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Department of Education

North West Province

REPUBLIC OF SOUTH AFRICA

NGAKA MODIRI MOLEMA DISTRICT

GRADE 12

LIFE SCIENCES CONTROLLED TEST 1

17 MARCH 2023

MARKS: 150
TIME: 2½ hours

This question paper consists of 16 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start the answer 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 where necessary.
11. Write neatly and legibly.
12. Round off all calculations to two decimals after the comma

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SECTION A

QUESTION 1

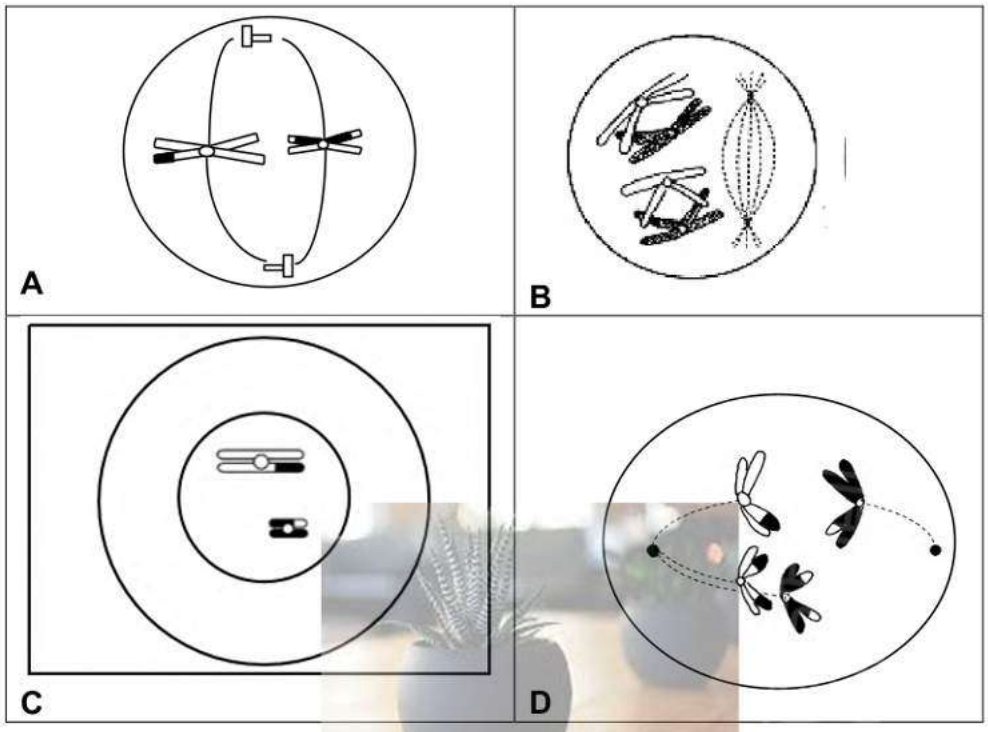
1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question numbers (1.1.1 to 1.1.8) in the ANSWER BOOK, for example 1.1.9 D.

1.1.1 Which ONE of the following differences between DNA replication and transcription is incorrect?

	DNA replication	Transcription
A	Two strands serve as templates	One strand serves as a template
B	Adenine pairs with thymine	Thymine pairs with Uracil
C	Two identical DNA molecules are formed	One m-RNA molecule is formed
D	The whole DNA molecule unzips	Only the section where a certain gene is located, unzips

Questions 1.1.2 and 1.1.3 refer to the following diagram of 4 cells.

1.1.2 Which diagram illustrates non disjunction?



1.1.3 Which diagram above shows random arrangement of chromosomes?

1.1.4 Sex chromosomes are also called ...

A autosomes.
B gametes.
C somatic cells.
D gonosomes.

