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Education and Sport Development

Department of Education and Sport Development
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NORTH WEST PROVINCE

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES

JUNE 2018

MARKS: 150
TIME: 2½ hours

This question paper consists of 15 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. Make 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.

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SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Write down the question number (1.1.1- 1.1.10) and next to it give the LETTER of your choice in the answer book.

1.1.1 The part of the brain that receives nerve impulses from the semi-circular canals is the ...

A cerebrum.
B cerebellum.
C hypothalamus.
D medulla oblongata.

1.1.2 The sacculus and utricle give information about ...

A position and movement of the body
B condition of the muscle
C position of the head
D condition of the joints

1.1.3 How many Chromosomes are in a human gamete?

A 46
B 23
C 22
D 44

1.1.4 The THREE hormones directly involved in the regulation of the sugar concentration in the human blood are...

A insulin , adrenaline , glucagon
B adrenal , thyroxin , insulin
C secretin , insulin , thyroxin
D glucagon , TSH , adrenalin

1.1.5 What is the phenotypic ratio of a monohybrid cross between two heterozygous parents ?

A 3:1
B 1:2:1
C 9:3:3:1
D 1:2:2:1

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1.1.6 What happens to sister chromatids in meiosis II?

A They duplicate
B They divide
C They remain together
D They do not take part

1.1.7 Gametogenesis is the term for the ...

A production of gametes
B fertilisation of eggs
C development of polar bodies
D movement of sperm

1.1.8 The absence of the protein melanin results in the disorder called...

A Haemophilia.
B color-blindness.
C albinism.
D Down syndrome.

1.1.9 Older people are often seen to hold books at arm's length when they are reading .Which of the following explaination could account for this ?

A The refractive power of the lens has decreased with age
B The refractive power of the lens has increased with age
C The lens has become less transparent with age
D The eyeball has become larger with age

1.1.10 Indicate the correct sequence in which impulses move in the case of a knee reflex

A .Motor neuron >synapse>sensory neuron>effector>receptor
B Receptor >motor neuron >synapse>sensory neuron>effector
C Effector >sensory neuron>synapse>motor neuron > receptor
D Receptor >sensory neuron >synapse > motor neuron > effector

(10x2)

(20)

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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 1.2.6) in the ANSWER BOOK.

