



KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

UMLAZI DISTRICT

GRADE 11

LIFE SCIENCES P1

NOVEMBER 2025

MARKS: 100

TIME: 2 ½ 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 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.
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.
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–D) next to the question numbers (1.1.1 to 1.1.9) in the ANSWER BOOK, for example 1.1.11 D.

- 1.1.1 C-shaped cartilaginous rings are ONLY found in the ...

- A bronchi and bronchioles.
- B trachea and bronchi.
- C trachea and bronchioles.
- D bronchioles and alveolus.

(2)

- 1.1.2 The main form in which oxygen is transported in the blood is ...

- A oxyhaemoglobin.
- B haemoglobin.
- C bicarbonate ions.
- D dissolved in blood plasma.



(2)

- 1.1.3 In which ONE of the following structures does BOTH mechanical and chemical digestion take place?

- A Large intestine
- B Gall bladder
- C Mouth
- D Pancreas

(2)

- 1.1.4 A person experiencing an asthma attack will have ...

- A constricted bronchioles.
- B thin alveoli walls.
- C a larger surface area for gaseous exchange.
- D an increased lung volume.

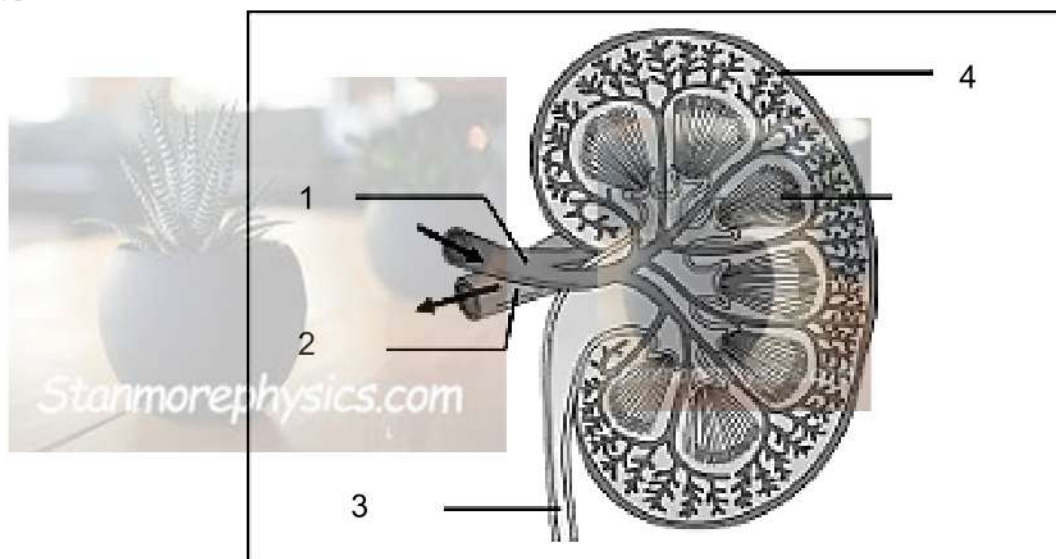
(2)

1.1.5 Which of the following occurs during inhalation in humans?

- A Pressure within the thoracic cavity decreases
- B The lungs deflate
- C The diaphragm relaxes
- D Pressure in the abdominal cavity decreases

(2)

1.1.6 The diagram below shows the kidney.



Which label represents the structure that transports nitrogenous wastes to the kidney?

- A 1
- B 2
- C 3
- D 4

(2)

1.1.7 The following are involved in the process of photosynthesis.



- (i) radiant energy
- (ii) carbohydrates
- (iii) carbon dioxide
- (iv) water
- (v) oxygen

Which ONE of the following equations correctly represents the process of photosynthesis?

- A $(i) + (iv) + (v) \rightarrow (ii) + (iii)$
- B $(i) + (iii) + (v) \rightarrow (ii) + (iv)$
- C $(i) + (ii) + (iii) \rightarrow (iv) + (v)$
- D $(i) + (iii) + (iv) \rightarrow (ii) + (v)$

(2)

1.1.8 Deamination of amino acids takes place in the ...

- A liver.
- B colon.
- C gall bladder.
- D small intestines.



(2)

1.1.9 Which ONE of the following substances is a form in which carbohydrates can be stored in animals?

- A Glycogen
- B Cellulose
- C Starch
- D Sucrose

(2)

(18)

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1–1.2.9) in the ANSWER BOOK.

