KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL STANDARDISED ASSESSMENT

GRADE 12

LIFE SCIENCES

JUNE 2026

MARKS: 150

TIME: $2^1/_2$ hours

N.B. This question paper consists of 16 pages including this page.

Copyright reserved

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, 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 must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

Copyright reserved

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.

1.1.1 Which ONE of the following structures connects two chromatids together?

A Chiasma
B Centrosome
C Centriole
D Centromere

1.1.2 Which ONE of the following is a characteristic of altricial development'

A Offspring is born with its eyes closed
B Young is born with body covered in down feathers
C Offspring has its eyes open at birth
D Able to feed itself immediately after birth/haching

1.1.3 The part of the female reproductive system where fertilisation takes place is …

A Ovary
B Fallopian tube
C Cervix
D Vagina

1.1.4 Which ONE of the following is an importance of meiosis?

A Producing diploid gametes
B Doubling the chromosome number during gamete formation
C Producing haploid somatic cells
D Halving the chromosome number during gamete formation

1.1.5 A DNA molecule consists of …

A a single strand, with nucleotides that have deoxyribose sugar.
B two strands, with nucleotides that have ribose sugar.
C a single strand, with nucleotides that have ribose sugar.
D two strands , with nucleotides that have deoxyribose sugar.

Copyright reserved

QUESTIONS 1.1.6 AND 1.1.7 ARE BASED ON THE INFORMATION BELOW.

The table below shows anti-codons coding for different amino acids.

ANTI-CODON	AMINO ACID
UAG	Aspartic acid
CUU	Valine
ACU	Serine
GAG	Arginine

A mutation occurred on a DNA molecule causing base triplet GAG to change into TAG.

1.1.6 This mutation will cause codon …

A CAC to change into AUC.
B UAG to change into GAG.
C CUC to change into AUC.
D GAG to change into UAG.

1.1.7 It can be concluded that the protein will contain …

A Serine instead of Arginine.
B Valine instead of Aspartic acid.
C Arginine instead of Aspartic acid.
D Aspartic acid instead of Arginine.

1.1.8 Below is a list of events during the process of protein synthesis.

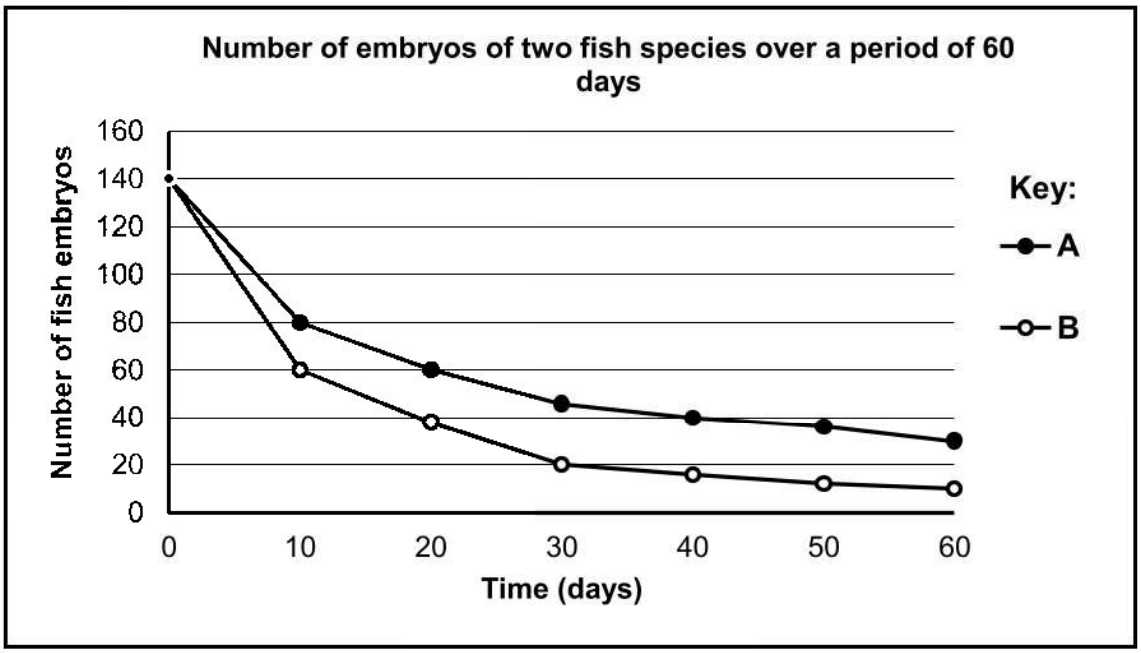
(i) The required protein is formed
(ii) tRNA brings the required amino acid to the ribosome
(iii) Each tRNA carries a specific amino acid
(iv) Amino acids become attached to each other by peptide bonds
(v) Anticodon on the tRNA matches with the codon on the mRNA