1.2.1 The microscopic space between consecutive neurons

1.2.2 The point at which crossing over of chromosomes occur during meiosis .

1.2.3 The hormone responsible for the development of male secondary sexual characteristics.

1.2.4 The ability of the lens in human eye to focus light rays from objects less than 6m away onto the retina.

1.2.5 The hormone that prepares the body for an emergency

1.2.6 A cross between two individuals using two characterisitcs

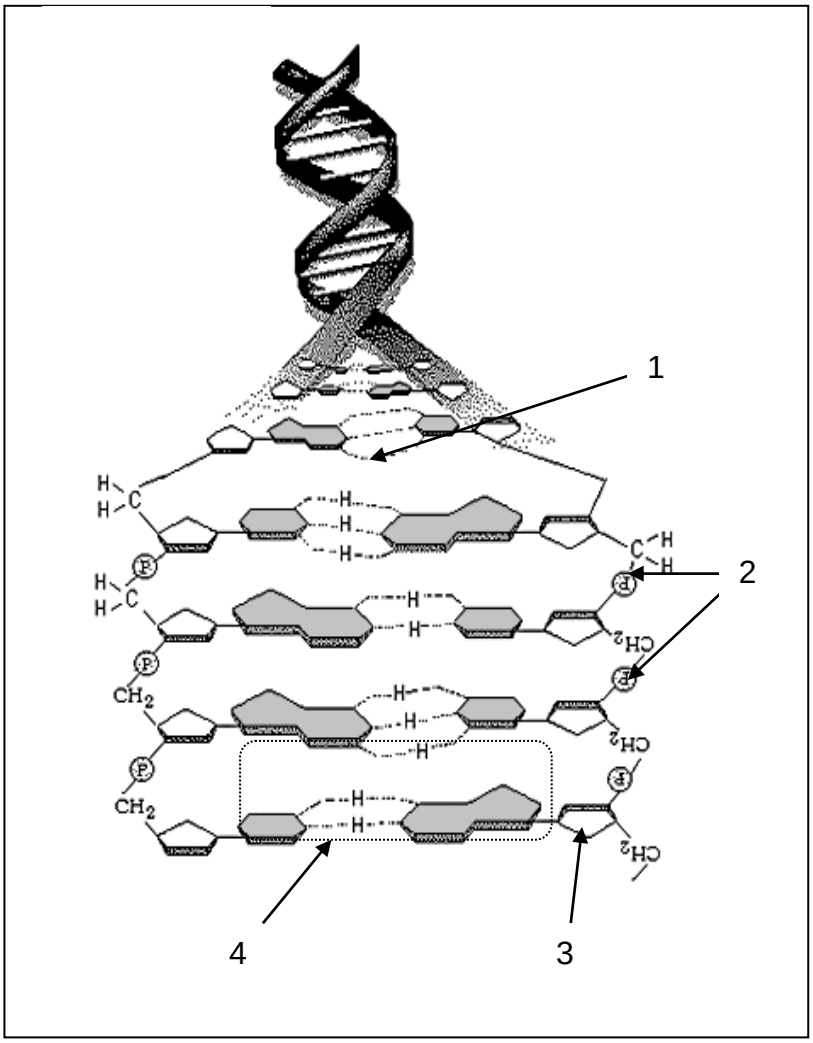
(6x1) **(6)**

1.3 Indicate whether each of the statements 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 In dim light	A: The radial muscles contract B: The radial muscles relaxes
1.3.2 Relates directly to the autonomic nervous system	A: Reflex action B: Peristalsis
1.3.3 The type of development in vertebrates where the young are well developed and are able to move at birth	A: Precocial development B: Altricial development

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

1.4 Study the diagram below and answer the questions that follow.



1.4.1 What is the scientific term used to name the above process? (1)

1.4.2 Identify part 2 and 3 respectively (2)

1.4.3 Mention ONE importance of the diagram above (1)

1.4.4 Where in the cell does this process take place? (1)

1.5 Inheritance of blood groups in humans is an example of muitiple alleles.

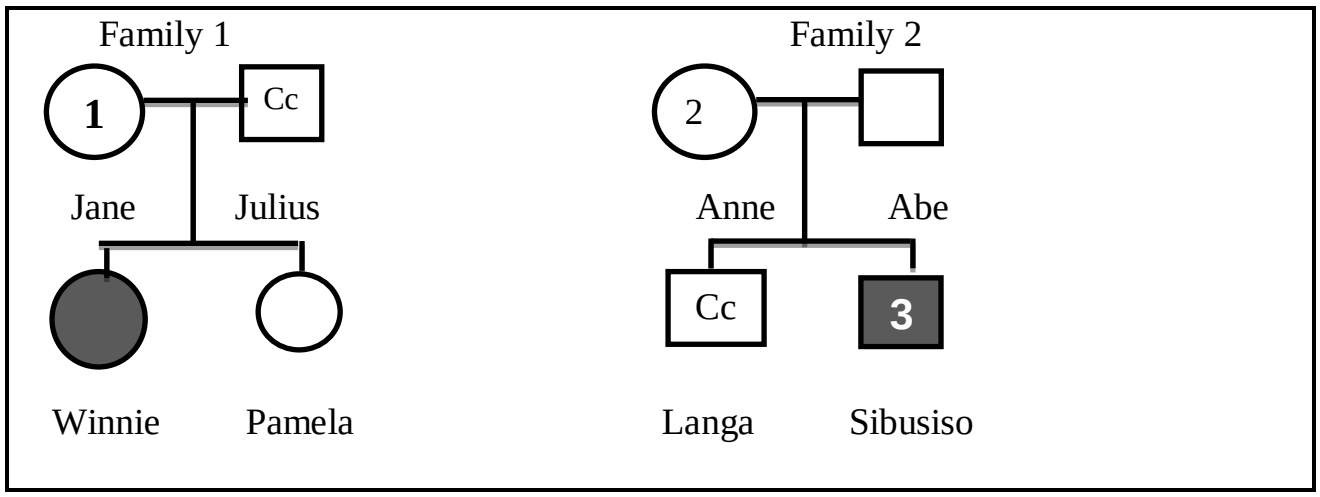
1.5.1 Human blood groups are controlled by multiple alleles. Name ALL the alleles that control human blood groups. (3)

1.5.2 How many of the alleles named in QUESTION 1.5.1 can an individual inherit? (1)

1.5.3 Give a reason for your answer to QUESTION 1.5.2. (2)

(6)

1.6 Cystic fibrosis is an inherited disorder of the human body caused by a recessive gene. This disorder affects the mucus production causing blockage of tiny air passages in the lungs. Study the pedigree diagram below and answer the questions that follow.