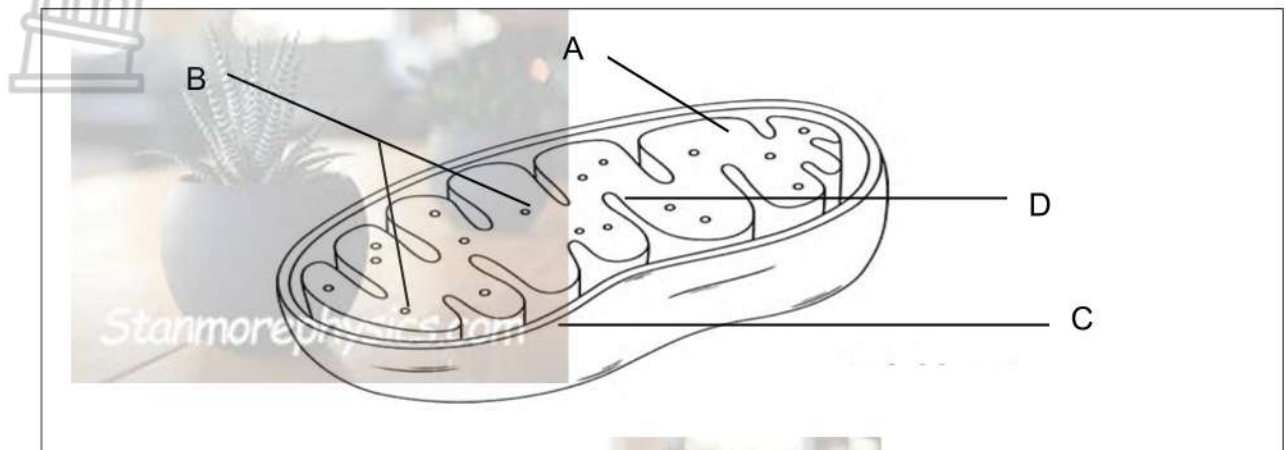
- 1.2.1 The functional unit of the kidney (1)
- 1.2.2 A leaf that has areas containing chlorophyll and areas without chlorophyll downloaded from Stanmorephysics (1)
- 1.2.3 Openings in the leaf through which gaseous exchange takes place during photosynthesis (1)
- 1.2.4 A glass building in which conditions are controlled for optimum plant growth (1)
- 1.2.5 The splitting of water molecules into hydrogen and oxygen in the presence of light (1)
- 1.2.6 Muscular, wave-like motion that moves food along the alimentary canal (1)
- 1.2.7 Sharp, pointed tooth responsible for tearing of food (1)
- 1.2.8 The valve that controls the movement of digested food from the stomach to the duodenum (1)
- 1.2.9 The removal of undigested food from the body (1)
- (9)**

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 1.3.4) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Open blood system	A. insects B. fish
1.3.2	The part of the brain that controls the breathing rate	A. medulla oblongata B. pituitary gland
1.3.3	Lactic acid is formed during this process	A. aerobic respiration B. anaerobic respiration
1.3.4	Muscular folds called rugae	A. small intestine B. mouth

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

- 1.4 The diagram below represents an organelle that plays a role in generating energy for the cell.



- 1.4.1 Identify the organelle above. (1)

- 1.4.2 Provide the LETTER and NAME for each of the following:

- (a) The part that is permeable to pyruvic acid. (2)
- (b) The part that increases the surface area for chemical reactions. (2)
- (c) The organelle that synthesizes proteins. (2)

- 1.4.3 Name the phase/s that occur/s in the:

- (a) cytoplasm of the cell. (1)
- (b) organelle above. (2)

(10)

- 1.5 Draw a labelled diagram of the organelle responsible for the process of photosynthesis. downloaded from Stanmorephysics (5)

TOTAL SECTION A: [50]

SECTION B

QUESTION 2

- 2.1 The following extract provides information on the process of removing starch from plants. The diagram below illustrates an investigation to test for the presence of starch when the plant is exposed to light.

The presence of starch in a leaf indicates that photosynthesis has occurred. When testing whether light is essential for photosynthesis, leaves that contain no starch are used.

Chemically removing starch without damaging the leaf is not possible. Therefore, the plant is kept in darkness for two to three days. In darkness, any stored starch is converted to sugar and used by the plant, leaving the leaves starch-free. For outdoor plants, wrap the leaves to be tested in aluminium foil for two to three days to remove their starch.



