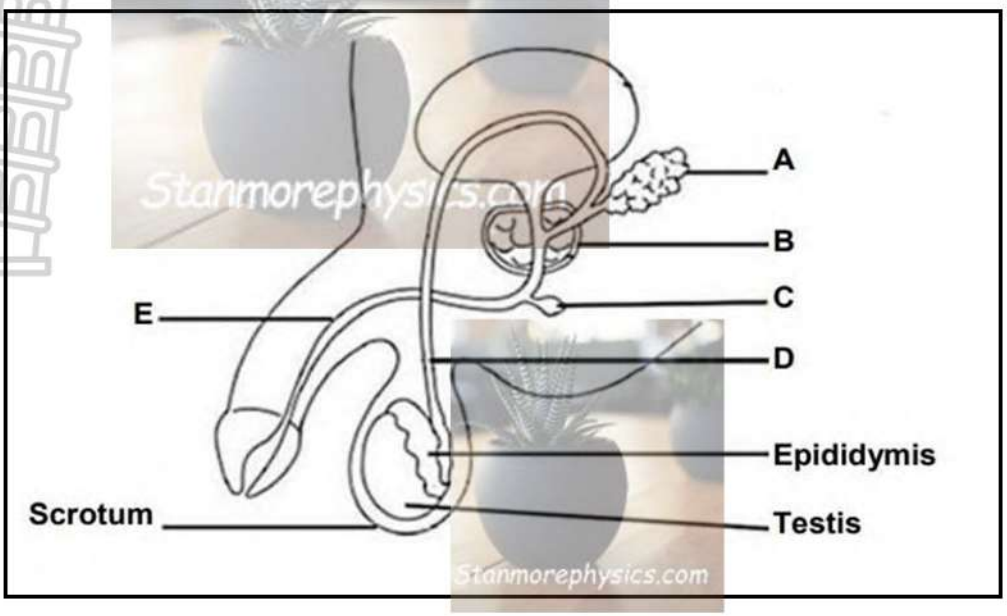
1.4.5 Name TWO structures in a non-dividing human cell where DNA is found. (2)

1.4.6 Give ONE difference between the MONOMERS found in DNA molecules and those found in RNA molecules. (2)

1.4.7 Give the names of THREE scientists that were responsible for discovering the shape as well as the base-pairing of DNA. (3)

(13)

1.5 Study the diagram of a male reproductive organ and answer questions that follow.



1.5.1 Give the LETTERS of ALL the structures that are involved in each of the following:

(a) Production of the fluid part of semen. (2)

(b) Transportation passageway of sperm cells. (2)

1.5.2 Name each of the following:

(a) Gland **B** (1)

(b) The main hormone produced by the testes (1)

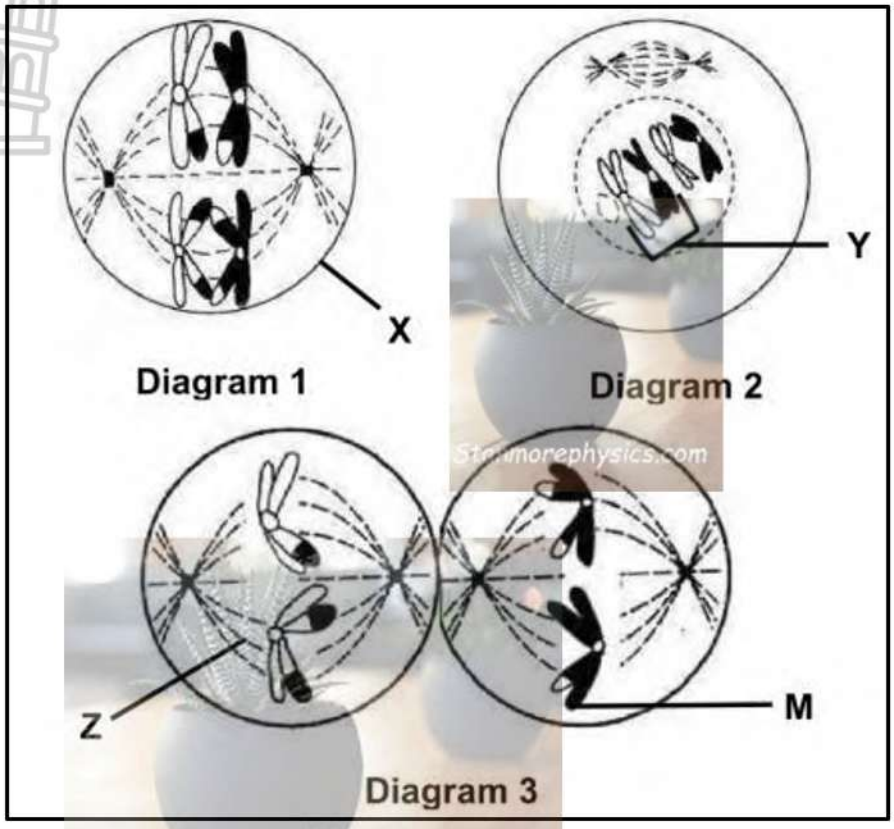
1.5.3 Name the environmental factor to which the scrotum adjusts, to ensure optimum sperm production. (1)
(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagrams below show phases of meiosis.