1.6.1 State the genotype of individuals 1 and 3 in the diagram. (2)

1.6.2 Does Winnie suffer from cystic fibrosis? (1)

1.6.3 Is cystic fibrosis a sex linked characteristic. Give a reason from the diagram. (2)

1.6.4 Winnie and Langa intend getting married.Explain why Winnie and Langa should consider Genetic counselling before they decide to have children. (2)

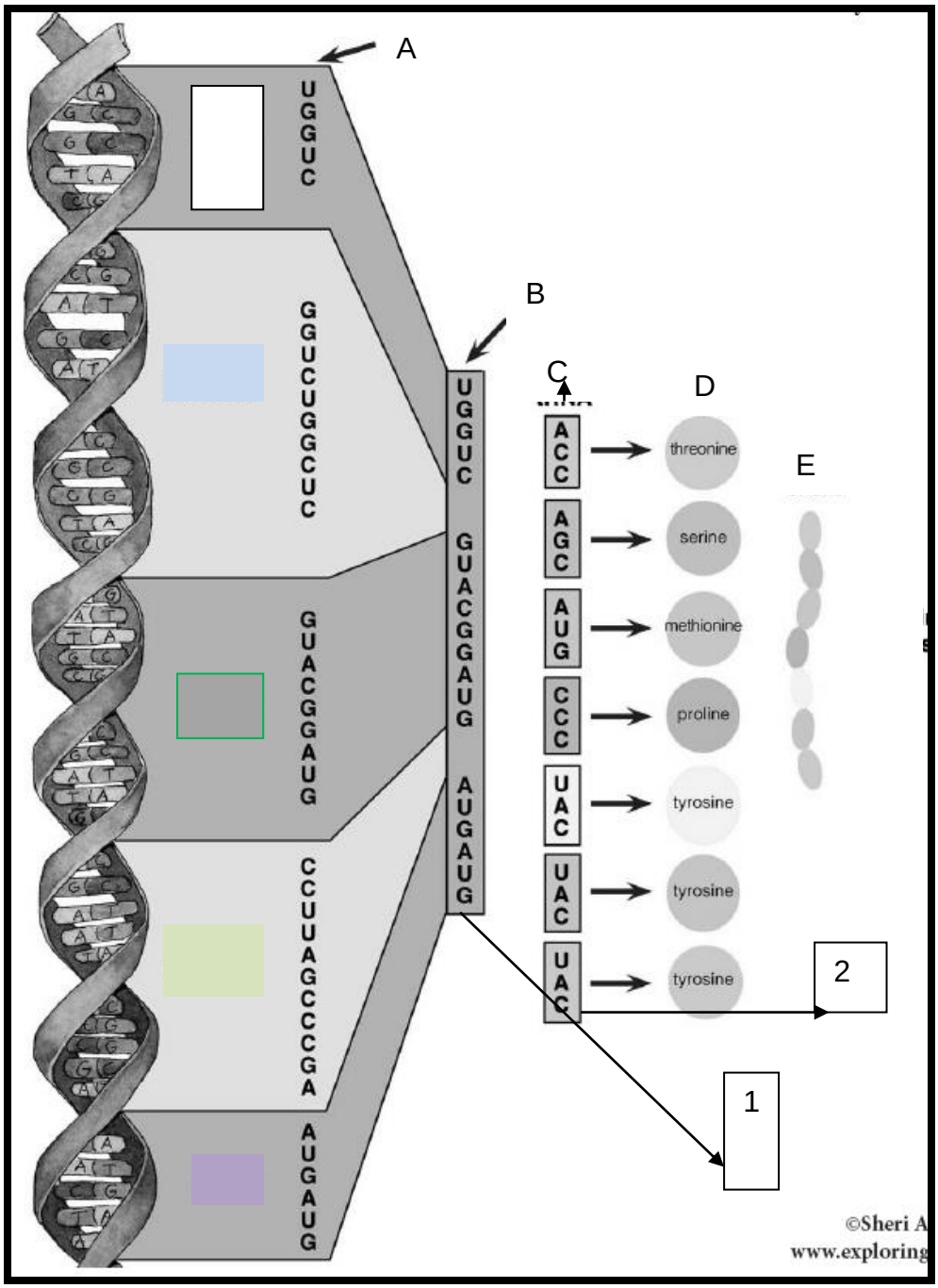
(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2.