- 2.1.1 Name the process whereby starch is removed from the leaves by placing the plant in dark cupboard. (1)
- 2.1.2 Explain why it is impossible to remove the starch chemically from the leaves. downloaded from Stanmorephysics (2)
- 2.1.3 Why is the aluminium foil strip used? (2)
- 2.1.4 Using the extract above, state how the leaves become starch free. (2)
- 2.1.5 Name the chemical reagent used to test for the presence of starch. (1)
- 2.1.6 Other than light, list TWO environmental factors that affect the rate of photosynthesis. (2)



- 2.1.7 Draw a labelled diagram showing the results of the starch test indicating the different colours on the leaf and the positive and negative test for starch. (5)
- 2.1.8 Tabulate TWO differences between the light phase and the dark phase of photosynthesis. (5)
- (20)**

- 2.2 The following extract describes the use of fermentation in the food and beverage industries.

Many food and beverage industries are entirely dependent on the fermentation process to manufacture their products. Some of the products manufactured are being distributed and sold locally while others are exported to foreign countries.

- 2.2.1 Name TWO food products that are manufactured by fermentation. (2)
- 2.2.2 Discuss TWO ways in which the production of fermented foods and drinks can benefit the South African economy. (4)
- 2.2.3 Fermentation takes place during the manufacture of alcoholic beverages.
- (a) Name the fermentation process that takes place in the manufacture of alcoholic beverages. (1)
- (b) Describe the fermentation process named in QUESTION 2.2.3 (a) above. (3)
- (10)**

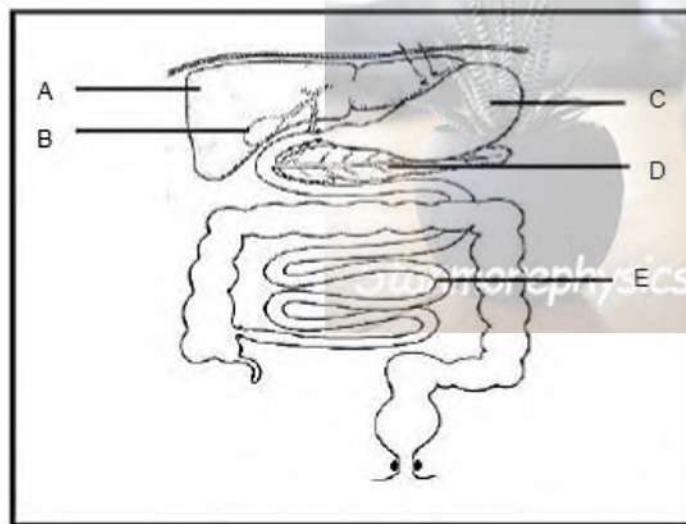
- 2.3 The table below shows the results of an investigation involving a healthy individual, who inhaled air containing different concentrations of carbon dioxide. The oxygen concentration was constant.

Concentration of CO ₂ inhaled (%)	Rate of breathing (number of breaths per minute)	Depth of breathing per minute (litres)
0.03	12	8.7
0.06	15	9.4
1.50	18	10.3
2.50	23	11.5
4.50	23	13.2
5.50	30	18.9
6.00	32	27.9

- 2.3.1 Define the term *homeostasis*. (2)
- 2.3.2 Describe how the mechanism of breathing plays a role in bringing about homeostasis when a person engages in strenuous exercise. (6)
- 2.3.3 State the relationship shown by the results for the **rate** and **depth** of breathing. (3)
- 2.3.4 Calculate the percentage increase in the rate of breathing when the concentration of CO₂ inhaled changes from 1.5 % to 2.5%. Show ALL working. (3)
- 2.3.5 Draw a line graph to show the relationship between the rate of breathing and the concentration of CO₂ inhaled. (6)
- (20)
- [50]

QUESTION 3

3.1 The diagram below shows parts of the human digestive system.



3.1.1 Identify the part labelled:

- (a) A (1)
- (b) B (1)
- (c) C (1)