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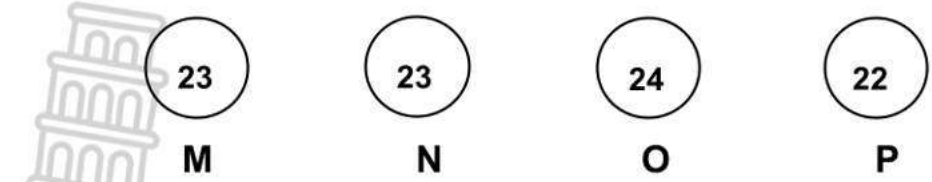
1.1.5 The following is a representation of the chromosome number in female gametes after abnormal meiosis took place.



Which one of the following statements is correct?

A The number of chromosomes in cell M and N was caused by mitosis.
B If cell P is fertilised with a normal sperm the offspring will have Down syndrome
C The number of chromosomes in cell N is haploid
D If cell O is fertilised with a normal sperm cell the offspring will have 46 chromosomes

1.1.6 Which ONE of the following is a reproductive strategy that involves the hatching of eggs in the female reproductive system?

A Ovipary
B Ovoviviparity
C Vivipary
D Hatching

1.1.7 How many chromatids are found in a pair of homologous chromosomes?

A One
B Two
C Four
D Eight

1.1.8 The correct sequence of the developmental stages during spermatogenesis is …

A germinal epithelial cells - spermatozoa - spermatogonia.
B germinal epithelial cells - spermatids - spermatozoa.
C spermatids - spermatogonia - spermatozoa.
D spermatogonia - spermatozoa - germinal epithelial cells.

1.1.9 What percentage of adenine bases is present in a DNA molecule with 2 000 bases, if 400 of the bases are cytosine?

A 20%
B 30%
C 40%
D 60%

(9 x 2) **(18)**

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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 1.2.9) in your ANSWER BOOK.

1.2.1 The division of the cytoplasm immediately after the nuclear division.

1.2.2 A cell that contains a full set of chromosomes.

1.2.3 The structure that keeps two chromatids of a chromosome together

1.2.4 The type of sugar found in an RNA molecule.

1.2.5 The hormone that stimulates the formation of corpus Luteum.

1.2.6 The process of converting the information carried by m-RNA to the correct sequence of amino acids to form a particular protein.

1.2.7 The process during prophase 1 which results in genetic variation.

1.2.8 Formation of female gametes during cell division.

1.2.9 A type of developmental strategy whereby the embryos develop inside the uterus of the female.

(9 x 1) **(9)**

1.3 Indicate whether each of the statements 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 1.3.6) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	A hormone that remains high during pregnancy	A: Follicle Stimulating hormone B: Progesterone
1.3.2	A bond between two amino acids	A: Polypeptide chain B: Hydrogen bond
1.3.3	The bursting of the graafian follicle to release an ovum	A: Ovulation B: Menstruation
1.3.4	Site for DNA Replication	A: Interphase B: Prophase
1.3.5	A place in the plant cell where DNA is found	A: Nucleus B: Mitochondrion