2.1.1 Identify structure:

(a) **X** (1)

(b) **M** (1)

(c) **Z** (1)

2.1.2 Identify the phase of meiosis in diagram **1**. (1)

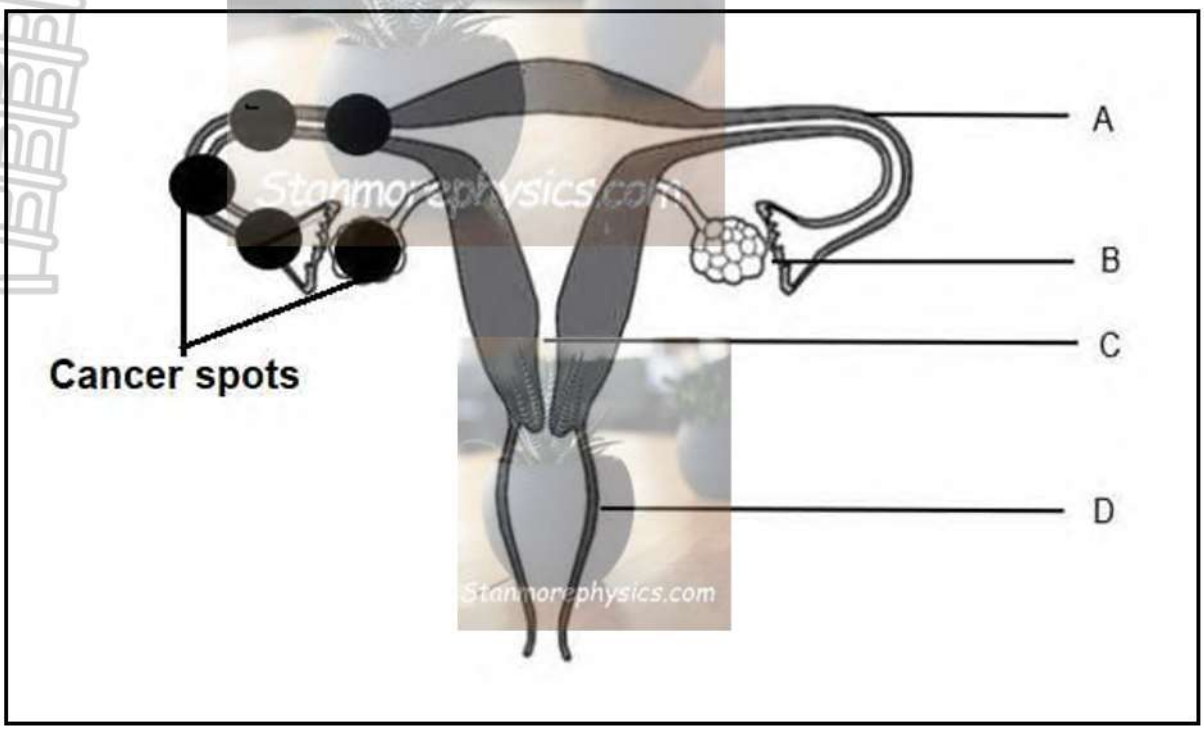
2.1.3 Give TWO observable reasons why chromosomes pair **Y** is regarded as a homologous pair (2)