3.1.2 State ONE function of part A. (2)

3.1.3 Name ONE food type that is digested by the secretions of organ B. (1)

3.1.4 Explain how the length of structure E is suited to aid in digestion. (2)

3.1.5. Digestion is aided by secretions. Name the secretions from the part labelled:

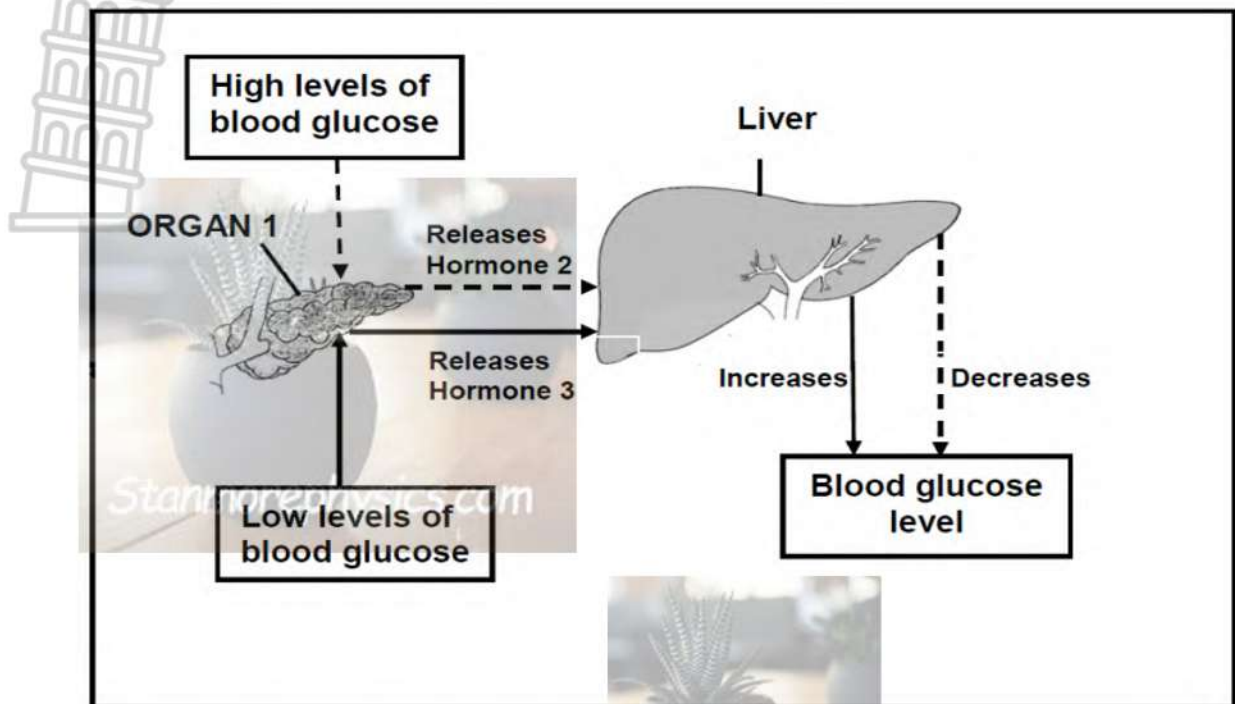
- (a) B (1)
- (b) C (1)
- (c) E (1)

3.1.6 Amanda eats a carbohydrate meal. Explain how:

- (a) saliva aids in the digestion of carbohydrates in the mouth. (2)
- (b) the villus aids in absorption of digested carbohydrates. (2)

(15)

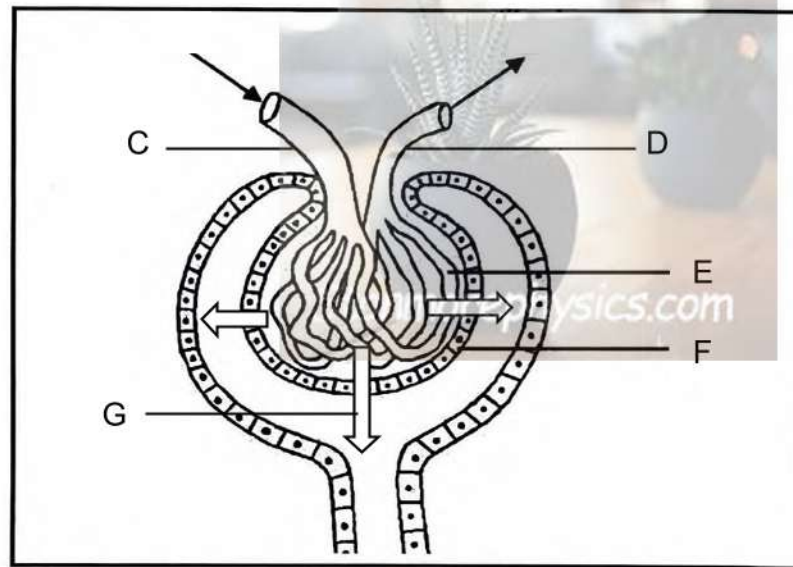
3.2 The flow diagram represents the process that occurs when there are changes in the blood glucose levels in humans.