2.1 The diagram below show protein sysnthesis



2.1.1 Identify the strucutres 1 and 2 respectively . (2)

2.1.2 Name the process indicated by A and C (2)

2.1.3 Describe how a mutation on AUGAUG will affect the strucutre of the protein fromed by process C. (2)

2.1.4 The following sequence represents a part of the nitrogenous base sequence on Process C.

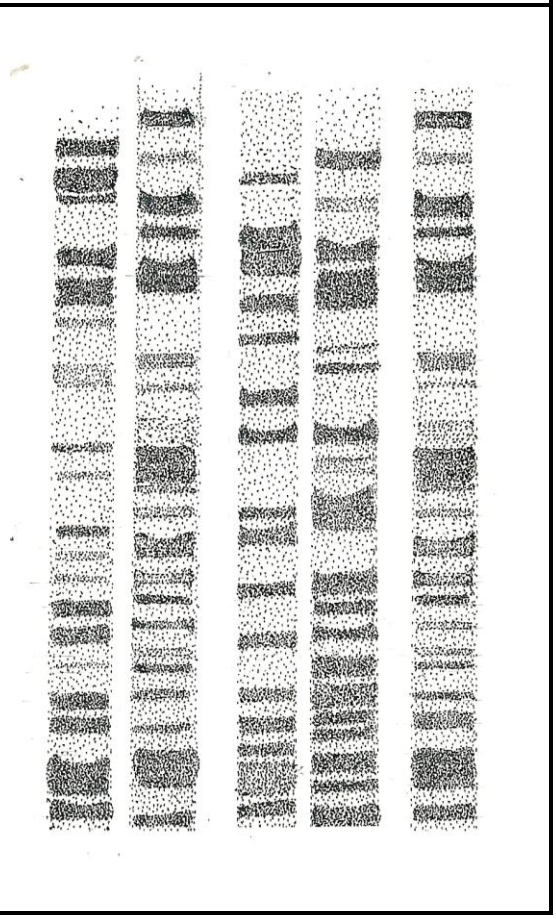
ACC

a) Write down the base sequence of the anticodon of triplet 1 shown above. (1)

2.1.5 Explain how the process A takes place ? (5)

2.1.6 State the term for long chain of amino acids indicated by E (1)
(13)

2.2 The diagram shows the separation of DNA fragments produced from blood samples taken at the scene of a crime , plus those of the three suspects.

Blood samples		**DNA FRAGMENTS FROM BLOOD SAMPLES**
KEY		**V CS S1 S2 S3**
V	**Victim**	
CS	Sample taken from the crime scene	
S1	Suspect 1	
S2	Suspect 2	
S3	Suspect 3	

2.2.1 Which suspect is most likely to be guilty. (1)

2.2.2 Explain your answer in 2.2.1 (2)
(3)

2.3 The following questions 2.3.1 , 2.3.2 and 2.3.3 are based on genetics .

2.3.1 The inheritance of fur colour in cats is sex-linked. The tortoise-shell colour of cats is a combination of black and orange fur. The allele for black fur is represented by X^B and the allele for orange fur is represented by $X^{O.}$ A female cat with a tortoise- shell colour mates with an orange male cat.

HINT: The sex chromosomes / gonosomes in cats are the same as in humans.

