KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

LIFE SCIENCES

COMMON TEST

JUNE 2024

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages including this page.

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.

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 1.1.8) in your ANSWER BOOK, for example 1.1.9 D.

1.1.1 Transfer of pollen grain from anther to the stigma is known as…

A fertilization.
B pollination.
C reproduction.
D germination.

1.1.2 Which of the following characterises phylum Cnidaria?

A Exoskeleton.
B Coelom.
C Radial symmetry.
D Bilateral symmetry.

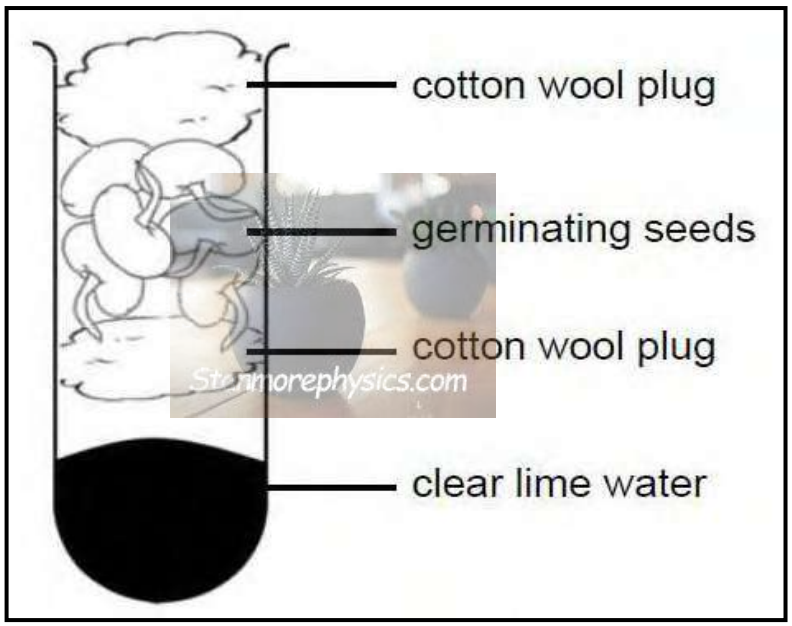
1.1.3 Alternation of generations is exhibited by…

A Bryophytes.
B Pteridophytes.
C Spermatophytes.
D all plants.

1.1.4 Which ONE of the following is incorrect on the influence of temperature on the rate of photosynthesis?

A When temperature is higher than optimum, rate of photosynthesis decreases.
B When temperature is low, the rate of photosynthesis is low.
C When temperature is at the optimum, the rate of photosynthesis reaches maximum.
D When temperature is higher than optimum, rate of photosynthesis remains constant.

1.1.5 The investigation below was done to determine if carbon dioxide is released during cellular respiration.



A control for this investigation will...

A have more seeds.
B have dead seeds.
C be placed in a dark cupboard.
D have more carbon dioxide.

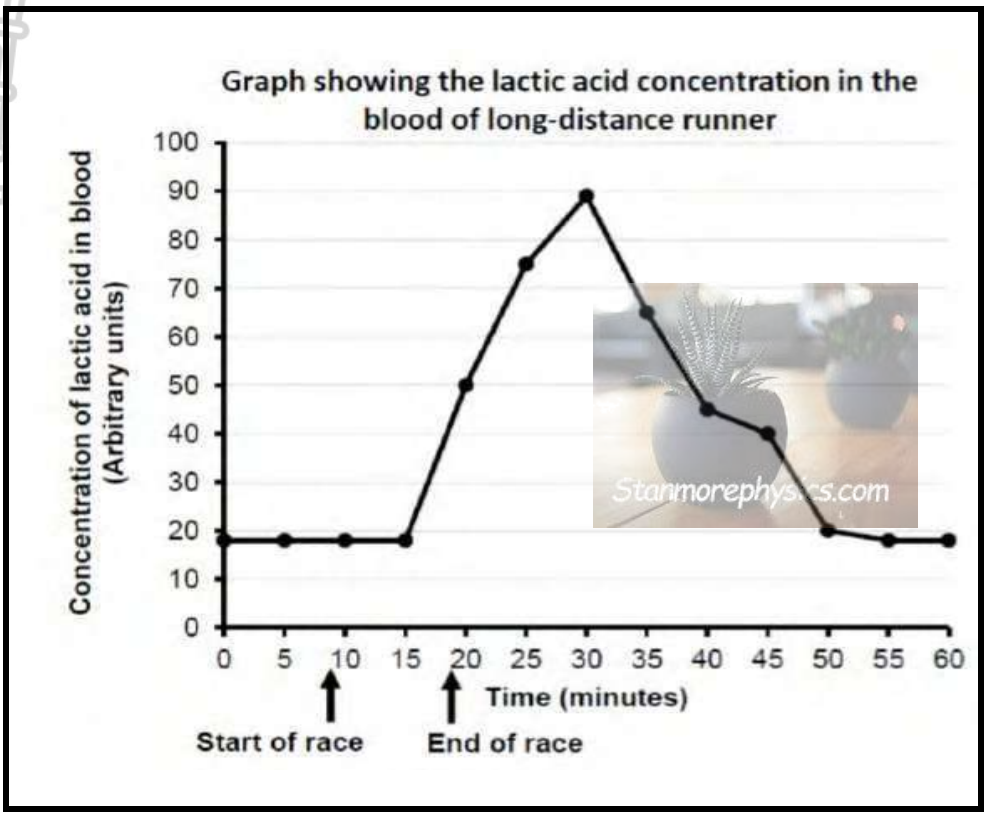
1.1.6 Tapeworm is a flatworm parasite that can live and feed on human intestine. Which combination correctly shows the phyla to which the parasite and host species belong?