3.2.1 Identify:

- (a) Organ 1 (1)
 - (b) Hormone 2 (1)
 - (c) Hormone 3 (1)
 - (d) The disorder caused when organ 1 fails to release sufficient amounts of Hormone 2. (1)
 - (e) The mechanism that controls the levels of glucose in the body (1)
- (5)**

3.3 The diagram below shows part of the nephron.



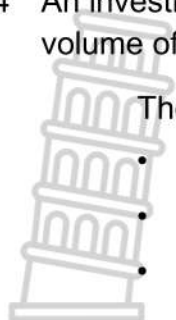
3.3.1 Identify:

- (a) Blood vessel D (1)
- (b) Structure E (1)
- (c) Specialised cells F (1)
- (d) Process G (1)



- 3.3.2 Name the essential nutrient that will not be reabsorbed from the contents of G, in diabetic patients. (1)
 - 3.3.3 Discuss TWO ways how the part of the nephron above is structurally adapted to perform its function. (4)
 - 3.3.4 State TWO functions of the kidney other than the excretion of nitrogenous waste. (2)
 - 3.3.5 Explain why high amounts of protein (albumen) in the urine indicate kidney damage. (2)
- (13)**

3.4 An investigation was carried out to determine the influence of alcohol on the volume of urine produced.



The investigation was conducted as follows:

- 12 healthy, 23-year-old males of similar height and mass were selected.
- The men were divided into two groups of six each, Group A and Group B.
- The two groups ate the same food and did the same exercise for a 24-hour period before testing.
- Each group was given the following drink after the 24-hour period.
Group A: 1 litre of alcohol-free beer (beer that does not contain alcohol)
Group B: 1 litre of alcoholic beer.
- Urine was collected from each man every hour for 3 hours.

Assume that the volume of urine collected is equal to the volume of urine produced. The results of the investigation are shown below.

TIME OF COLLECTION	AVERAGE VOLUME OF URINE COLLECTED (mL)	
	GROUP A	GROUP B
After 1 hour	599	643
After 2 hours	413	504
After 3 hours	112	132

3.4.1 State the aim of this investigation. (2)

3.4.2 Identify the:

(a) dependent variable. (1)

(b) independent variable. (1)

3.4.3 List TWO planning steps that the investigators had to take before conducting the investigation. (2)

3.4.4 State TWO ways that investigators ensured validity. (2)

3.4.5 Identify TWO factors, other than those mentioned in the investigation, that should be kept constant during the investigation. (2)

- 3.4.6 Mention ONE way in which the reliability was maintained during the investigation. (1)
- 3.4.7 What conclusion can be drawn from the results in the table? (2)
- 3.4.8 State the effect of excessive alcohol consumption on the:
- (a) Liver (2)
- (b) Brain (2)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150





KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

UMLAZI DISTRICT

GRADE 11

LIFE SCIENCES P1
NOVEMBER 2025
MARKING GUIDELINE

MARKS: 150

TIME: 2 ½ Hours

These marking guidelines consists of 11 pages.

PRINCIPLES RELATING TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
Stop marking when maximum marks are 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 part of it is required**
Read all and credit relevant part.
4. **If comparisons are asked for and descriptions are given**
Accept if 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-recognized abbreviations**
Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of 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 recognizable accept provided it does not mean something else in Life Sciences or if it is out of context.
13. **If common names given in terminology**
Accept provided it was accepted at the National memo discussion meeting.
14. **If only letter is asked for and only name is given (and vice versa)**
No 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 captions.

18. **Code-switching of official languages (terms and concepts)**

A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.