(5 x 2) **(10)**

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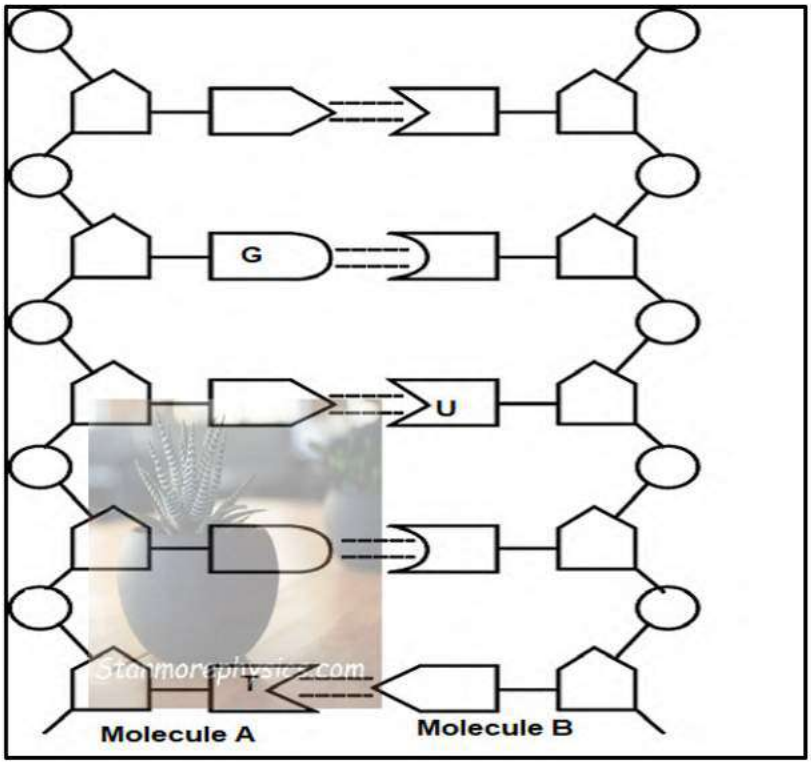
1.4 The diagram below that represents a stage of protein synthesis.



1.4.1 Identify molecule A. (1)

1.4.2 Give a reason for your answer in Question 1.4.1. (1)

1.4.3 Write down the correct sequence of bases on molecule A from top to bottom (1)

1.4.4 Where in the cell does stage of protein synthesis is represented in the diagram above occur. (1)

1.4.5 How many ...

a) ribose molecules are shown in the diagram above? (1)

b) nucleotides are shown in the diagram above? (1)
(6)

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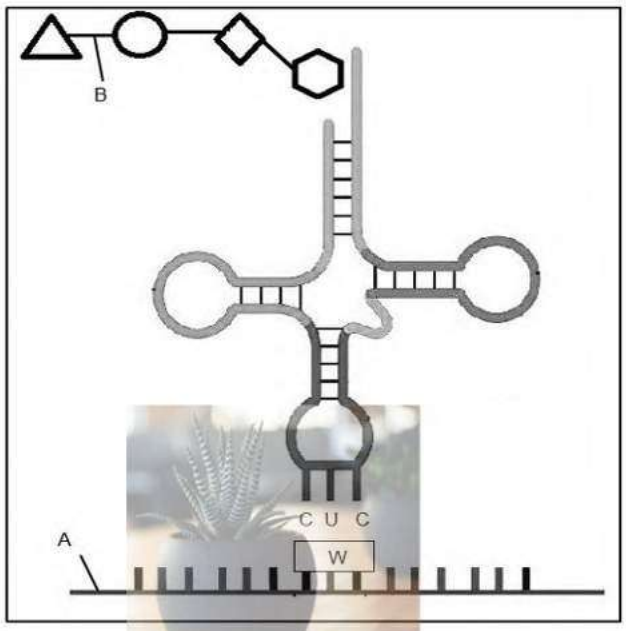
1.5 The diagram below show two molecules that are required during proteins synthesis.



1.5.1 Identify

a) Molecule **A** (1)

b) The bond at **B** (1)

c) The base triplet sequences for **W** (2)

1.5.2 Name the organelle at which this phase of protein synthesis takes place. (1)

1.5.3 Name the nitrogenous base represented by **U** in the diagram. (1)

1.5.4 Identify the collective name given to the base triplet that is complementary to base triplet **W** shown on the diagram (1)

(7)