Which ONE is the correct sequence of events during translation?

A (iii) → (v) → (ii) → (i) → (iv)
B (ii) → (iv) → (v) → (iii) → (i)
C (iii) → (v) → (ii) → (iv) → (i)
D (ii) → (v) → (i) → (iii) → (iv)

Copyright reserved

QUESTIONS 1.1.9 AND 1.1.10 ARE BASED ON THE FOLLOWING GRAPH SHOWING THE NUMBER OF EMBRYOS OF TWO FISH SPECIES (A AND B) THAT ARE OVIPAROUS.



1.1.9 The percentage decrease in the number of fish embryos of species **A** between day 10 and 40 is …

A 20%
B 30%
C 40%
D 50%

1.1.10 Which ONE of the following combinations in relation to embryo survival and predation is CORRECT?

	SPECIES	EMBRYO SURVIVAL	PREDATION
A	**Species A**	Higher number of surviving embryos	Reduced risk of predation
B	**Species A**	Lower number of surviving embryos	Increased risk of predation
C	**Species B**	Higher number of surviving embryos	Increased risk of predation
D	**Species B**	Lower number of surviving embryos	Reduced risk of predation

(10 x 2) **(20)**

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 1.2.10) in the ANSWER BOOK.

1.2.1 A segment on a chromosome coding for a characteristic

1.2.2 The hormone responsible for the development of a Graafian follicle