SECTION A

QUESTION 1

1.1.1 B ✓✓

1.1.2 A ✓✓

1.1.3 C ✓✓

1.1.4 A ✓✓

1.1.5 A ✓✓

1.1.6 A ✓✓

1.1.7 D ✓✓

1.1.8 A ✓✓

1.1.9 A ✓✓

(9 x 2) (18)

1.2.1 nephron ✓

1.2.2 variegated ✓

1.2.3 stomata ✓

1.2.4 glasshouse/ greenhouse ✓

1.2.5 photolysis ✓

1.2.6 peristalsis ✓

1.2.7 canine/s ✓

1.2.8 pyloric sphincter ✓

1.2.9 defaecation/ egestion ✓



(9 x 1) (9)

1.3.1 A only ✓✓

1.3.2 A only ✓✓

1.3.3 B only ✓✓

1.3.4 None ✓✓

(4 x 2) (8)

1.4.1 Mitochondrion ✓

(1)

1.4.2 (a) C ✓ - outer membrane✓

(2)

(b) D ✓ - cristae ✓

(2)

(c) B ✓ - ribosome ✓

(2)

1.4.3 (a) glycolysis ✓

(1)

(b) Krebs cycle ✓

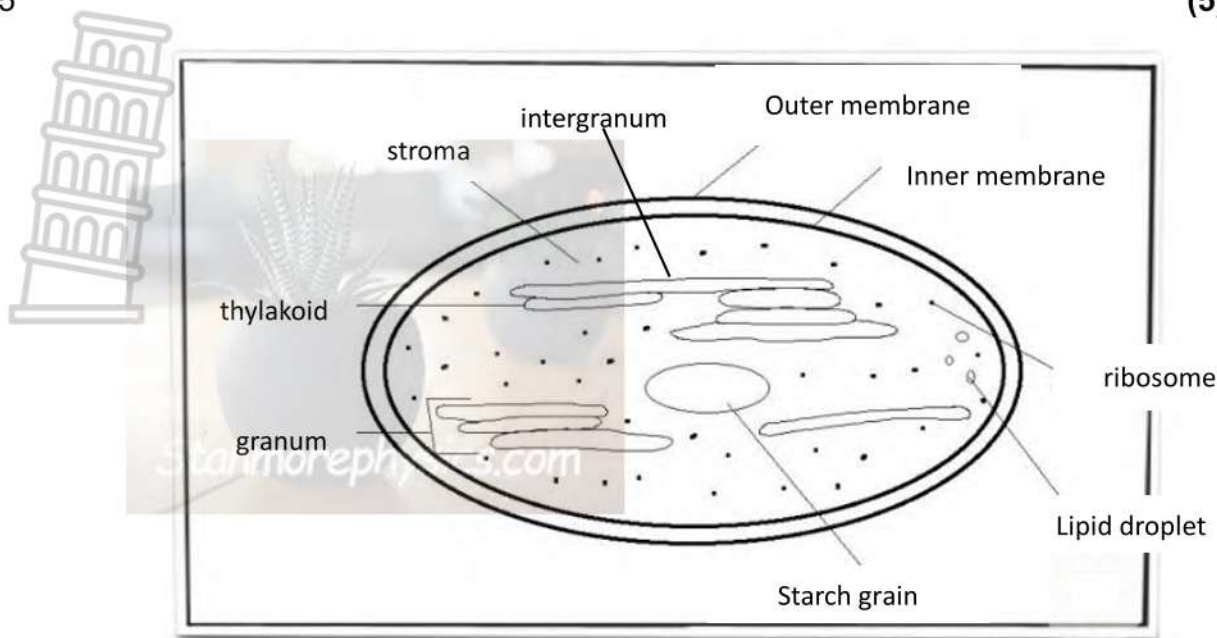
oxidative phosphorylation ✓

(2)

(10)

1.5

(5)



Correct Diagram (D)	✓
Caption (C)	✓
Labels (L)- any 3 correct	✓✓✓

TOTAL SECTION A: 50

SECTION B

QUESTION 2

- 2.1 2.1.1 Destarch ✓ / destarching (1)
- 2.1.2 Removing starch in this way will cause damage✓ to the tissues and
organelles✓ / will kill the tissues (any 2 x1) (2)
- 2.1.3 Prevents ✓ the leaves from absorbing light✓
OR
does not allow ✓ sunlight to pass through✓ (any 1 x 2) (2)
- 2.1.4 In darkness, any stored starch is converted to sugar ✓ and used by the
plant ✓, leaving the leaves starch-free. ✓ (any 2 x1) (2)
- 2.1.5 iodine solution ✓ (1)
- 2.1.6 carbon dioxide concentration ✓, temperature ✓, humidity✓, wind✓
(any 2 x 1) (2)



(5)



Diagram of the leaf After the Starch Test

Caption	✓
Yellow/brown and negative result	✓✓
Blue-black and positive result	✓✓

2.1.8 **1 Mark for table**✓

(5)