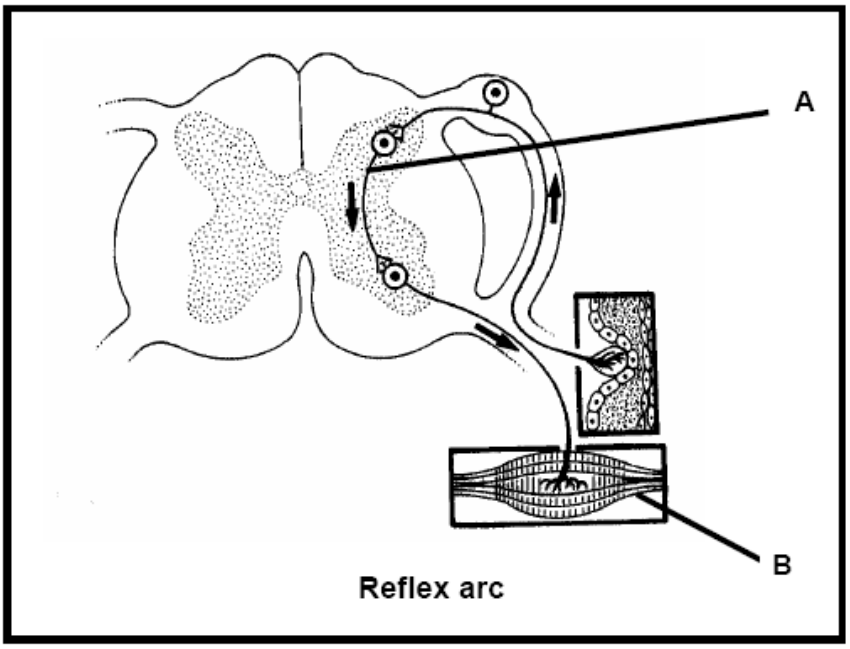
Use the symbols X^B , X^O and Y to represent a genetic sross of the mating stated above. Also indicate the proportion of the F1 phenotypes. (7)

2.3.2 Explain why the male kittens can never have tortoise-shell colour? (3)

2.3.3 In a cross between two plants with genotypes **BBGG** and **bbgg** what percentage of the offspring will be homozygous for both characteristics?

(1)
(11)