TOTAL QUESTION 1 50

TOTAL SECTION A 50

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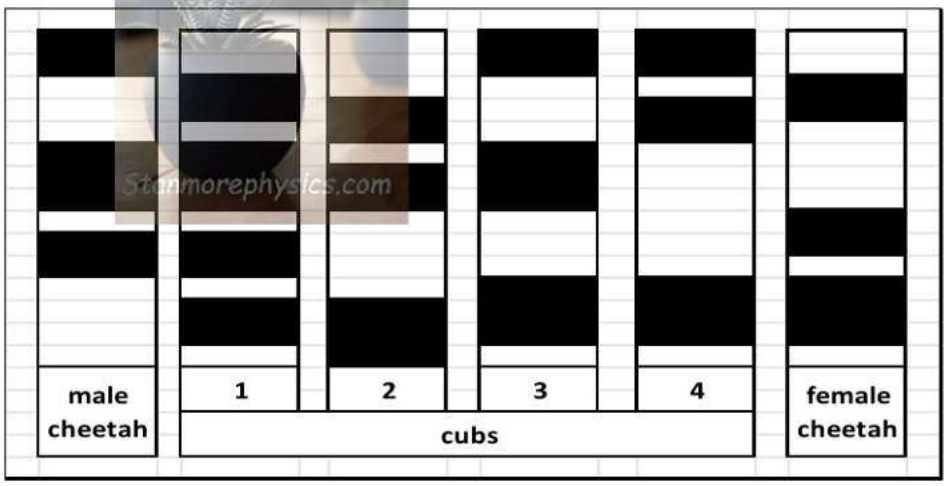
SECTION B

QUESTION 2

2.1 A study was carried out on a male cheetah, a female cheetah and a group of cubs. Samples of DNA were extracted from the animals and analysed.

The results are shown in the diagram below in which the dark bands represent fragments of DNA of a specific length.



2.1.1 Name the technique which is used and represented in the diagram above. (1)

2.1.2 Which of the cubs is/are not the offspring of the male and female cheetah studied in this investigation. (1)

2.1.3 Explain your answer to QUESTION 2.1.2 (2)

2.1.4 Name **TWO** other uses of the technique mentioned in QUESTION 2.1.1 (3)
(6)

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2.2 Table 1 shows the DNA base triplets that code for different amino acids.

Table 1

Amino acid	Base triplet of DNA template
Proline	GGG
Phenylalanine	AAA
Glycine	CCT
Lysine	TAT
Proline	GGT
Alanine	TTA

Table 2 shows a part of the sequence of anticodons that code for a polypeptide.

Table 2

Amino acid	1	2	3	4
tRNA Base triplet	GGG	CCU	GGU	UUA

2.2.1 Identify, using the tables above, amino acids 2 and 4. (2)

2.2.2 How many different amino acids will be coded for by the tRNA base triplets in Table 2? (1)

2.2.3 Describe how the composition of the protein molecule changes if the base sequence of a codon changes from CCC to CCA (2)

2.2.4 Name and describe the process that results in the formation of mRNA. (5)
(10)

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2.3 A chicken farmer wanted to know if amount of peanuts given to chickens had an effect on the mass of eggs laid by the chickens

- The investigation was scientifically planned and variables were strickly controlled.
- Non-salted, unshelled Spanish peanuts were placed in a kitchen blender and ground into small granules.
- The peanut mixture was added to the normal diet of chickens.
- 200 hens, of the same age and type were divided into four groups and fed with different amounts of peanuts mixed into their normal diet.
- The hens were fed daily over a period of 1 week.
- The eggs layed on the 7th day were collected from each group and weighed with an electronic scale.

The results are tabulated as follows:

GROUP	AMOUNT OF PEANUTS MIXED INTO 1KG DIET	AVERAGE MASS OF EGGS
1	No peanuts	57 g
2	50 g	60 g
3	100 g	65 g
4	150 g	No eggs produced

2.3.1 Identify the following variables in this investigation:

(a) Dependent variable (1)

(b) Independent variable (1)

2.3.2 Name **TWO** fixed variables not mentioned in the method above, which had to be controlled to make this investigation valid. (2)