1.2.3 An extra embryonic membrane that stores waste in amniotic eggs

1.2.4 The production of ova by meiosis

1.2.5 The innermost lining of the uterus which is richly supplied with blood vessels

1.2.6 The structure in the ovary that secretes progesterone

1.2.7 The maintenance of a constant internal environment in humans

1.2.8 The part of the brain that connects the two hemispheres

1.2.9 A fluid filled, hollow ball of cells into which the fertilised ovum develops

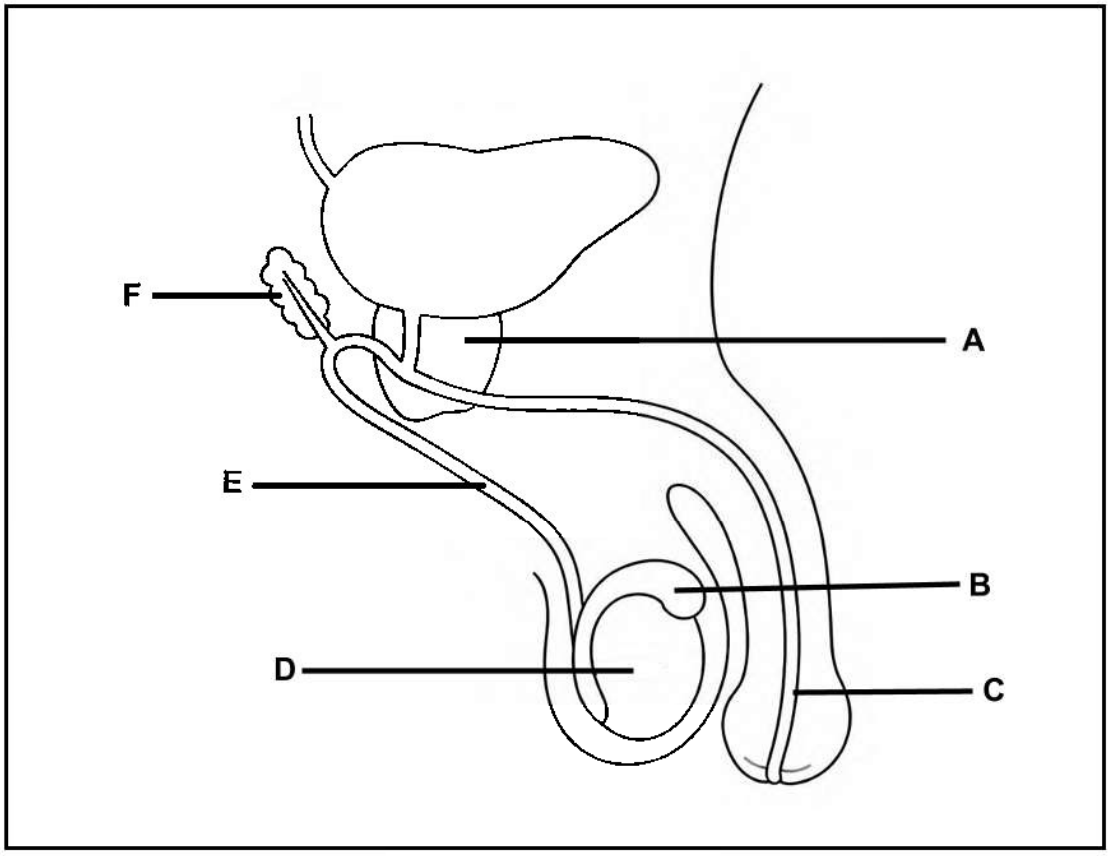
1.2.10 A single set of chromosomes in a cell (10 × 1) **(10)**

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	Constriction of blood vessels in humans	A: Cold temperature B: Hot temperature
1.3.2	Giving birth to live young ones	A: Viviparous B: Oviparous
1.3.3	Stimulates conversion of glycogen into glucose	A: Glucagon B: Insulin

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

1.4 The diagram below shows a male reproductive system.



1.4.1 Identify part:

(a) **A** (1)

(b) **E** (1)

(c) **F** (1)

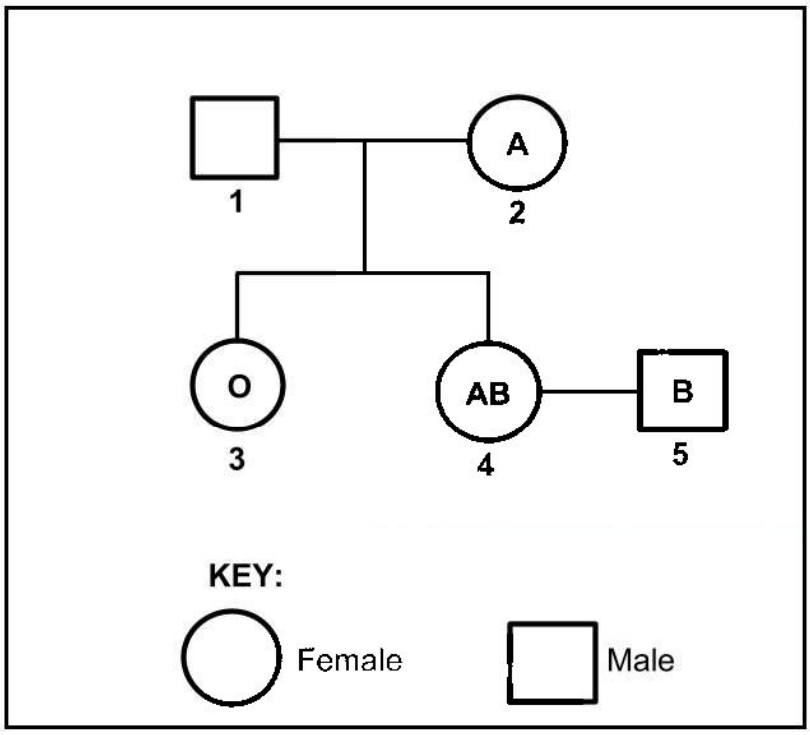
1.4.2 Give the LETTER and the NAME of the part that:

(a) Produces male gametes (2)

(b) Transports semen out of the body (2)
(7)

1.5 The pedigree diagram below shows the inheritance of blood groups in a family.

Blood groups of individuals **2**, **3**, **4** and **5** are indicated on the diagram.



1.5.1 How many alleles control blood group in humans? (1)

1.5.2 Give the:

(a) Blood group of individual **1** (1)

(b) Genotype of individual **3** (1)

(c) Possible phenotype(s) of children of individual **4** and **5** (2)

1.5.3 Individuals **1** and **2** are planning to have a fourth child.

Give the percentage chance that they will have a:

(a) Female child (1)

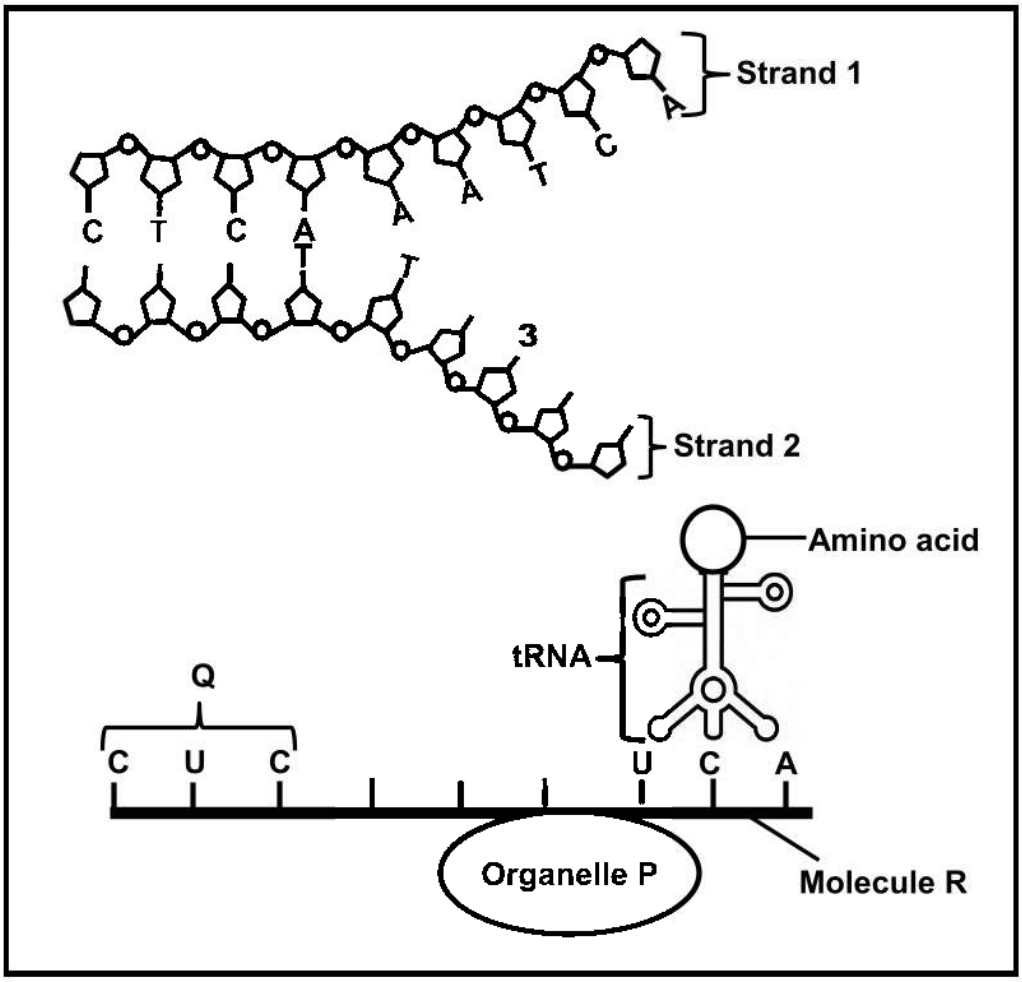
(b) Child with blood group **B** (1)
(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