2.4 Study the diagram below showing a reflex arc.



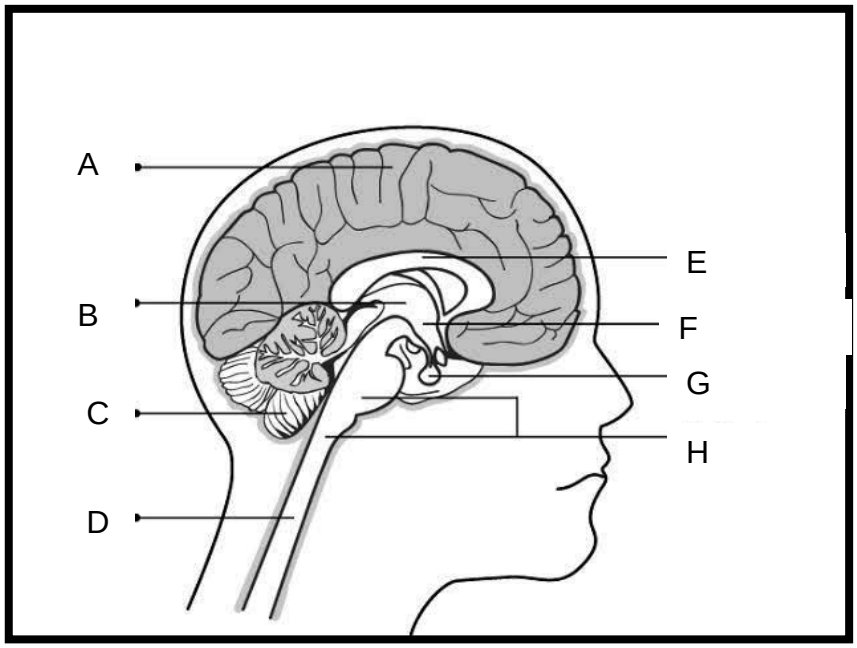
Reflex arc

2.4.1 Identify the neuron labelled A. (1)

2.4.2 Name the type of neuron that is connected to structure B. (1)

2.4.3 Explain the effect on the body if the neuron mentioned in 2.4.2 is damaged. (2)
(4)

2.5 Study the following diagram and answer the questions that follow.



2.5.1. Identify the structure A illustrated in the diagram (1)

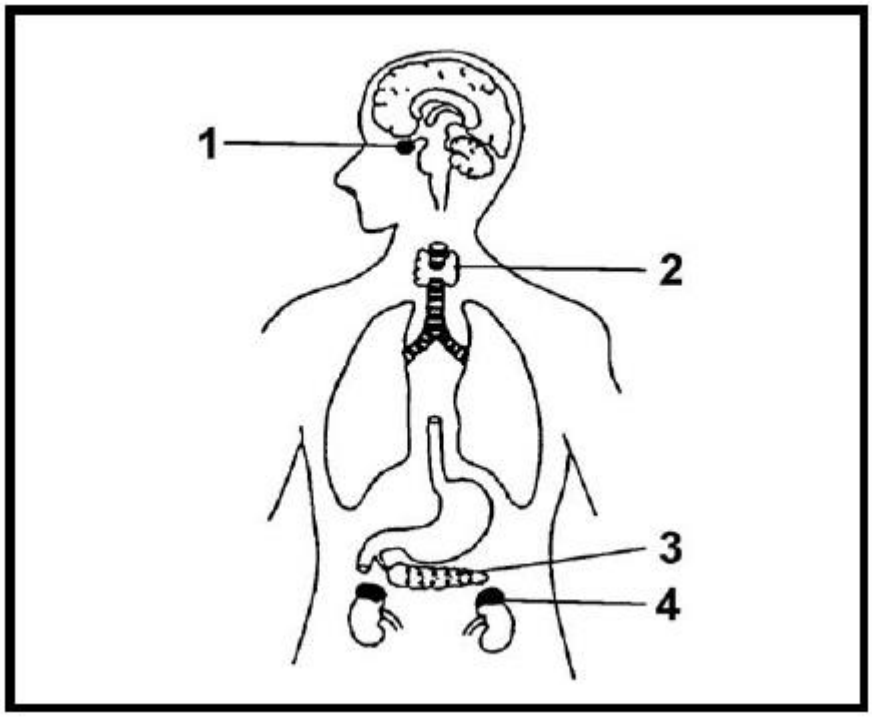
2.5.2 Name the parts labelled B, C and D respectively . (3)

2.5.3 State TWO functions of part A. (2)

2.5.4 Draw the strucuture of motor neuron found in part C and label any TWO parts. (3)
(9)

[40]

3.1 .Study the following diagram and answer the question that follow .



3.1.1 Label the parts numbered 1 and 4 (2)

3.1.2 Name the part that :

a) produces hormone glucagon (1)

b) produces an iodine –containing hormone (1)