	Tapeworm	Human
A	Annelida	Chordata
B	Plathyhelminthes	Artropoda
C	Annelida	Artropoda
D	Platyhelminthes	Chordata

1.1.7 Pyruvic acid is converted into lactic acid during ...

A Kreb's cycle.
B Glycolysis.
C anaerobic respiration.
D oxidation of glucose.

1.1.8 The graph below represents the lactic acid levels in the blood of a long-distance runner.



According to the graph, the acceptable level of lactic acid in the blood in arbitrary unit is …

A 18
B 20
C 50
D 90

(8 x 2) **(16)**

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 1.2.8) in the ANSWER BOOK.

1.2.1 Concentration of sense organs at the anterior end of an animal leading to the formation of a head

1.2.2 The germ layer in animals that gives rise to muscles and other internal organs

1.2.3 Reproduction which uses non-reproductive parts of a plant to produce new plants

1.2.4 The general energy carrier in the cells of living organisms

1.2.5 The reagent used to test for the presence of starch

1.2.6 The organic molecules that act as catalysts and control the chemical reactions during photosynthesis

1.2.7 A reproductive structure found in gymnosperms and angiosperms only and consists of a plant embryo with a protective coat

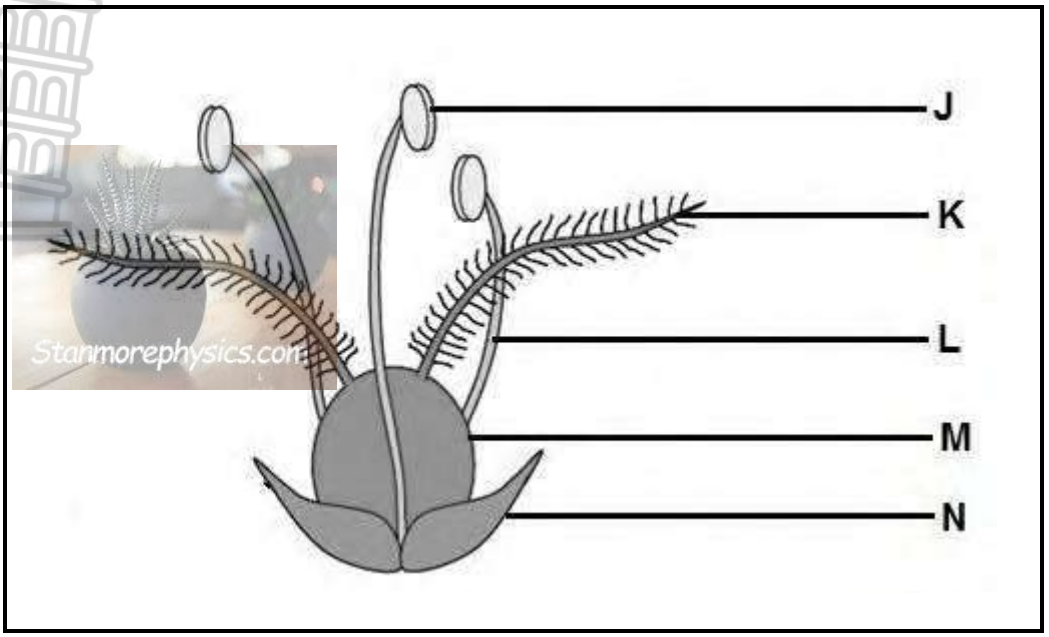
1.2.8 Microbes which cause diseases. (8 x 1) **(8)**

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 Genetic material found in viruses.	A: DNA B: RNA
1.3.2 Colour of the petals in a flower.	A: Forms the calyx B: Attract pollinators
1.3.3 Plant group that is thallus	A: Bryophytes B: Pteridophytes

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

1.4 The diagram below represents a wind pollinated flower.



1.4.1 Identify part:

(a) **K** (1)

(b) **N** (1)

1.4.2 Give the LETTER and NAME of the part that forms the fruit after fertilization. (2)

1.4.3 State the function of part **J.** (1)

1.4.4 Give the collective name for the parts **J** and **L.** (1)

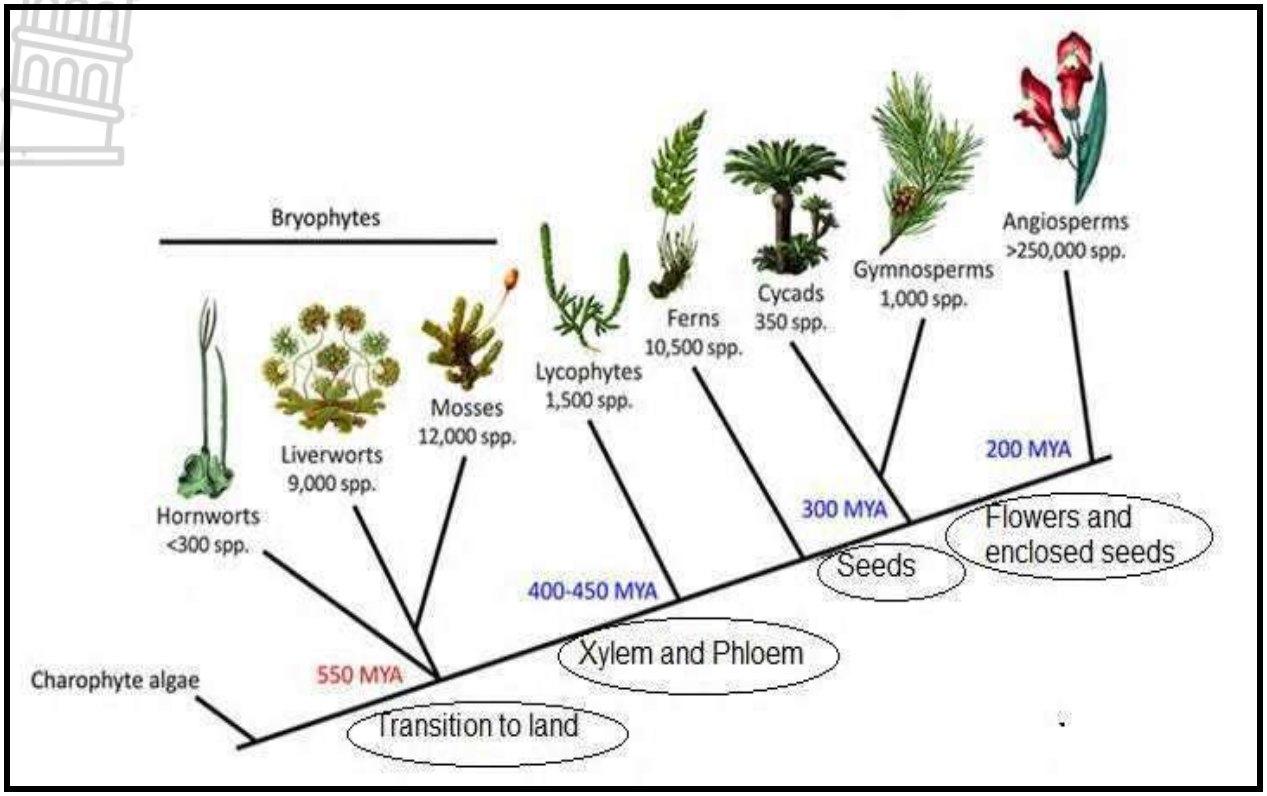
1.4.5 Explain TWO observable features that show that the above flower is adapted for wind pollination. (4)