Light phase	Dark phase
- light is required ✓/dependent on light	-light is not required /independent of light ✓
-Occurs in the grana/ (thylakoid membranes) ✓	-Occurs in the stroma✓

(20)

2.2 2.2.1 Cheese✓, yoghurt ✓, bread ✓
(any relevant food products)

(any 2 x1) (2)

2.2.2 Jobs are created✓ and reduces unemployment✓/ more people have a source of income.

Company profit increases✓ and government earns more revenue as taxes. ✓

Products are exported ✓ and earns foreign exchange ✓ (any 2 x 2) (4)

2.2.3 (a) Alcoholic fermentation ✓ /anaerobic fermentation (1)



(b) a metabolic process ✓ by which yeast converts sugars ✓ into ethanol (alcohol) ✓ and carbon dioxide (CO_2) ✓ in the absence of oxygen ✓ (any 3 x 1) (3)

(10)

2.3 — 2.3.1

Maintenance of a constant internal environment ✓ regardless of changes in the environment ✓ (2)

2.3.2

Strenuous physical activity increases the body's need for energy. ✓ This, in turn, demands a greater intake of oxygen ✓.

When the carbon dioxide level in the blood increases, ✓ the medulla oblongata responds ✓ by increasing the heart rate ✓ and by increasing the rate ✓ and depth of breathing. ✓

More blood flows to the lungs ✓, more oxygen is taken in ✓ and more carbon dioxide is expired. ✓ (any 6) (6)

2.3.3

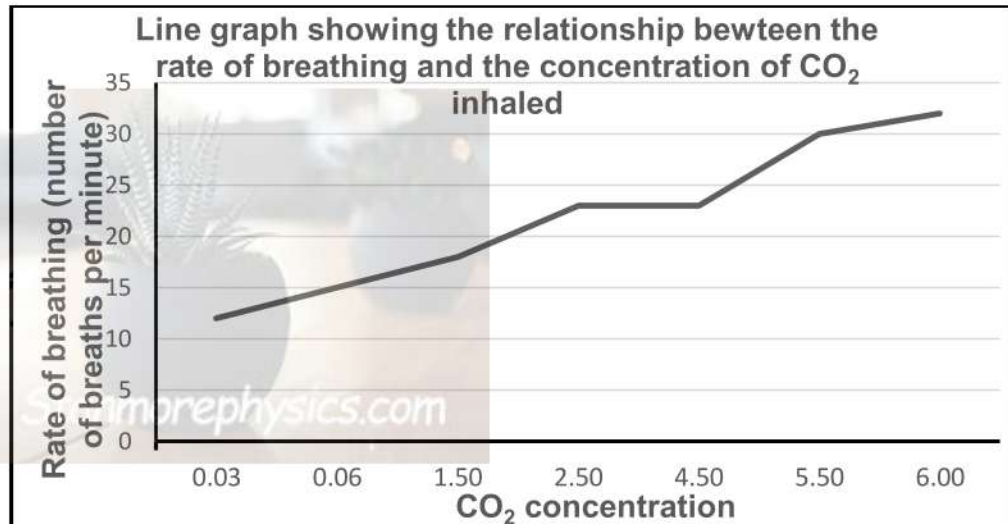
As the concentration of carbon dioxide inhaled increases, ✓ the rate and depth ✓ of breathing also increases. ✓ (3)

2.3.4

$\frac{23 - 18}{18} \times 100 = 28\%$ ✓ (3)



2.3.5



Correct Caption	1 mark
Correct label for X & Y axis	1 mark
Correct scale for X & Y axis	1 mark
Correct type of graph	1 mark
Plotted points: all 7 points correct	2 marks
1-4 points correct	1 mark

(6)

(20)

[50]

QUESTION 3

- 3.1 3.1.1 (a) liver ✓ (1)
- (b) gall bladder ✓ (1)
- (c) stomach ✓ (1)
- 3.1.2 The liver cells secrete bile ✓✓
- The liver converts glucose to glycogen ✓✓
- The liver converts glucose to fat and stores fat ✓✓
- The liver serves as a storehouse for minerals such as iron ✓✓
- Important vitamins such as A, D and B₁₂ are stored in the liver ✓✓
- The liver deaminates excess amino acids ✓✓
- The liver detoxifies certain harmful substances ✓✓
- (any 1 x 2) (2)
- 3.1.3 Fats/lipids ✓ (1)

- 3.1.4 The length increases the surface area ✓ for maximum digestion✓ (2)
- 3.1.5 (a) bile ✓ (1)
- (b) gastric juice ✓ (1)
- (c) intestinal juice ✓ (1)
- 3.1.6 (a) Saliva contains the enzyme ✓ salivary amylase which starts the chemical digestion process✓ (2)

(b) - Glucose/ monosaccharide moves by diffusion ✓ through the columnar epithelial cells✓ into the blood capillaries ✓ of a villus.