3.1.3 State TWO differences between hormones and nerves with regard to their functions (4)

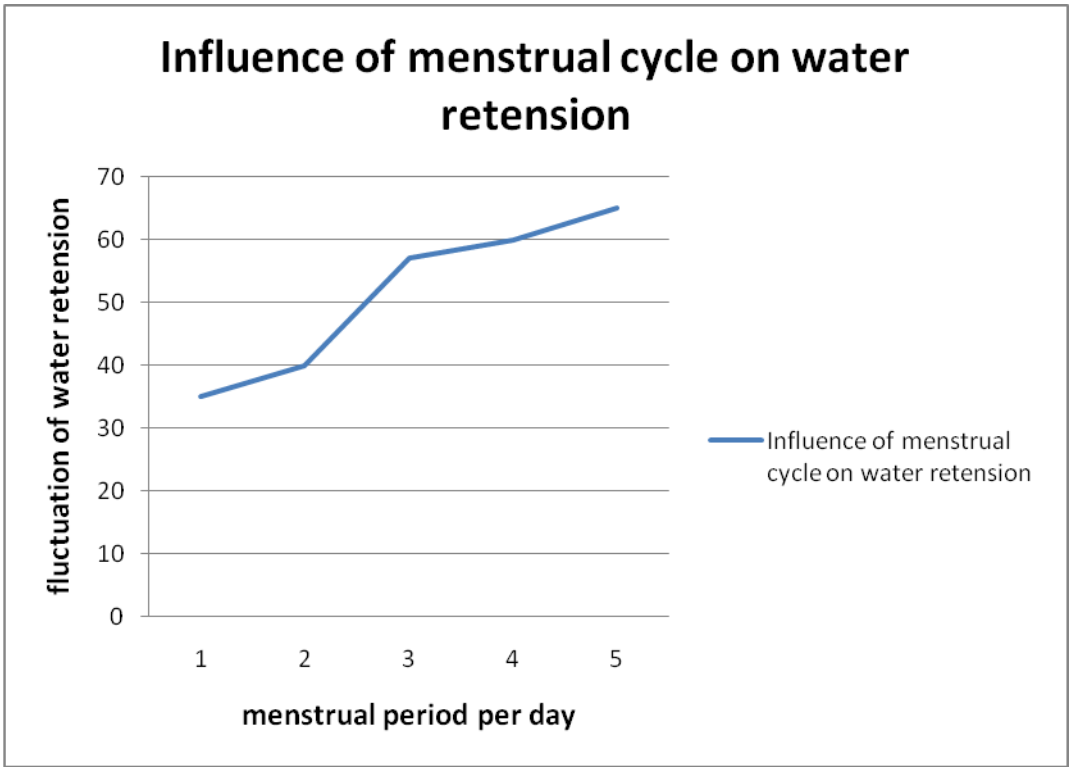
3.1.4 Name and describe the disorder that causes part 2 to swell . (2)

(10)

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3.2 Study the extracts and graph given below and answer the questions thart follow.

Minimal investigation has been conducted on the influence of menstrual cycle on water retention.Most women experience some type of discomfort during the menstrual cycle such as heaches, breast , tenderness , mood swing and most notably water retension .Since water makes up approxiametely 73% of lean body tissue, fluctuation in body water due to change in a women's menstrual cycle may affect measurement of body composition .(Menduke,& Conly, 1965



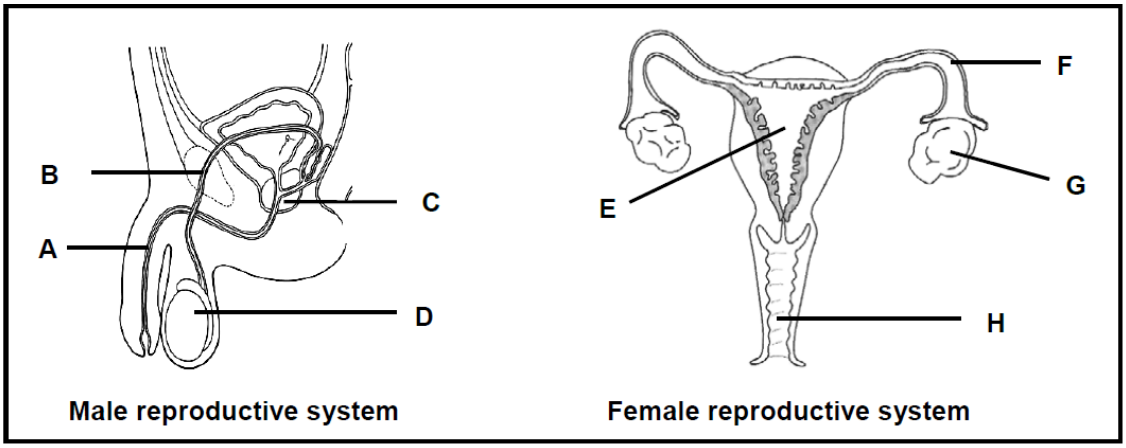
3.2.1 Formulate a hypothesis for this investigation. (2)

3.2.2 State the independent variable from the graph (1)

3.2.3 Mention TWO planning steps which should be taken before the above investigation is conducted. (2)

(5)