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



2.1.1 Identify:

(a) Organelle **P** (1)

(b) Molecule **R** (1)

(c) The nitrogen base at **3** (1)

2.1.2 Give the collective name for the nitrogen bases labelled **Q**. (1)

2.1.3 Which strand (**1** or **2**) was used as a template to form molecule **R**? (1)

2.1.4 State TWO functions of a DNA molecule. (2)

2.1.5 Name and describe the process that resulted in the formation of molecule **R**. (6)
(13)

2.2 DNA profiling is a critical forensic tool that can be used to determine paternity based on individuals' genetic code. It is an incredibly accurate scientific method. Without a DNA test, you cannot be 100% certain of paternity, as appearance is subjective and unreliable.

2.2.1 Give ONE:

(a) Other use of DNA profiling (1)

(b) Reason why some people may be against the use of DNA profiling (1)

(c) Reason why DNA profiling is regarded as an incredibly accurate scientific method (1)

2.2.2 The DNA profiles of the mother, the child and the possible father have been collected and analysed.

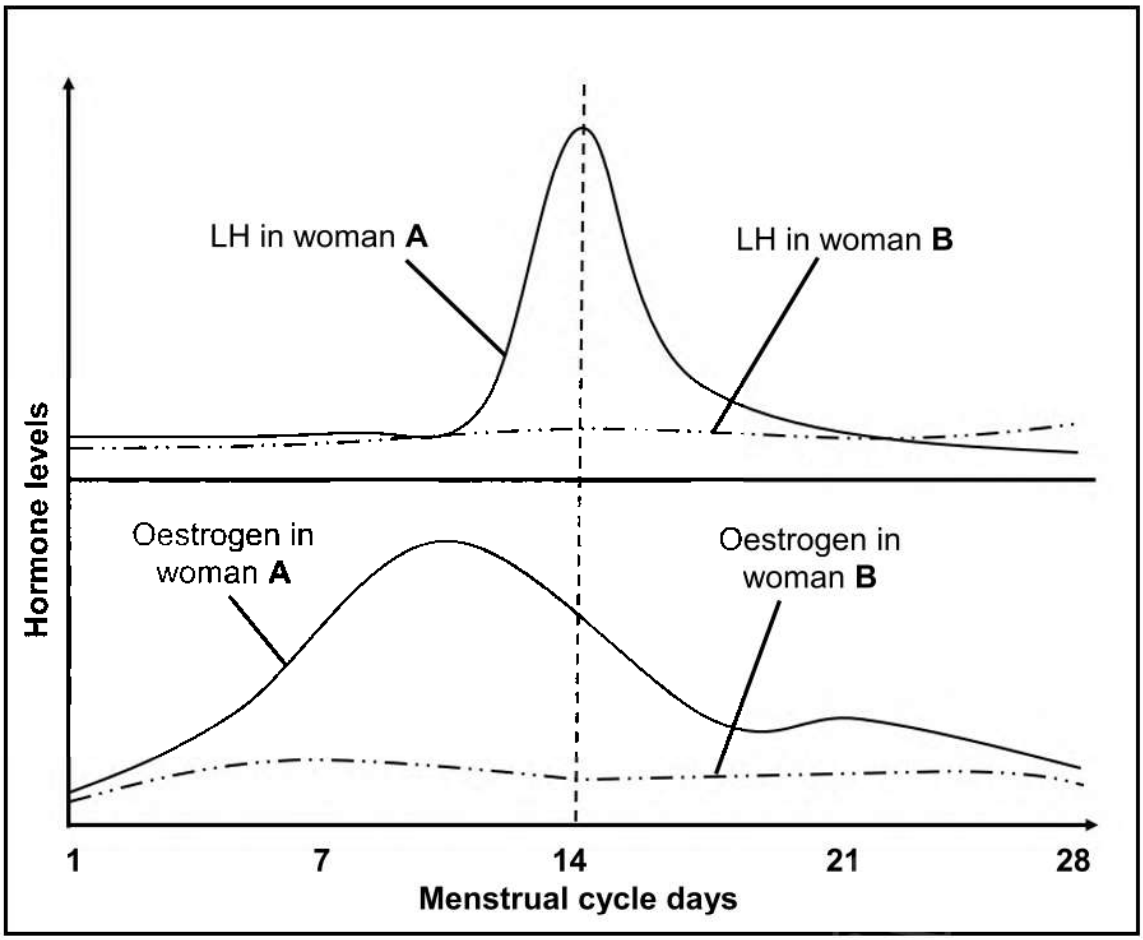
Explain how this could be used to prove that the man is the biological father of the child. (2)
(5)