1.4.6 Seeds are formed inside part **M.** Seed banks are increasingly considered priceless resources that could one day prevent worldwide food crisis.

State ONE benefits of seed banks. (1)

(11)

1.5 Over years plants evolved and developed characteristics that make them more adapted to live on land. The diagram below shows the relationship between the plant phyla.



1.5.1 Identify the diagram above. (1)

1.5.2 Name the common ancestor of all the plant groups. (1)

1.5.3 According to the diagram, state the characteristic shared by the ferns and gymnosperms. (1)

1.5.4 How long after the appearance of the bryophytes did the angiosperms appear? (2)

1.5.5 Give TWO reasons why the bryophytes are poorly developed to live on land. (2)

1.5.6 The angiosperms are the most abundant of the plant groups. There are more than 250 000 species of the angiosperms.

Explain how their abundance is influenced by the presence of flowers. (2)

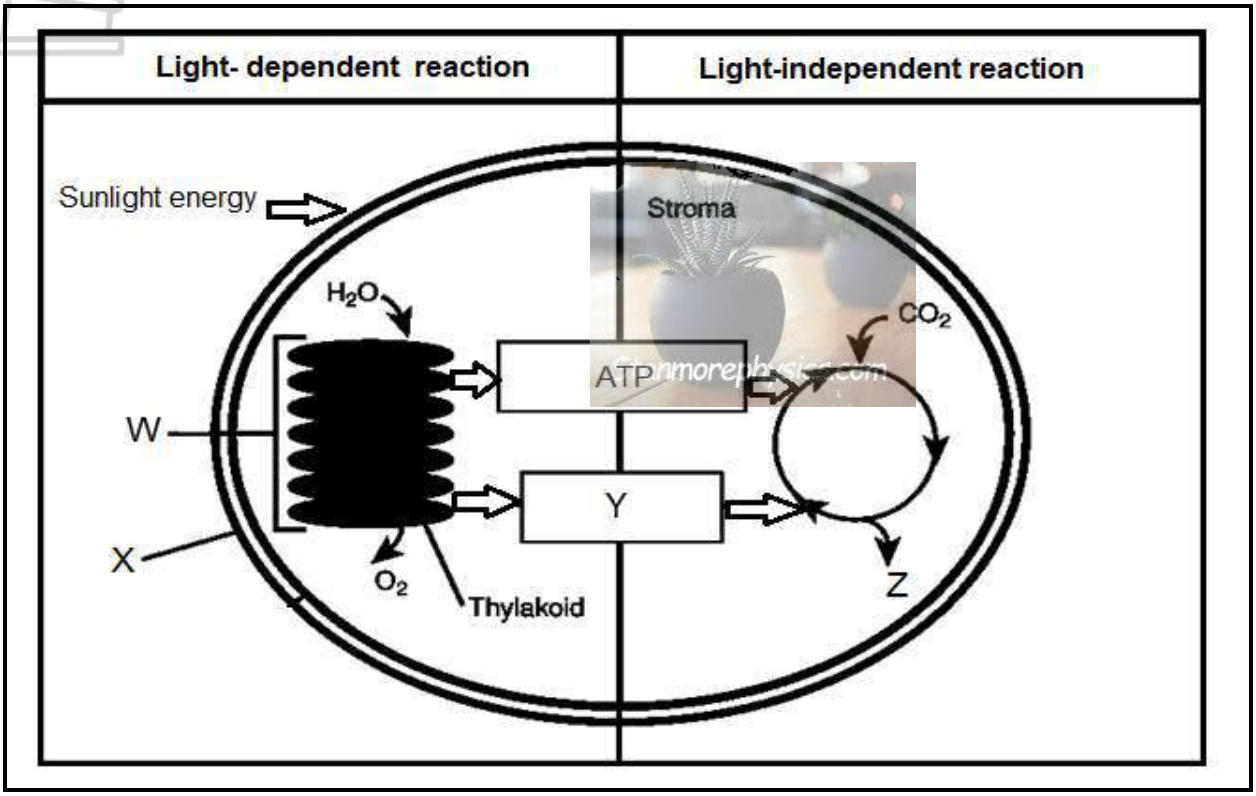
(9)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents an organelle and the process of photosynthesis.