3.3 Study the following diagrm below and answer the questions that follow.



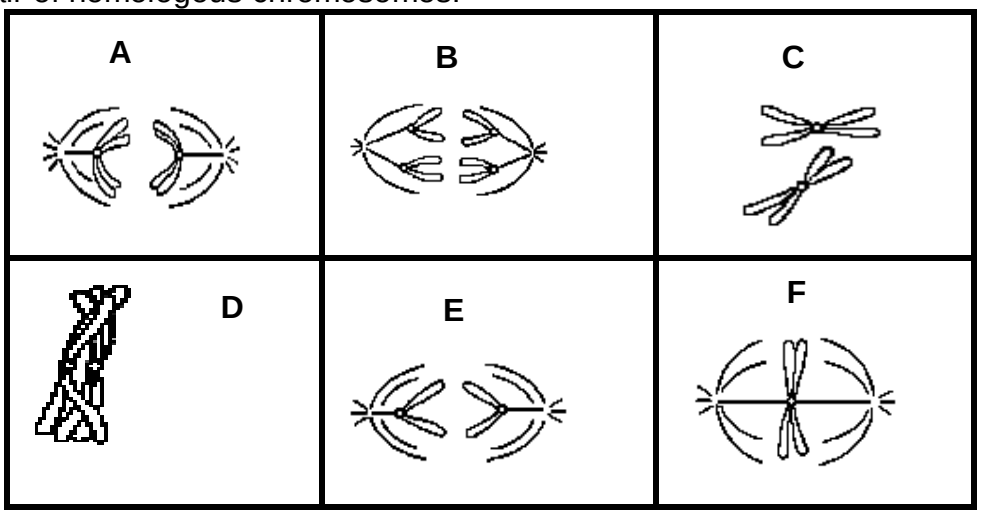
3.3.1 Label structure D, E and G (3)

3.3.2 Why is it necessary for part D to be outside of male's body ? (1)

3.3.3 State ONE function of part B. (1)

3.4 Give the LETTER only of the part where fertilisation takes place. (1)
(6)

3.4 The following diagrams show chromosomes as they might appear during various stages of meiosis I and meiosos II, starting with a cell with a single pair of homologous chromosomes.



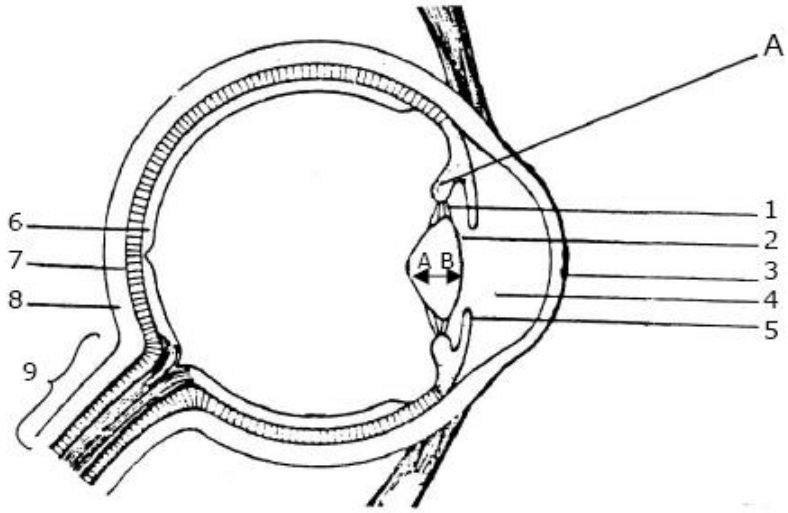
3.4.1 Give the LETTERS of the drawings that represent meiosis I in the correct order in which the phases occur. (3)

3.4.2 State ONE visible difference between the events in meiosis

represented in diagrams A and E. (2)

3.4.3 Name the process in meiosis represented in the phase shown in diagram D. (1)
(6)

3.5 Study the following diagram of human eye



3.5.1 Write down the NUMBER and NAME of layer:

(i) Which gives colour to the eye. (2)

(ii) That prevents reflection of light rays. (2)

3.5.2 Explain the path taken by sound through the human ear until the impulses are interpreted by the brain. (9)
(13)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

4.1 Female gametes or ova are produced in the ovaries. Name and describe the process during which ova are produced in a human female. Also describe the functions of the different parts of an ovum.

Content (17)
Synthesis (3)
(20)

NOTE: NO marks will be awarded for answers in the form of flow charts, diagrams or tables.

TOTAL SECTION C: 20
GRAND TOTAL: 150