-Increases surface area✓ for maximum✓ absorption of digested carbohydrates downloaded from Stanmorephysics (any 2 x 1)

(2)

(15)

- 3.2 3.2.1 (a) pancreas ✓ (1)
- (b) insulin✓ (1)
- (c) glucagon✓ (1)
- (d) diabetes mellitus ✓ (1)
- (e) negative feedback mechanism ✓ (1)

(5)

- 3.3 3.3.1 (a) efferent vessel ✓/efferent arteriole (1)
- (b) glomerulus ✓/ blood capillary/ first capillary network (1)
- (c) podocytes ✓ (1)
- (d) (Ultra) filtration ✓/ glomerular filtration (1)

3.3.2 glucose ✓ (1)

3.3.3 The diameter of the afferent arteriole is wider than the efferent arteriole✓ creates pressure which allows for ultrafiltration✓

The glomerulus is branched / forms a network of capillaries ✓ to increase the surface area for filtration ✓



Walls of the glomerular capillaries consist of a single layer of endothelial cells ✓ which is in close contact with inner wall of the Bowman's capsule and therefore facilitates efficient filtration ✓

The Bowman's capsule is cup-shaped ✓ allowing for the close fitting of the glomerulus for diffusion ✓.

Podocytes ✓ of the Bowman's capsule which selectively allow certain substances to pass through ✓.

Endothelial wall of glomerular capillaries have many pores ✓ which allow for selective filtration ✓ (any 2 x 2) (4)

3.3.4 osmoregulation ✓ , blood pH regulation ✓ , salt regulation ✓ (any 2 x 1) (2)

3.3.5 Protein molecules are large molecules which generally cannot pass through the tiny pores of the thin glomerular endothelium ✓ into the capsular space or through the slit pores ✓

Therefore, very high amounts of protein in the urine indicates malfunctioning of filtration process ✓.

Greater pressure facilitates filtration as well as tubular reabsorption ✓ and a tear in the glomerular membrane can also lead to proteins appearing in the urine ✓ (any 1 x 2) (2)

(13)

3.4 3.4.1 To determine the influence of alcohol ✓ on the volume of urine ✓ produced. downloaded from Stanmorephysics (2)

3.4.2 (a) Volume of urine ✓ (1)

(b) influence of alcohol ✓ (1)

3.4.3 Ask permission from participants engaging in the investigation ✓

Decide on a sample size ✓

Decide on the gender to be investigated ✓

Decide on the age of the participants ✓

Decide on the health status of the participants ✓

Decide on a time ✓ / date / place to conduct the investigation. ✓

Decide on the apparatus ✓ / materials that need to be used.

Decide on how to record the data ✓



Decide what factors to keep constant ✓/ examples of factors to be kept constant.

(Mark the first TWO only)

(any 2 x 1) (2)

3.4.4 The two groups ate the same food ✓

and did the same exercise ✓ for the 24-hour period before testing.

Urine was collected from each man every hour for 3 hours ✓

Men of the same age ✓ were selected

Same gender ✓ were selected

Men of the same mass ✓ were selected

Men of the same health status ✓ were selected

(Mark the first TWO only)

(any 2 x 1) (2)

3.4.5 The same room ✓

The same environmental temperature ✓

The same apparatus ✓ being used to measure

The same investigator ✓ conducting investigation/ recording results

No other liquid intake by both groups ✓

(Mark the first TWO only)

(any 2 x 1) (2)

3.4.6 Two groups of 6 men each were selected ✓

(1)

3.4.7 Men who drank alcoholic beer produced a greater volume ✓ of urine compared to men who drank alcohol-free beer ✓

Volume of urine produced decreased in both groups after 3 hours ✓. (3)

3.4.8 a) damage to the liver ✓ or liver cirrhosis ✓, which can lead to liver cancer ✓/ death. ✓

(any 2 x 1) (2)

(b) intoxication ✓, impaired judgment ✓ brain cell death ✓, cognitive decline ✓, memory loss ✓, brain shrinkage. ✓

(any 2 x 1) (2)

(15)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150