2.1.4 Name and describe the process that occurs at **Y**. (3)

2.1.5 Describe the phase that takes place after the phase in diagram **1**. (3)

2.1.6 Tabulate TWO differences between mitosis and meiosis. (5)
(17)

2.2 The diagram illustrates the female reproductive system.



2.2.1 Give the LETTER of the part where the following takes place:

a) Sperm cells are introduced (1)

b) The embryo is implanted (1)

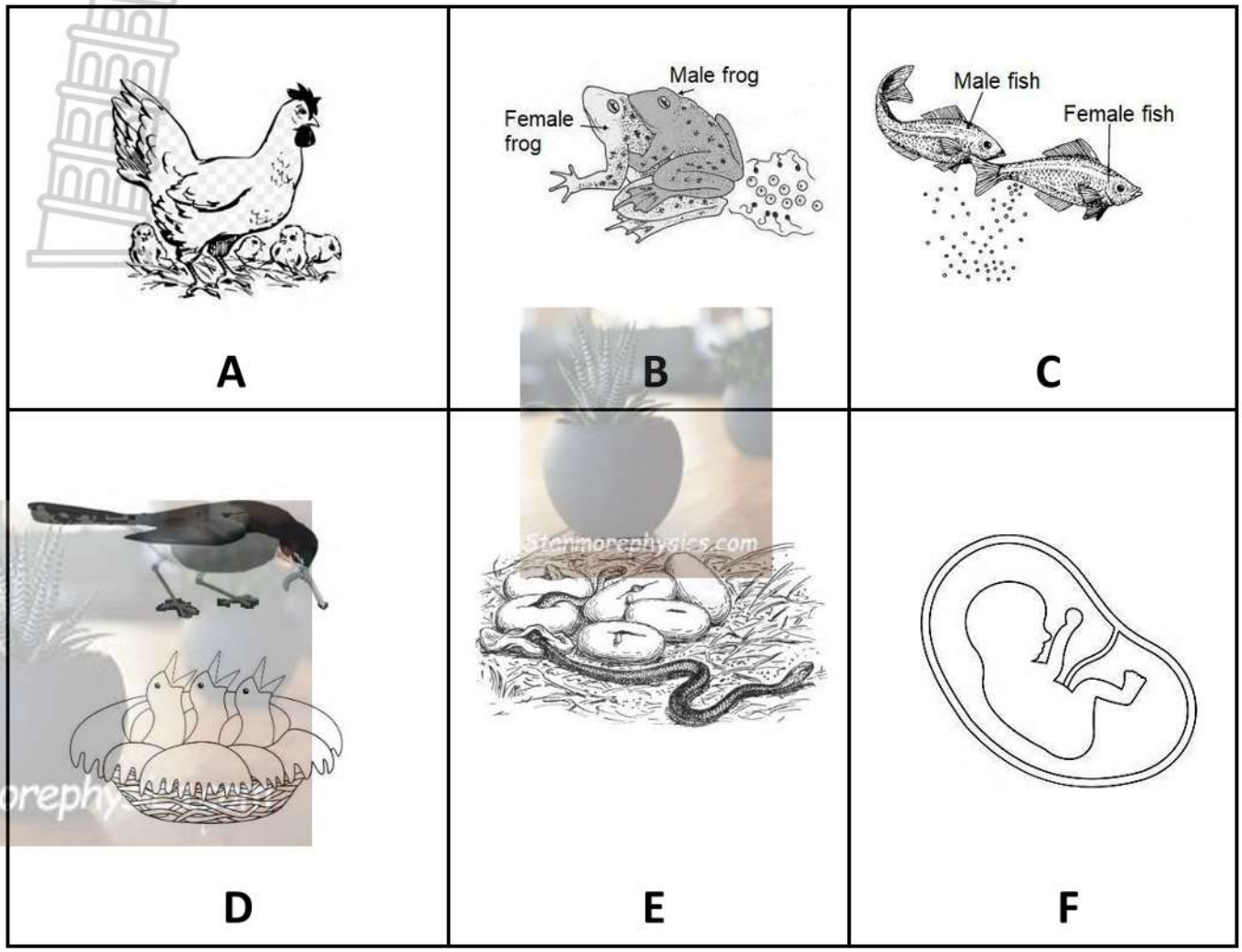
2.2.2 Explain ONE adaptation of part **A** for its function. (2)