2.3.3 Describe **ONE** way in which reliability of the investigation was improved? (1)

2.3.4 Explain why the first group of hens had no peanuts added to their food. (2)

2.3.5 Describe the conclusion of this investigation. (2)

2.3.6 Explain the differences in the amount of egg yolk between an altricial bird and a precocial bird (4)
(13)

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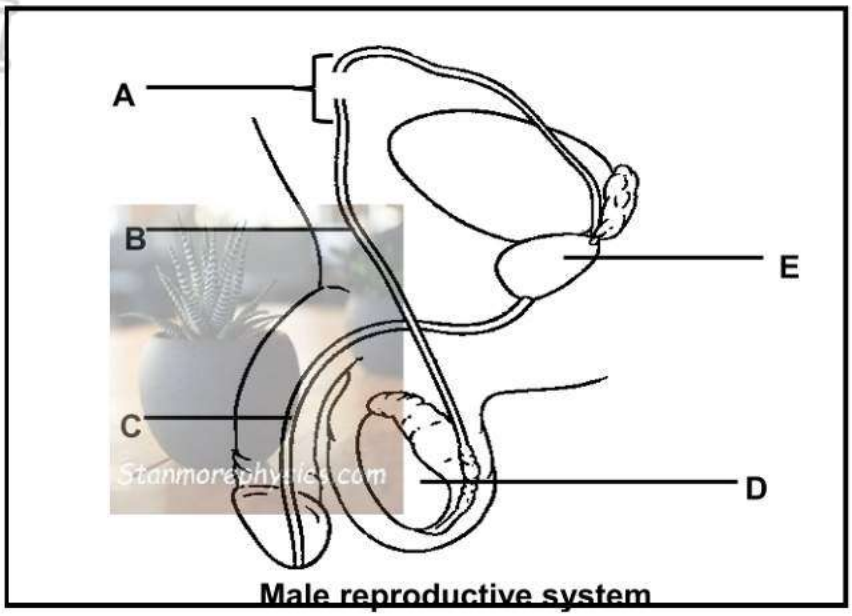
2.4 The diagram below shows the male reproductive system.



Male reproductive system

2.4.1 Identify parts labelled:

(a) **B** (1)

(b) **C** (1)

(c) **E** (1)

2.4.2 Name and describe the type of gametogenesis that occurs in part **D**. (4)

2.4.3 Test results show that a man has a low sperm count.

Explain why a doctor would advise him against wearing tight underwear. (3)

2.4.4 A man had surgery and his part **A** was cut as shown in the diagram above.

Explain **ONE** reason why this man will not be able to reproduce (2)
(12)

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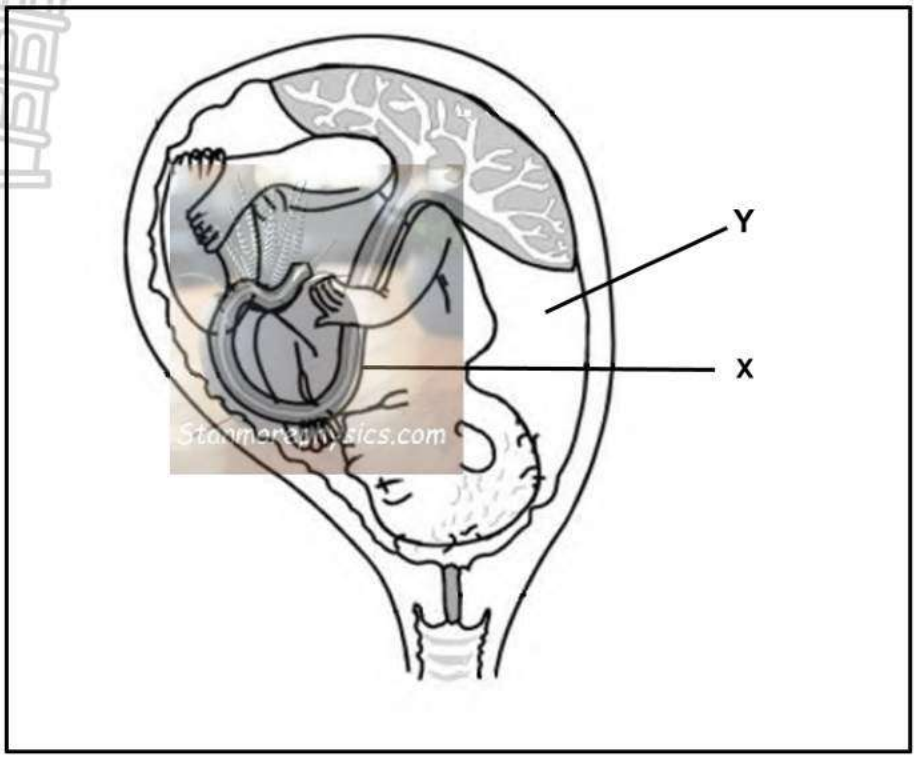
2.5 The following diagram represents a human foetus at 36 weeks of gestation.