2.3 The graph below shows the LH and oestrogen levels of two women during a menstrual cycle:

Woman A: A healthy woman without a stress.

Woman B: A woman with a severe chronic stress for over a year.

Both women were struggling to get pregnant. They were given the same food daily and were living in the same environmental conditions.



2.3.1 Name the gland that secretes:

(a) Oestrogen (1)

(b) LH (1)

2.3.2 Explain:

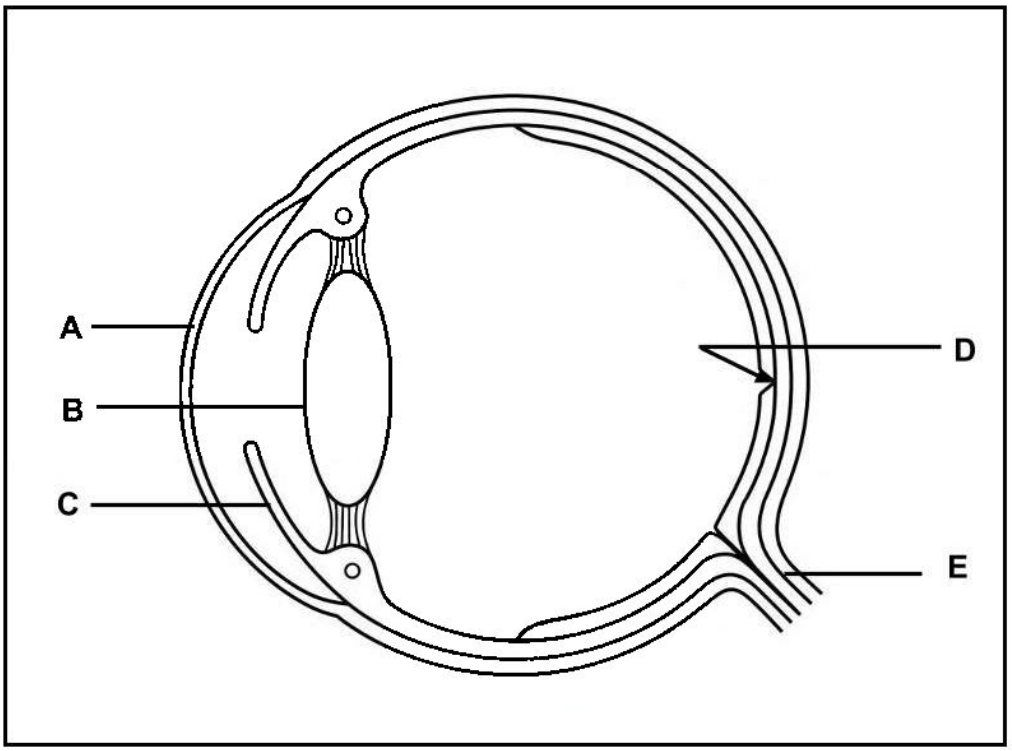
(a) The significance of the level of LH on day 14 as shown in woman **A** (3)

(b) How the level of oestrogen in woman **B** may affect pregnancy (3)
(8)

2.4 Presbyopia is a natural condition that develops with age and affects the eye's ability to focus on nearby objects. It happens when the eye's natural lens becomes harder and less flexible over time.