2.1.1 Identify the organelle shown above in which photosynthesis occurs. (1)

2.1.2 Identify part:

(a) **W** (1)

(b) **X** (1)

2.1.3 Identify molecule:

(a) **Y** (1)

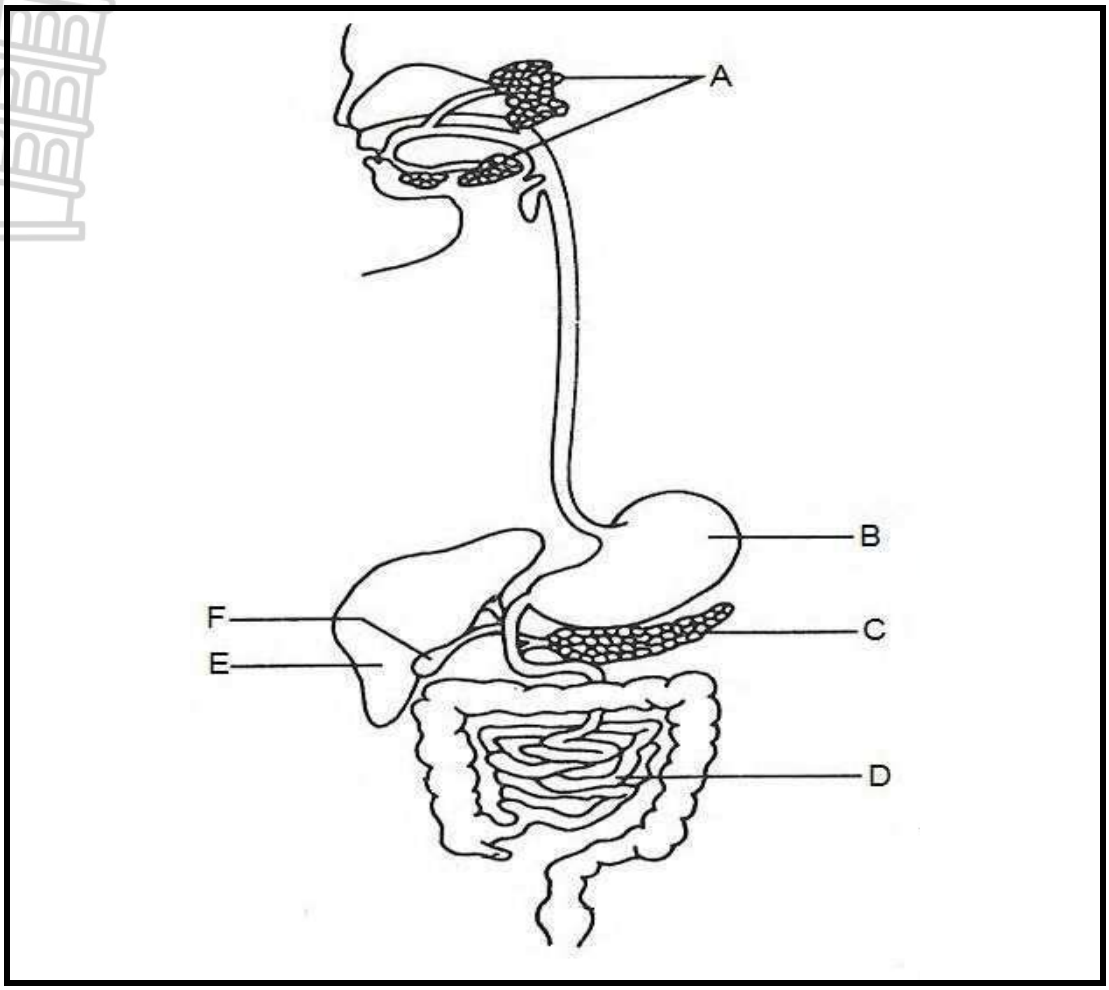
(b) **Z** (1)

2.1.4 Describe the role of the water molecule during the light dependent reaction of photosynthesis. (4)

2.1.5 Explain why an increase in the concentration of carbon dioxide may not necessarily lead to an increase in the rate of photosynthesis. (2)

(11)

2.2 The following diagram shows a human digestive system.



2.2.1 Write down the LETTER and NAME of the part that:

(a) Produces hormones that regulate the blood glucose level. (2)

(b) Contains villi. (2)

(c) Produces gastric juice. (2)

2.2.2 Explain the role of **E** in bringing the blood glucose back to normal if it becomes low. (2)

2.2.3 Describe the role of **A** in the chemical breakdown of carbohydrate. (3)

2.2.4 Inflammatory bowel disease is a group of intestinal disorders that cause prolonged inflammation/swelling of the digestive tract.

Explain the consequence if part **D** becomes affected. (2)

(13)