2.5.1 Identify

a) Part **X**. (2)

b) Part **Y** (2)

2.5.2 State **TWO** functions of part **Y** (2)

2.5.3 Describe the development of a zygote until a foetus is formed. (5)
(9)

TOTAL QUESTION 2 50

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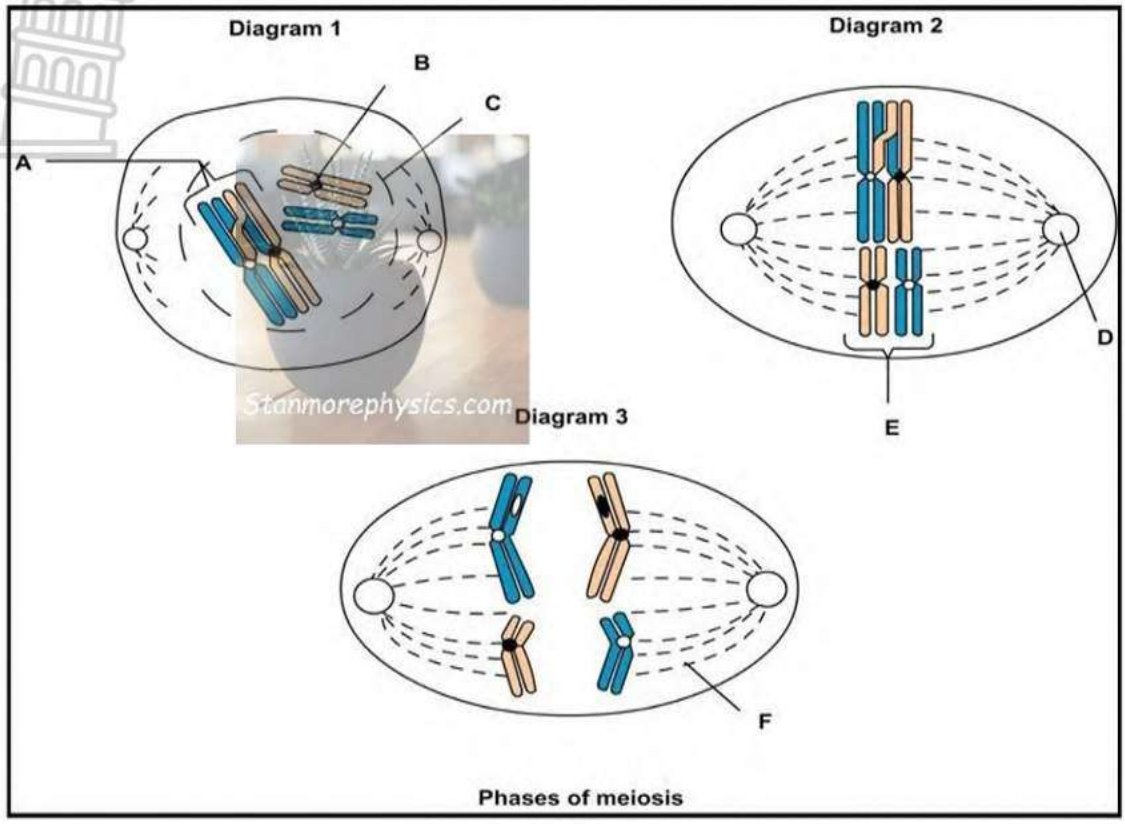
QUESTION 3