2.2.3 Cancer was detected in this female reproductive system as indicated. Will it be possible for this female to get pregnant? (1)

2.2.4 Explain you answer in QUESTION 2.2.3. (2)

2.2.5 Describe the process of oogenesis (5)
(12)

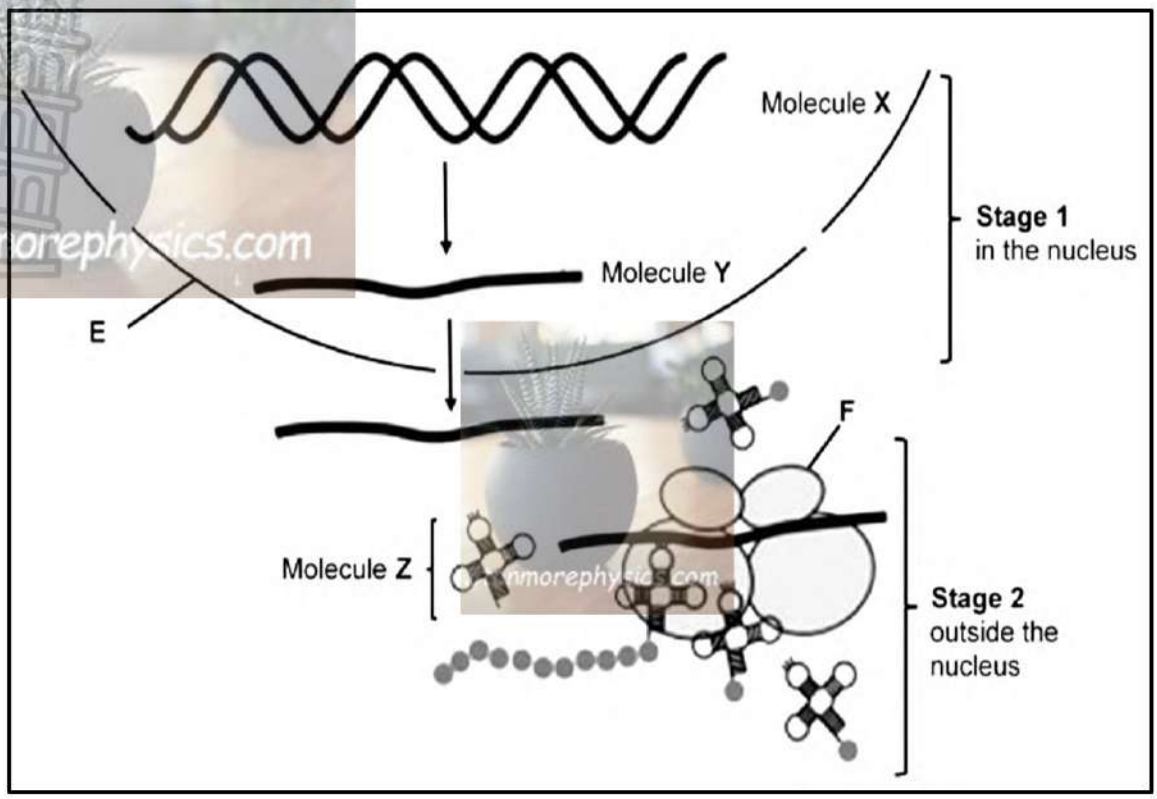
2.3 The diagrams below show animals with different reproductive strategies.



2.3.1 Give the LETTER only of the organism(s) with the following reproductive strategies:

(a) External fertilisation with precocial development (1)
(b) Altricial development (1)
(c) Ovipary (1)
(d) Vivipary (2)
(5)

2.4 The following diagram represents stages of protein synthesis.



2.4.1 Identify:

(a) Structure **E** (1)

(b) Molecule **X** (1)