2.3 The table below shows the percentage growth of malaria in Tanzania over 7 years.

Year	Percentage growth of malaria
1	2.1
2	2.4
3	2
4	2.2
5	2.6
6	3.1
7	3.5

2.3.1 Name the protists that causes malaria. (1)

2.3.2 Draw a line graph to represent the data in the table. (6)

2.3.3 Describe the percentage growth of malaria in Tanzania over the 7 years. (3)

2.3.4 Between which two consecutive years was the greatest increase in growth of malaria? (1)

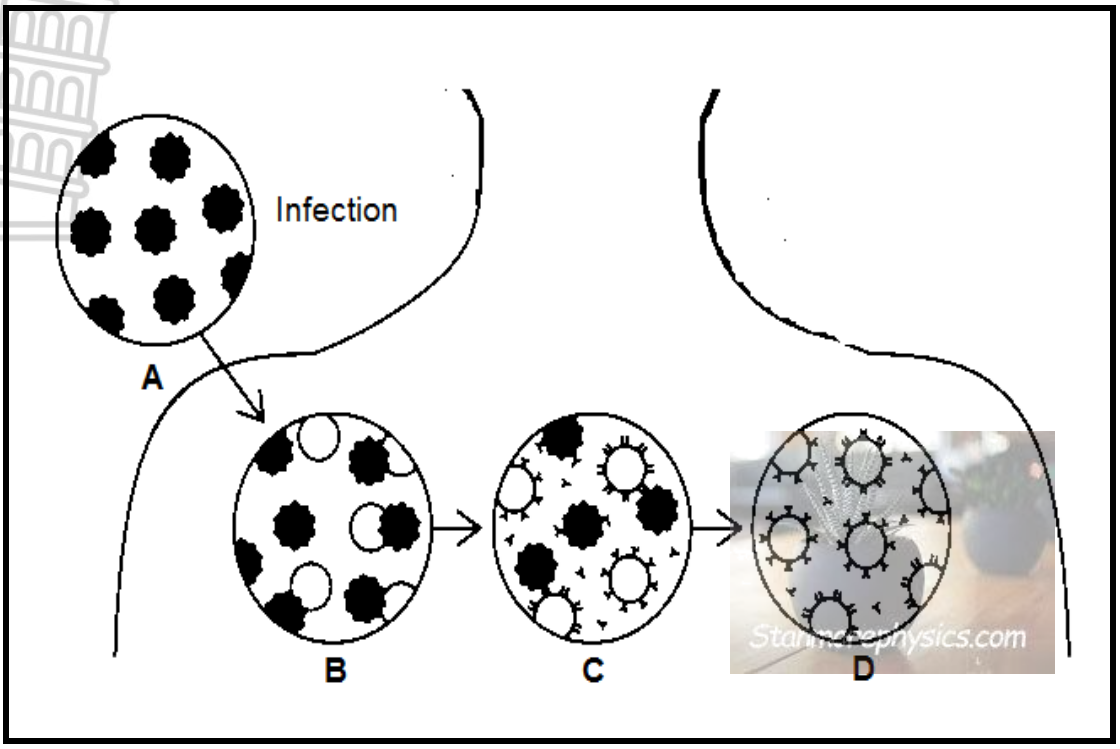
2.3.5 State ONE way in which the data on the growth of malaria may have been collected. (1)

2.3.6 State ONE way in which an outbreak of malaria can be effectively managed. (1)

2.3.7 Explain why a person with malaria cannot be treated by using antibiotic. (2)

(15)

2.4 The diagram below shows how the human body defences itself after an infection.



2.4.1 Define infection. (1)

2.4.2 State whether the immunity shown in the diagram is active or passive. (1)

2.4.3 Use the diagram to explain how the body develops the type of immunity mentioned in QUESTION 2.4.2. (4)

2.4.4 Name TWO first lines of defence mechanism in humans against infections. (2)

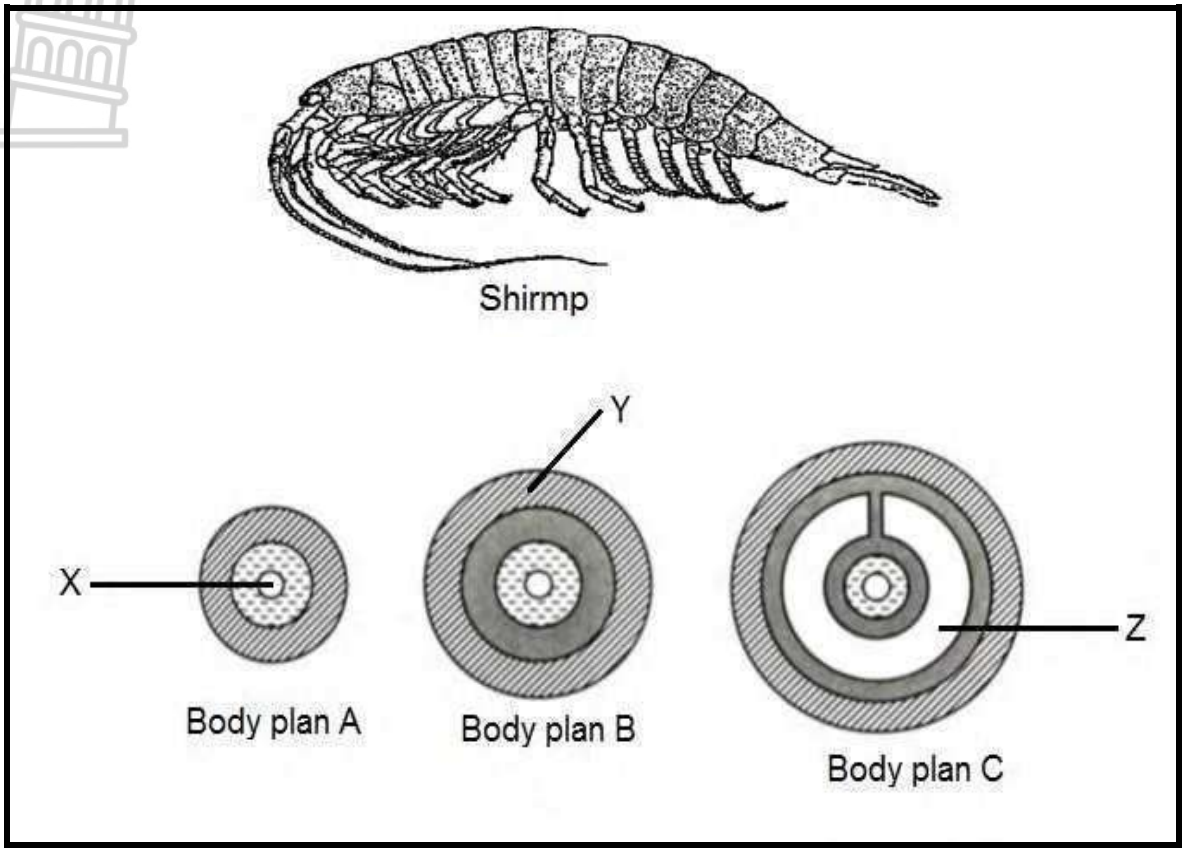
2.4.5 State THREE ways in which the government could improve public health and prevent deaths due to diseases caused by microorganisms. (3)