Common symptoms include blurred near vision, eye strain, and holding reading materials at a distance.

The diagram below represents the structure of the eye.



2.4.1 Give the LETTER of the part that:

(a) Transmits nerve impulse to the cerebrum (1)

(b) Refracts light the most (1)

2.4.2 Describe the changes that occur in part **C** when the lights are switched off. (2)

2.4.3 Give TWO symptoms of presbyopia mentioned above. (2)

2.4.4 Explain:

(a) The effect of presbyopia on part **B** when reading a book (3)

(b) How vision may be affected if part **D** is damaged (2)
(11)

2.5 A learner accidentally touches a hot metal surface during a practical investigation in the laboratory. The learner reacted immediately by withdrawing her hand without consciously thinking about it. This is called a reflex action.

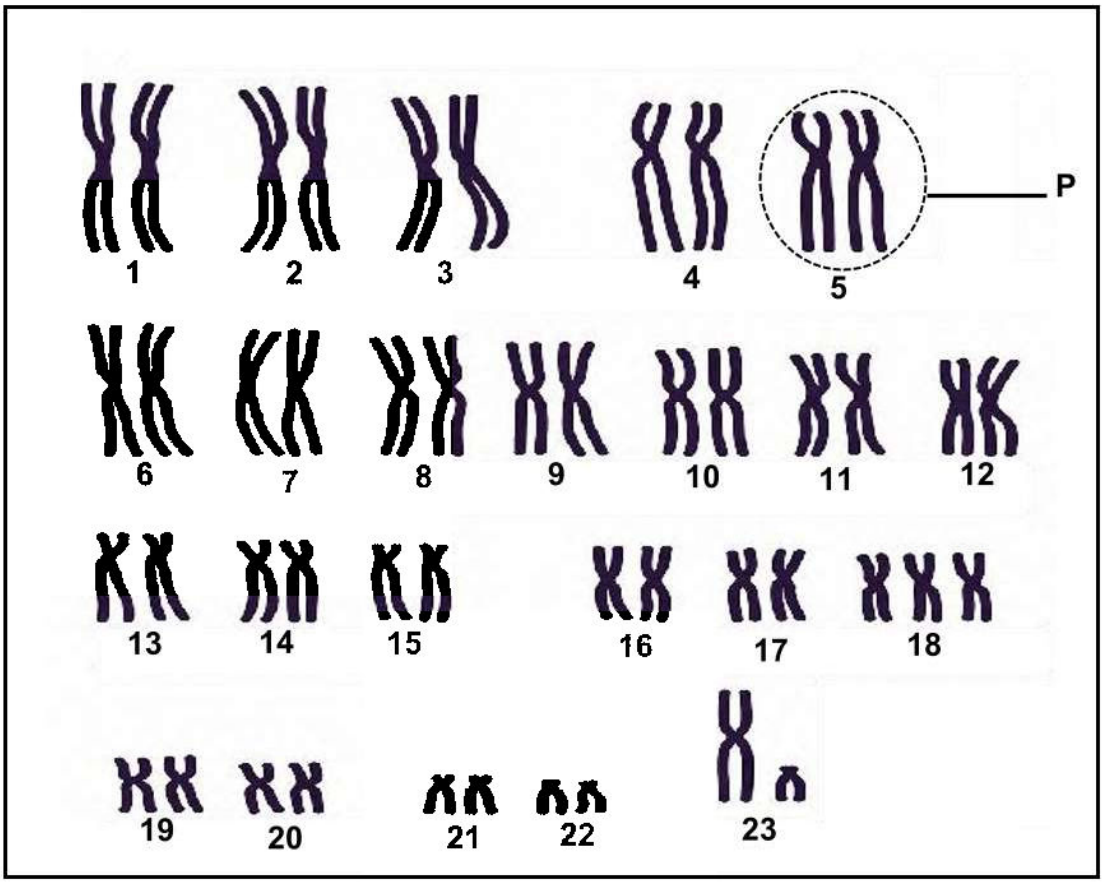
2.5.1 Explain the significance of a reflex action. (2)