2.4.2 Name and describe the events that occurs at stage **2**. (6)

2.4.3 The sequence of nitrogenous bases shown below belongs to a section of a DNA molecule.

AAA – GTA – CTG – CGC

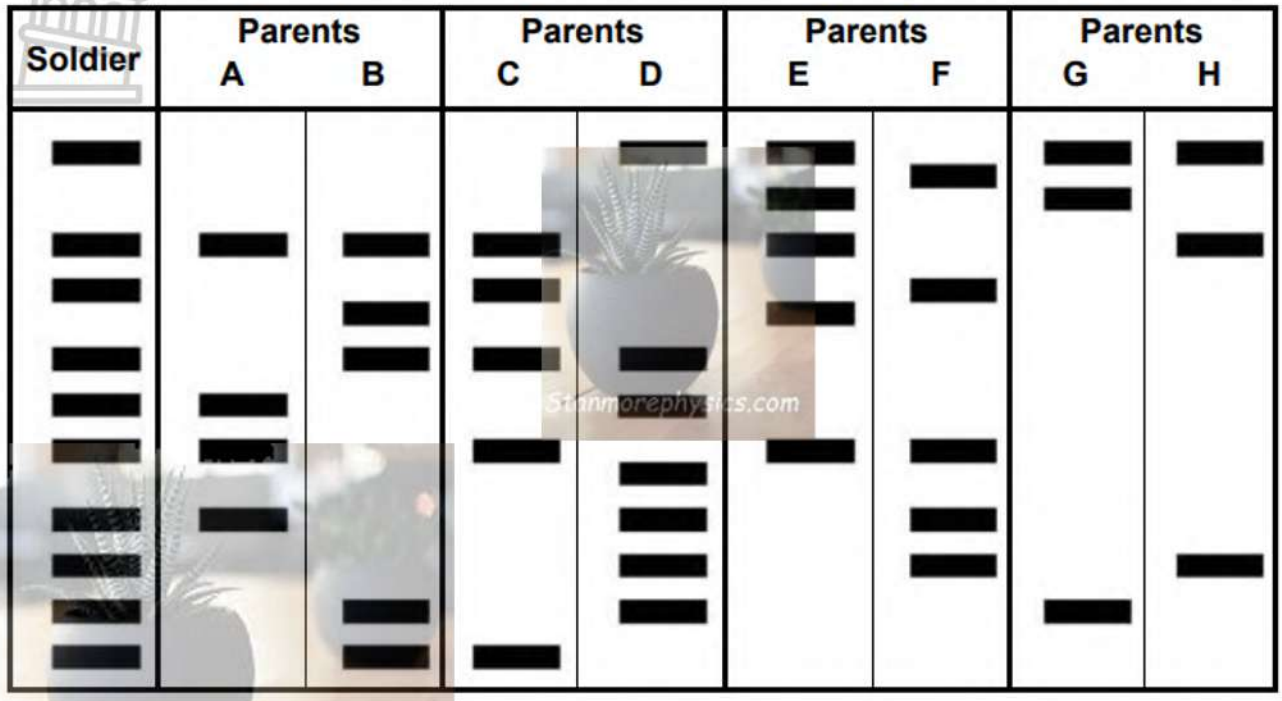
(a) Give the sequence of nitrogenous bases on molecule **Y**, if Y formed from this section of DNA. (2)

(b) Give the corresponding anticodon to triplet 2 from left to right in the sequence. (2)

(12)

2.5 Four soldiers are missing from an army unit. The unit finds the body of one of the missing soldiers who has been killed in an explosion. There are no identifiable features on the body, and the identification tags are missing.

The army asks the parents of the four missing soldiers for a DNA sample so that they can compare the DNA profiles of the parents with the DNA profile of the soldier that was killed.



2.5.1 Which set of parents are the parents of the deceased soldier? (1)

2.5.2 Explain your answer to QUESTION 2.5.1. (2)

2.5.3 Mention ONE other use of DNA profiling. (1)
(4)
[50]

QUESTION 3

3.1 DNA samples from a patient with an illness showed that there were two different types of DNA present. The investigator conducted a study to determine the nitrogenous base composition of two types of DNA.

One section of DNA was from a human (double stranded) and the other was from a virus. The virus DNA was surprisingly single-stranded. The two types of DNA were isolated, put into different test tubes and analysed. The analysis of the nitrogenous base composition of each type of DNA is shown in the table below.