(11)

TOTAL QUESTION 2: 50

QUESTION 3

3.1 The diagrams below show a shrimp and three body plans. The shrimp is an arthropod found in all oceans.



3.1.1 Identify:

(a) **X** (1)

(b) **Y** (1)

3.1.2 Name the kingdom to which the shrimp belongs (1)

3.1.3 Which body plan (**A, B** or **C**) is associated with the shrimp (1)

3.1.4 Is the body plan mentioned in QUESTION 3.1.3 diploblastic or triploblastic? (1)

3.1.5 Name the type of skeleton found in the shrimp (1)

3.1.6 Explain how cephalisation and symmetry of the shrimp are appropriate to its mode of life (3)

3.1.7 Explain TWO advantages of the development of part **Z** to animals with body plan **C** (4)

(13)

3.2 In cellular respiration glucose is broken down in a step-wise process to release energy as ATP.

3.2.1 Describe what happens to the glucose molecule during glycolysis (4)

3.2.2 Tabulate TWO differences between the products of aerobic and anaerobic cellular respiration in animals cells (5)

3.2.3 Draw and label the cell organelle in which cellular respiration occurs (4)

(13)

3.3 Read the extract below.

Greenhouse farming, also known as controlled environment agriculture (CEA) is a method of cultivating crops in an enclosed structure in which optimal growing environment is created and maintained for crops. Greenhouses provide controlled environment that protect crops from extreme weather conditions by regulating temperature, humidity and light levels. Farmers are able to grow crops throughout the year irrespective of external climate and are also able to provide the ideal conditions required for each specific crop. This level of control enhances crop growth and reduces the risk of pest and diseases.

By providing an optimized environment for plant growth, greenhouse farming offers increased crop yield, better crop quality and year round cultivation. Hence there is a continuous reliable supply of fresh produce.

3.3.1 Define greenhouse farming. (2)

3.3.2 Name TWO environmental factors mentioned in the extract that are regulated in greenhouses. (2)

3.3.3 From the extract, describe how greenhouse farming affects food security. (5)

(9)

3.4 A scientific investigation was conducted to determine the rate of digestion of different food types.

The procedure was as follows:

- 48 teenage boys with no health conditions participated in the investigation
- The boys were divided into four equal groups (**A, B, C** and **D**)
- All boys fasted for 8hrs after which all were given same plate size of foods
- Group **A** was given rice
- Group **B** was given beef
- Group **C** was given cheese
- Group **D** was given fruits
- Each boy drank 500ml of water after their meals
- All the boys engaged in no physical activities after the meals.
- Bowel transit time of each group was measured
- Average bowel transit time was calculated in each group

The table below shows the result of the investigation:

FOOD TYPE	AVERAGE BOWEL TRANSIT TIME (minutes)
Rice	92
Beef	196
Cheese	270
Fruits	28

3.4.1 State:

(a) the dependent variable. (1)

(b) how the dependent variable was measured. (1)

3.4.2 Explain why all the boys fasted for 8 hours before given food. (2)

3.4.3 State THREE factors that were kept constant for this investigation. (3)

3.4.4 Apart from the sample size, state ONE way in which the reliability of the results were ensured for this investigation. (1)

3.4.5 Calculate, how many times the rate of digestion of beef is higher than the food with the least digestion time? Show ALL working. (3)

3.4.6 Explain the consequences if the boys were allowed to engage in physical activities after the meals. (2)

3.4.7 State a conclusion for this investigation. (2)

(15)

TOTAL QUESTION 3: [50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

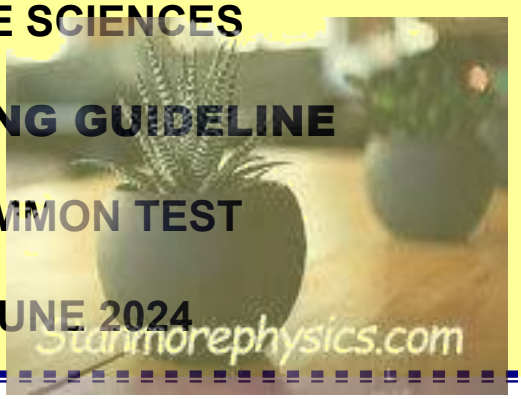
GRADE 11

LIFE SCIENCES

MARKING GUIDELINE

COMMON TEST

JUNE 2024



MARKS: 150

This marking guideline consists of 8 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only a part of it is required**
   Read all and credit the relevant part.

4. **If comparisons are asked for, but descriptions are given**
   Accept if the differences/similarities are clear.

5. **If tabulation is required, but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks.

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names are given in terminology**
    Accept, provided it was accepted at the national memo discussion meeting.

14. **If only the letter is asked for, but only the name is given (and vice versa)**
    Do not credit.

15. **If units are not given in measurements**
    Candidates will lose marks. Memorandum will allocate marks for units separately.

16. **Be sensitive to the sense of an answer, which may be stated in a different way.**

17. **Caption**
    All illustrations (diagrams, graphs, tables, etc.) must have a caption.