3.1 The diagrams below show phases of meiosis.



3.1.1 Name the process taking place at **A** (1)

3.1.2 Identify structure **D** (1)

3.1.3 State **TWO** functions of structure **F** (2)

3.1.4 State **ONE** visible reason in Diagram 2 which indicates that meiosis is taking place. (2)

3.1.5 Name **ONE** organ in the human female body where the process of meiosis will occur. (1)

3.1.6 Identify the phase in Diagram 3. (1)

3.1.7 Describe how meiosis contributes to genetic variation in a species. (5)
(13)

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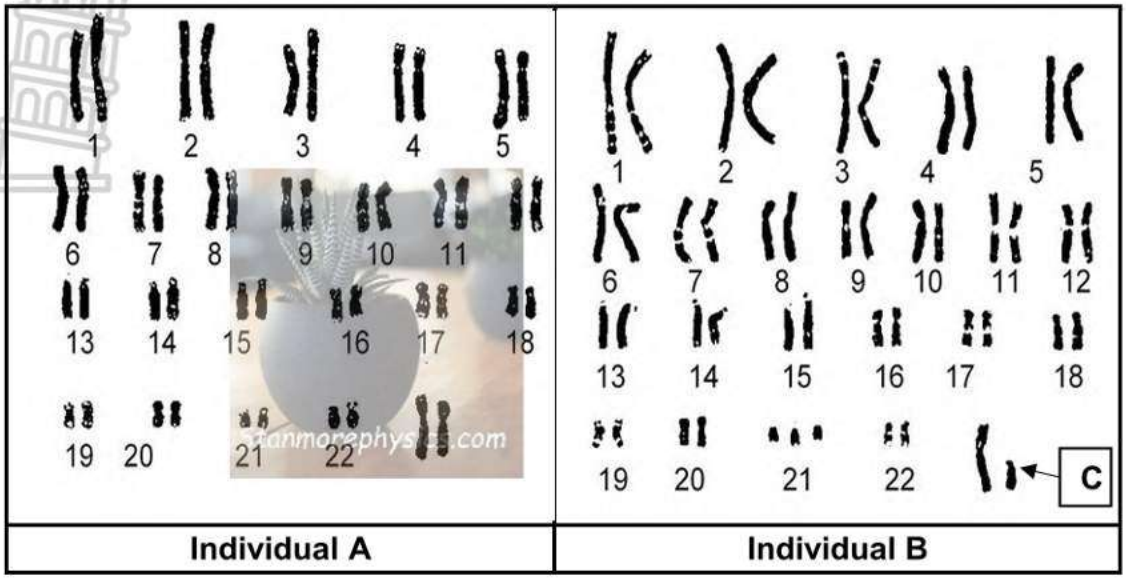
3.2 The diagrams below show the chromosomes in the cells of two individuals.