2.5.2 Describe the path taken by the nerve impulse from the time the learner touches the hot surface until she pulls her hand away. (5)
(7)

2.6 Describe the process of hearing. **(6)**
[50]

QUESTION 3

3.1 The diagram below shows the number and arrangement of chromosomes in a human somatic cell.



3.1.1 Name the diagram shown above. (1)

3.1.2 Identify part **P**. (1)

3.1.3 Give TWO characteristics of the part identified in QUESTION 3.1.2. (2)

3.1.4 How many autosomes are shown in this diagram? (1)

3.1.5 State ONE reason why the diagram shown above belongs to a male. (1)

3.1.6 Give the chromosome pair number that:

(a) Shows abnormality (1)

(b) Represents gonosomes (1)

3.1.7 Describe how the abnormality referred to in QUESTION 3.1.6 (a) may have occurred. (4)

(12)

3.2 In a species of sea star (often called starfish), body colour and arm length are controlled by two different genes.

Body colour can either be green (**G**) or blue (**g**) while arms are either long (**L**) or short (**l**).

Two sea stars that are both heterozygous for body colour and arm length are crossed.

3.2.1 Give the:

(a) Genotype of the parents (2)

(b) Phenotypic ratio of the offspring (2)

3.2.2 Calculate the percentage chance that an offspring produced by these parents will have green body with short arms. Show ALL working. (3)
(7)

3.3 Sideroblastic anaemia is caused by a recessive allele $\mathbf{X^h}$ in humans. It causes reduced oxygen carrying capacity by the blood. The allele $\mathbf{X^H}$ causes normal oxygen carrying capacity.

A heterozygous female is crossed with an unaffected male.

3.3.1 Give the genotype of a female with sideroblastic anaemia. (1)

3.3.2 Explain:

(a) How the energy levels will differ between an unaffected individual and an individual with sideroblastic anaemia (3)

(b) why females are less likely to have sideroblastic anaemia than males (3)

3.3.3 Use a genetic cross to show the percentage chance of a heterozygous female and an unaffected male having a male offspring with sideroblastic anaemia. (6)
(13)

3.4 An investigation was conducted to determine the effect of exercise intensity on adrenalin levels.

The procedure was as follows:

- Permission was obtained from 30 healthy boys who were seventeen years old.
- The boys were divided into three equal groups.
- The boys in group **A** participated in low exercise intensity.
- The boys in group **B** participated in moderate exercise intensity.
- The boys in group **C** participated in high exercise intensity.
- All participants were given 30 minutes to exercise daily for five consecutive days.
- Adrenalin level was measured before and after exercise.
- Average levels of adrenalin after exercise were calculated and recorded on the table below.

Exercise intensity	Average level of Adrenalin(ng/mL)
Low	110
Moderate	160
High	220

3.4.1 Identify the:

(a) Dependent variable (1)

(b) Independent variable (1)

3.4.2 State TWO:

(a) Planning steps that the researchers had to consider at the beginning of this investigation (2)

(b) Other factors that should have been considered during this investigation (2)

(c) Ways in which the reliability of the results was increased (2)

3.4.3 Explain why adrenalin levels were measured before the start of an exercise. (2)

3.4.4 State the conclusion for this investigation. (2)

3.4.5 Draw a bar graph to represent the results shown in the table. (6)
(18)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

Copyright reserved