SECTION A

QUESTION 1

1.1	1.1.1	B✓✓		
	1.1.2	C✓✓		
	1.1.3	D✓✓		
	1.1.4	D✓✓		
	1.1.5	B✓✓		
	1.1.6	D✓✓		
	1.1.7	C✓✓		
	1.1.8	A✓✓		
			(8 x 2)	**(16)**

1.2	1.2.1	Cephalisation✓		
	1.2.2	Mesoderm✓		
	1.2.3	Asexual✓ reproduction/ Vegetative		
	1.2.4	Adenosine triphosphate✓/ ATP		
	1.2.5	Iodine✓ solution		
	1.2.6	Enzymes✓		
	1.2.7	Seed ✓		
	1.2.8	Pathogens✓		
			(8 x 1)	**(8)**

1.3	1.3.1	Both✓✓		
	1.3.2	B only✓✓		
	1.3.3	A only✓✓	(3 x 2)	**(6)**

1.4	1.4.1	(a) Stigma✓		(1)
		(b) Petals✓/sepals		(1)
	1.4.2	**M**✓ Ovary✓		(2)
	1.4.3	Produces pollen grains✓		(1)
	1.4.4	Stamen✓		(1)
	1.4.5	- Anthers are hanging outside the flower ✓ - to allow pollen grains to be easily carried by wind ✓ - Anthers are large ✓ - to produce many pollen grains ✓ - Filaments are long ✓ - to sway in the wind ✓ - Stigma is large and feathery ✓ - to trap as much pollen as possible✓ - Petals are reduced ✓ - to expose the stamens and stigma to wind ✓ **(Mark the FIRST TWO only)**	(Any 2 x 2)	(4)

1.4.6
- Ensure food security✓
- Conserves biodiversity✓
- Conservation of endemic species✓
- Conservation of endangered species✓
- Conservation of plants with medicinal values✓
- Preservation of seeds that are resistant to pest/harsh weather condition✓/ with good quality

Any (1)

(Mark the FIRST ONE only) **(11)**

1.5 1.5.1 Cladogram✓/ Phylogenetic tree (1)

1.5.2 Charophyte algae✓ (1)

1.5.3 Both have xylem and phloem✓/ vascular tissues (1)

1.5.4 350✓ MY✓/ million years (2)

1.5.5
- Depends on water for sexual reproduction✓
- No vascular tissues✓/no xylem and phloem (2)

(Mark the FIRST TWO only)

1.5.6
- Flowers attract pollinating agents✓/ pollinators
- Hence increased chances of fertilization✓ (2)

(9)

TOTAL SECTION A: [50]

SECTION B

QUESTION 2

2.1 2.1.1 Chloroplast✓ (1)

2.1.2 (a) Granum✓/ grana (1)
(b) Double membrane✓/outer membrane (1)

2.1.3 (a) H^+ atoms/ high energy hydrogen atoms✓ (1)
(b) glucose✓ (1)

2.1.4
- Source of H atoms✓
- and oxygen atoms✓
- H atoms to form carbohydrates✓
- Oxygen atom to form oxygen as a gas✓ (4)

2.1.5
- Other requirements for photosynthesis✓
- Maybe in short supply✓

OR

- Large increase in carbon dioxide makes the PH acidic✓
- Enzyme controlling the process is damaged✓ (Any 1 x 2) (2)

(11)

2.2 2.2.1 C✓ Pancreas✓ (2)
D✓ Small intestine✓ (2)
B✓ Stomach✓ (2)

2.2.2 The liver (E) converts stored glycogen✓ to glucose✓ (2)

2.2.3 - Salivary glands produce saliva✓
- which contains carbohydrases✓
- to breakdown of carbohydrates/ polysaccharides/ starch into maltose✓/ disaccharides (3)

2.2.4 - Poor absorption of nutrients✓
- thus, some nutrients will move with the undigested foods into colon✓

OR

- The rate of digestion would be slow✓
- Some food particles would not be digested✓

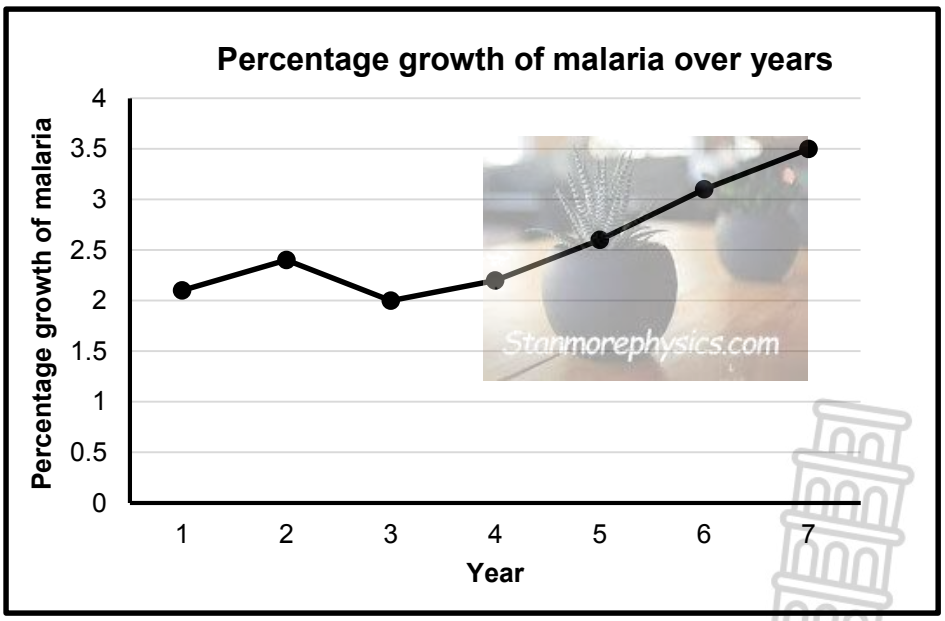
OR

- Part D/ small intestine will constrict✓/ be blocked
- food movement reduced✓or stopped (Any 1 x 2) (2)

(13)

2.3 2.3.1 Plasmodium✓ (1)

2.3.2



Criteria for marking the graph:

Criteria	Mark allocation
Line graph is drawn (**T**)	1
Caption of the graph includes both variables (**C**)	1
Correct labels on the X-axis and Y-axis with correct unit on the Y-axis (**L**)	1
Correct scale for X-aixs and Y axis (**S**)	1
Plotting (**P**) correctly done for: 1 – 6 years 7 years	 1 2