Individual A	Individual B

3.2.1 Name the type of diagram shown above. (1)

3.2.2 Explain the gender of individual **A**. (3)

3.2.3 State why the diagrams above show the chromosomes of a somatic cell and not a gamete. (1)

3.2.4 Identify the chromosome pair labelled **C** (1)

3.2.5 Name the disorder that individual **B** has. (1)

3.2.6 Describe the cause of the disorder mentioned in QUESTION 3.2.5. (5)
(12)

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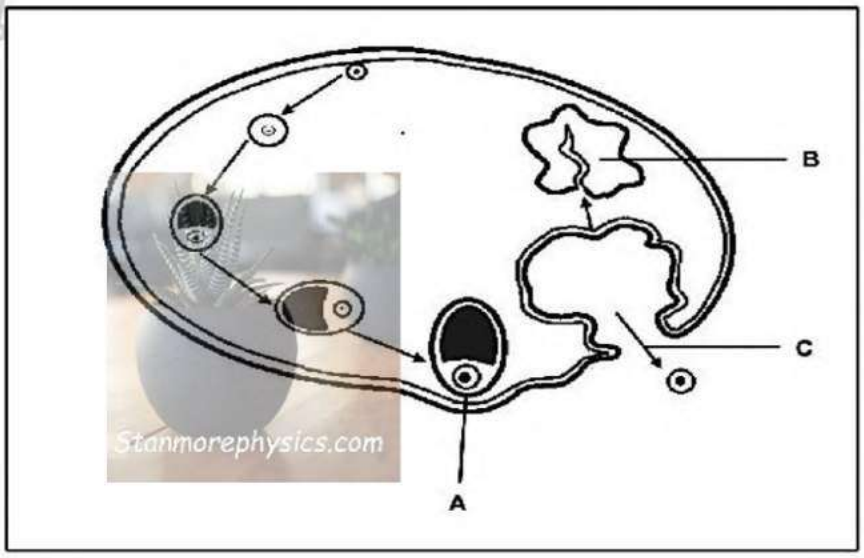
3.3 The diagram below represents the sequence of events that take place in the ovarian cycle of a human female



3.3.1 Give the name of the:

(a) Hormone that controls the development of structure **A** (1)

(b) Process taking place at **C** (1)

3.3.2 Describe the change that takes place in the uterus as the result of the hormone secreted by structure **A** (2)

3.3.3 Structure **B** degenerates if fertilization does not take place.

Explain the implications of this for the:

(a) Ovarian cycle (3)

(b) Uterine cycle (3)
(10)

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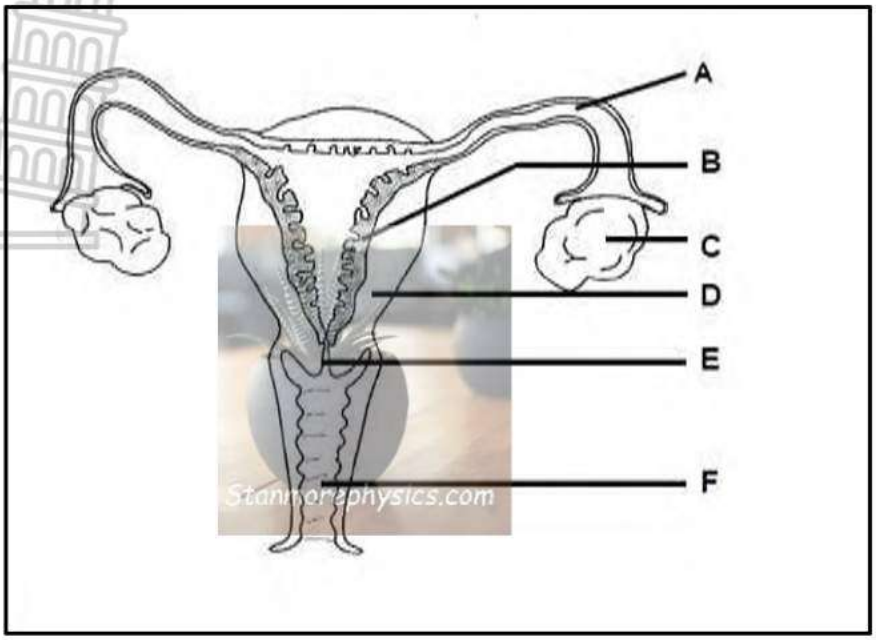
3.4 The diagram below shows the human female reproductive system.



3.4.1 Identify parts:

(a) **E** (1)

(b) **C** (1)

3.4.2 State **TWO** functions of part **F**. (2)

3.4.3 A woman had a tumor growing at **A**, which resulted in a complete blockage but she continued with her normal menstrual cycles.

Explain why her menstrual cycles continued to be normal. (3)

3.4.4 Name the structure formed by **B** with the chorion of the embryo during gestation and explain **TWO** protective functions of this structure. (5)

3.4.5 Describe the process of fertilisation. (3)

(15)

TOTAL QUESTION 3 50
GRAND TOTAL 150

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