Type of DNA	Nitrogenous base composition %			
	Adenine	Cytosine	Guanine	Thymine
Type 1	22.1	27.9	27.9	22.1
Type 2	31.1	31.3	18.7	18.9

3.1.1 Identify the:

a) Independent variable (1)

b) Dependent variable (1)

3.1.2 Draw a bar graph that shows the composition of nitrogenous bases in the DNA of type 2. (6)

3.1.3 List TWO ways to improve the reliability of this study. (2)

3.1.4 State TWO ways in which the validity of this study can be ensured. (2)

3.1.5 Calculate the ratio of guanine to cytosine in the type 2 DNA. (3)

3.1.6 Which DNA type (Type 1 or Type 2) is most probably the virus DNA. Give a reason for your answer. (2)

3.1.7 State TWO objections that people may have against keeping a DNA database of all citizens in the country. (2)
(19)

3.2 Read the extract below and answer the questions that follow.

ROMANCE OF THE SEAS: STRANGE MATING HABITS OF THE SEAHORSE

Seahorses display internal fertilisation. During mating, the female seahorse deposits her pear-shaped egg cells into the male's brood pouch, a specialised structure on his abdomen. Inside this pouch, the male fertilises the egg cells and provides a safe environment for the developing embryos. The walls of the brood pouch have a rich blood supply and provide oxygen and nutrients to the embryos, but the developing young are nourished mainly by their egg yolk.

This mode of reproduction is called ovovivipary, in which embryos develop inside eggs retained within the parent's body until they hatch internally or just before birth. The male then gives birth to tiny, fully independent offspring.

Shortly after the male gives birth, the female already has new egg cells ready, so they can mate again right away. This increases the chances of successful fertilisation and rapid reproduction.

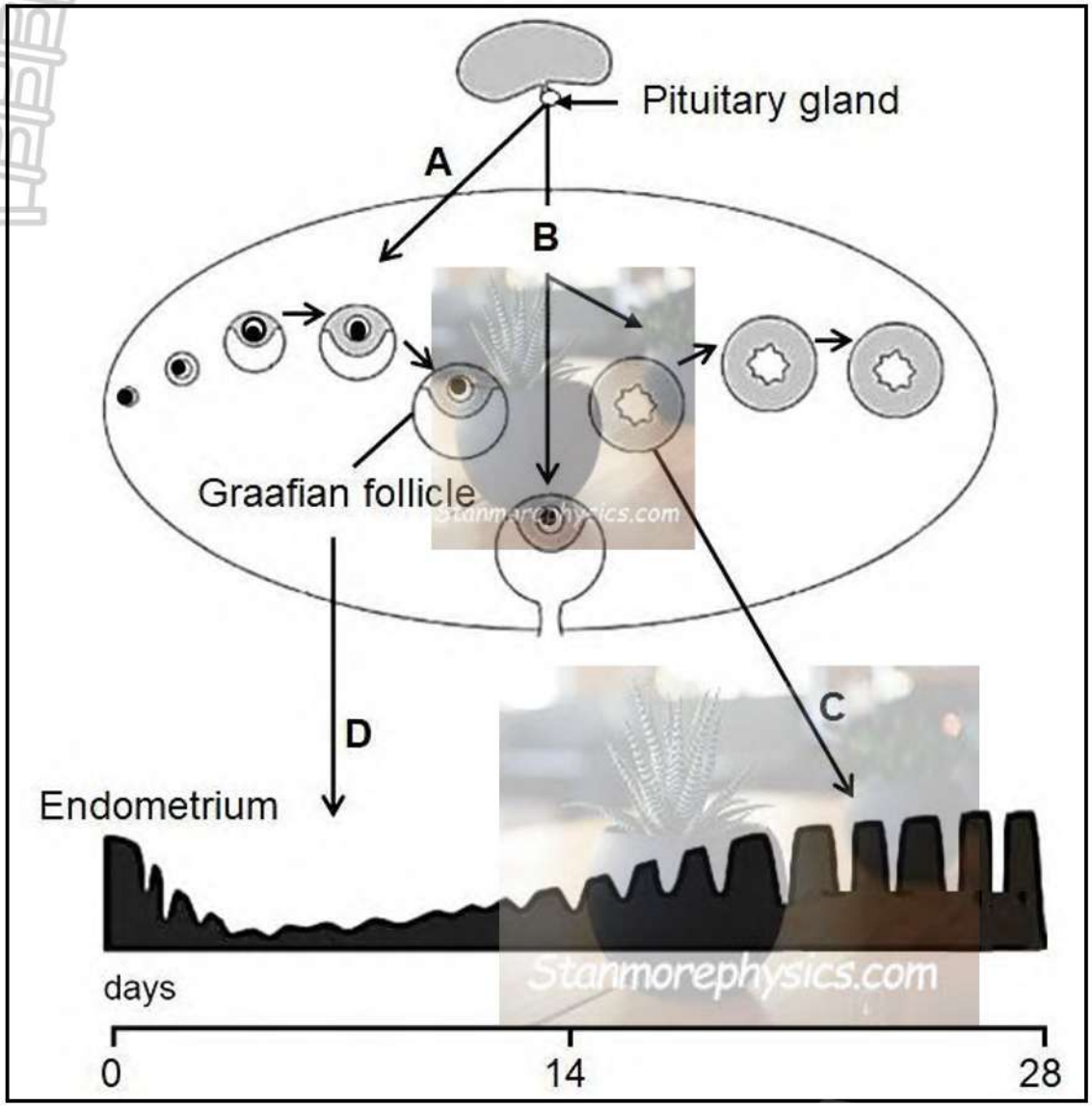
3.2.1 Fertilisation in seahorses takes place internally.