(6)

2.3.3 - Percentage growth of malaria increased in the first 2 years✓
- and then dropped in year 3✓
- then increased again from year 4 to year 7✓ (3)

2.3.4 5 and 6✓ (1)

2.3.5 Hospital✓/clinic records (1)
(Mark the FIRST ONE only)

2.3.6 To destroy the vector✓ (1)
(Mark the FIRST ONE only)

2.3.7 - Antibiotics is used to treat diseases caused by bacteria ✓
- Malaria is caused by protista ✓ (2)
(15)

2.4 2.4.1 The entry of pathogens✓/ disease causing microorganism into the body. (1)

2.4.2 Active✓ immunity (1)

2.4.3 - The pathogens/antigens enter the body in diagram A✓
- The body/white blood cells produces antibodies in diagram B✓
- The antibodies fight/kill the pathogens in diagram C✓
- Antibodies remain in the body as memory cells for future infection in diagram D✓ (4)

2.4.4 - Mucus in the nose and throat✓
- Cilia lining the nasal passages and trachea✓
- Tears and conjunctiva of the eye✓
- Hydrochloric acid in the stomach✓
- Unbroken skin✓ Any (2)
(Mark the FIRST TWO only)

2.4.5 - Vaccination✓
- Education programmes like posters✓ / TV
- Isolation of sick people from public✓
- Free public health/Medicines if sick✓
- Home assistance for sick people✓ Any (3)
(Mark the FIRST THREE only) **(11)**
[50]

QUESTION 3

3.1 3.1.1 (a) Gut✓ (1)
(b) Ectoderm✓ (1)

3.1.2 Animalia ✓ (1)

3.1.3 Body plan **C**✓ (1)

3.1.4 Triploblastic✓ (1)

3.1.5 Exoskeleton✓ (1)

3.1.6 - The shrimp is bilaterally symmetrical✓
- with the concentration of sense organs at the head region✓
- allowing for more efficient forward movement✓ (3)

3.1.7 - Provides space✓ for development of internal organs✓
- Contains fluid✓ which acts as hydrostatic skeleton✓
- The fluid cushions internal organs✓ protecting them from injury✓
- Separates gut wall from body wall✓ enabling to function independently✓ (Any 2 x 2) (4)

(Mark the FIRST TWO only) **(13)**

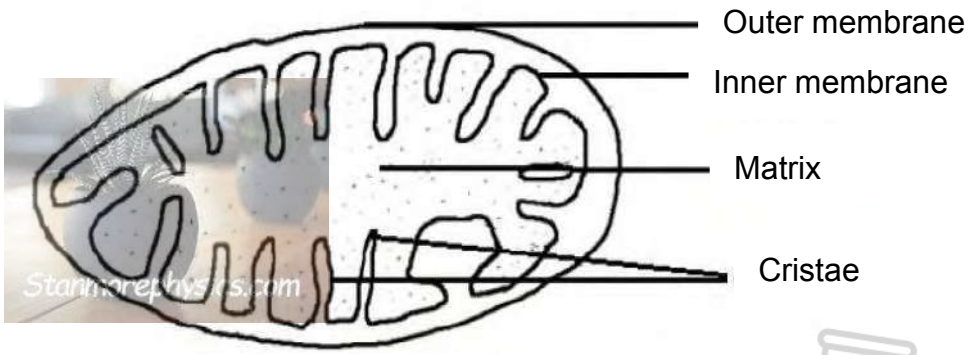
3.2 3.2.1 - Glucose is broken down✓
- To form 2 pyruvic acid✓
- Energy-rich hydrogen atoms (H^+) are released✓
- Some energy released is used to form 2 ATP molecules✓
- Process is controlled by enzyme✓ Any 4 (4)

3.2.2 ✓*

Aerobic respiration	**Anaerobic respiration**
- 38 / more ATP produced✓	- 2 / less ATP produced✓
- CO_2 and water are produced✓	- lactic acid is produced✓

(1* compulsory mark for the table + 4) (5)

3.2.3



Structure of mitochondrion

Criteria for marking the diagram

Criteria	**Mark allocation**
Caption (**C**)	1
Labels (**L**)	3

(4)

(13)

3.3 3.3.1
- Method of cultivating crops within an enclosed structure ✓
- In which optimal growing environment ✓ is created and maintained for crops (2)

3.3.2
- Temperature✓
- Humidity✓
- Light levels✓ Any (2)

(Mark the FIRST TWO only)

3.3.3
- Crops are grown throughout the year/ year-round cultivation ✓
- Provides ideal conditions required for each specific crop ✓
- Enhances crop growth ✓
- reduces the risk of pest and diseases. ✓
- Increased crop yield/ better crop quality ✓
- continuous reliable supply of fresh produce ✓
- There is increase in food security ✓ Any (5)

(9)

3.4 3.4.1
(a) Rate of digestion✓ (1)
(b) By determining bowel transit time✓ (1)

3.4.2
- Ensure foods already in the colon✓
- are digested before the investigation✓

OR

- Ensure there is no food in the colon✓
- before the investigation✓ Any (2)

3.4.3
- Participants were all teenage boys✓
- All boys have no health conditions✓
- All boys fasted 8 hours before the investigation✓
- Same plate size food given✓
- Each drank 500ml of water✓
- All did not engage in physical activities after the meals✓ Any (3)

(Mark the FIRST THREE only)

3.4.4 Average bowel transit time was calculated in each group✓ (1)

3.4.5 $\frac{196✓}{28✓} = 7✓$ times (3)

3.4.6
- Investigation will not be valid✓
- Physical activities needs more energy✓/ rate of digestion will be increased (2)

3.4.7 Cheese has highest rate of digestion✓✓

OR

Fruits have lowest rate of digestion✓✓ (2)

(15)
[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150