State TWO advantages of internal fertilisation. (2)

3.2.2 Name TWO ways, apart from nutrition, in which the developing embryos benefit from the brood pouch of the male seahorse. (2)

3.2.3 Explain ONE manner in which the chances of survival are increased in seahorses. (2)
(6)

3.3 The diagram below represents some changes that occur in the human female body during the menstrual cycle. The letters A to D represent hormones.



3.3.1 Identify hormones **A**, **B**, **C** and **D**. (4)

3.3.2 On which day of the cycle did ovulation take place? (1)

3.3.3 Is the female above pregnant? Give TWO reasons for your answer. (3)

3.3.4 Explain the negative feedback mechanism between hormones **A** and **C** if fertilisation occurs. (4)
(12)

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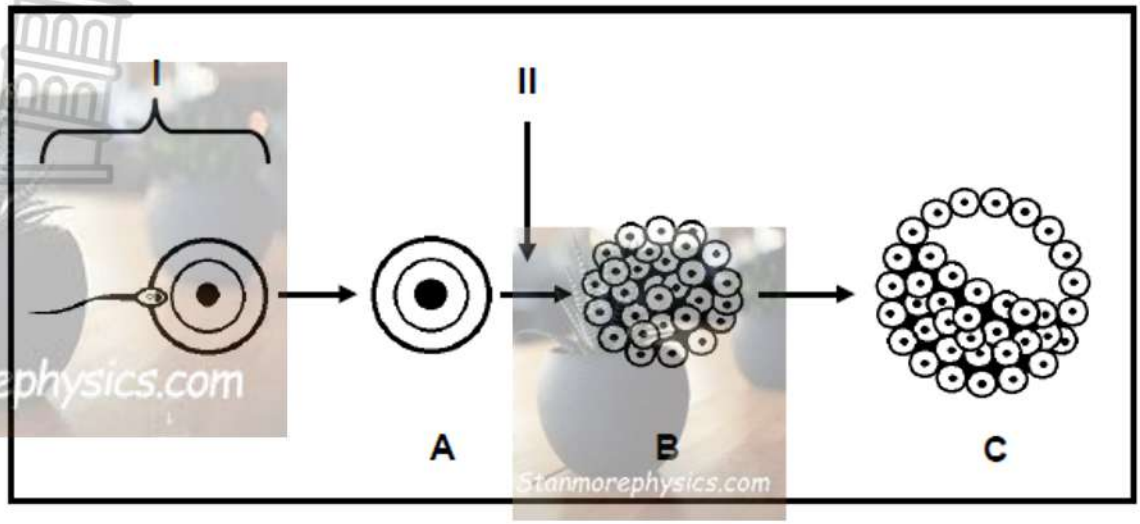
3.4 The diagram below represents a sequence of events that may take place inside the human female reproductive system.



3.4.1 Identify the type of fertilisation found in humans. (1)

3.4.2 State the type of cell division that takes place at **II**. (1)

3.4.3 Identify the stage of development indicated by:

(a) **A** (1)

(b) **B** (1)

(c) **C** (1)

3.4.4 Make a labelled drawing of a sperm cell. (5)

3.4.5 Discuss the consequences if the ovum in the diagram above has two copies of chromosome 21. (3)
(13)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150