

GAUTENG DEPARTMENT OF EDUCATION EXEMPLAR 2020

LIFE SCIENCES P1

OCTOBER/ NOVEMBER

QUESTION PAPER

GRADE: 11

TIME : 2½ hours MARKS : 150

NUMBER OF PAGES : 16

GAUTENG DEPARTMENT OF EDUCATION EXEMPLAR

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 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. ALL drawings should be done in pencil and labelled in blue or black ink.
- 7. Draw diagrams 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.
- 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 All the biochemical processes that take place in a living organism are collectively called...
 - A metabolism.
 - B catabolism.
 - C anabolism.
 - D fermentation.
 - 1.1.2 Where is urea produced in the human body and from which compound is it produced?

	Produced	Compound
A	Intestine	Proteins
В	Kidneys	Amino acids
С	Kidneys	Fatty acids
D	Liver	Amino acids

- 1.1.3 The following is a list of steps in a test for starch in green leaves:
 - (i) Immerse leaves in iodine solution
 - (ii) Boil leaves in water
 - (iii) Rinse leaves in water
 - (iv) Boil leaves in alcohol

Which is the CORRECT sequence of steps?

- A $(i) \rightarrow (iii) \rightarrow (ii) \rightarrow (iv)$
- $\mathsf{B} \quad (\mathsf{ii}) \to (\mathsf{iv}) \to (\mathsf{iii}) \to (\mathsf{i})$
- C (iii) \rightarrow (i) \rightarrow (iv) \rightarrow (ii)
- D (iv) \rightarrow (ii) \rightarrow (i) \rightarrow (iii)

- A Oxygen
- B Glucose
- C Urea
- D Carbon dioxide
- 1.1.5 Chloroplasts contains a flattened membranous sac called...
 - A cristae.
 - B thylakoids.
 - C matrix.
 - D stroma.

QUESTIONS 1.1.6 AND 1.1.7 ARE BASED ON THE TABLE BELOW.

Gases	Concentration in inhaled air (%)	Concentration in exhaled air (%)
Oxygen	21	16
Carbon dioxide	0,04	4
Nitrogen	78	78
Water vapour	0,96	2

- 1.1.6 The reason for the concentration of nitrogen being the same in inhaled and exhaled air is that:
 - A Nitrogen is taken into the bloodstream and the same amount diffuses back to the alveoli to be breathed out.
 - B Nitrogen gas does not reach the alveoli but remains in the bronchiole until exhalation occurs.
 - C Nitrogen gas is used in the body, but the same amount is produced in the body as a waste product, which is then exhaled.
 - D Nitrogen cannot be absorbed by the body in its gaseous form, so the amount inhaled is the same as the amount exhaled.

inhaled air?

- A Water from the cells is excreted as water vapour.
- B Blood plasma leaks into the alveoli, which is then excreted as water vapour.
- C A small amount of water produced during cellular respiration is excreted.
- D The respiratory surface must be kept moist at all times and some of this moisture evaporates and is exhaled.
- 1.1.8 In a dialysis machine, which one of the following combination of substances can escape from the patient's blood into the bathing solution?
 - A Salts, water and glucose.
 - B Salts, urea and glucose.
 - C Water, urea and uric acid.
 - D Water, uric acid and glucose. (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 your ANSWER BOOK.
 - 1.2.1 Folded structures found on the inner membrane of a mitochondrion
 - 1.2.2 The type of energy absorbed by the chlorophyll during photosynthesis
 - 1.2.3 A disorder caused by a diet high in carbohydrates and extremely low in proteins
 - 1.2.4 Process of removing starch reserves in a plant for experiments concerning photosynthesis
 - 1.2.5 The structure that controls the movement of digested food from the stomach to the duodenum
 - 1.2.6 The organic molecules that act as catalysts and control the chemical reactions during photosynthesis
 - 1.2.7 The tiny finger-like projections in the small intestine
 - 1.2.8 Splitting of water molecules into oxygen atoms and hydrogen atoms in the presence of light

(8)

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 1.3.4) in the ANSWER BOOK.

	COLUMNI		COLUMN		
1.3.1	Tube that carries urine from the	A:	Ureter		
	kidney to the bladder	B:	Urethra		
1.3.2	Removal of an amino group from	A:	Detoxification		
	amino acids	B:	Deamination		
1.3.3	Cyclic process during light	A:	Krebs Cycle		
	independent phase of	B:	Calvin cycle		
	photosynthesis				
1.3.4	Factor(s) that increase(s) the	A:	Humidity		
	rate of photosynthesis	B:	Low temperature		
		-		(4 x 2)	(8)

1.4 The diagram below is a model that can be used to demonstrate the breathing mechanism in humans.



- 1.4.1 What do each of the following parts represent in the human breathing system?
 - (a) **A** (b) **B**
- (c) **C**

(3)

(2)

(1)

- 1.4.2 Explain ONE way in which part **A** in humans is adapted for its function.
- 1.4.3 Which diagram (**A** or **B**) represents inhalation?

Please turn over

- 1.4.4Give TWO visible reasons from the diagrams to support your
answer to QUESTION 1.4.3.(2)1.4.5Describe the mechanism of inhalation in humans.(5)
(13)
- 1.5 Read the passage below and answer the question that follows.

A device, the size of a cell phone, monitors and treats patients with type 1 insulin-dependent diabetes. The system includes a glucose meter, an insulin pump strapped to the body and a tiny catheter (thin tube) for delivering insulin into the blood stream.

The glucose meter measures a patient's glucose levels every five minutes. The insulin pump releases insulin into the blood stream when needed. This helps patients maintain glucose levels within the normal range.



1.5.1 Explain how this device assists the patient to maintain normal blood glucose levels.

(5)

TOTAL SECTION A: 50

QUESTION 2

2.1 Study the diagram below which shows part of the human digestive system.



2.1.1 Provide labels for parts **A**, **B**, **C** and **F**.

(4)

- 2.1.2 Provide the LETTER where:
 - (a) Bile is temporarily stored
 - (b) The hormones that control the blood glucose level are secreted
 - (c) Digested food is absorbed into the blood stream
 - (d) Absorption of water and mineral salts takes place (4)
- 2.1.3 Describe how part **D** is responsible for breaking down food molecules by both mechanical and chemical digestion.

(4) (12) 2.2 Read the passage below and answer the questions that follow:

Malnutrition in children can lead to wasted growth, stunted growth, underweight and obesity. It puts children at risk of illness and difficulties later in life. Child malnutrition is a persistent problem in South Africa, it became a topic of controversy during the country's COVID-19 lockdown. Those experiencing malnutrition and diet-related diseases face worse symptoms from COVID-19. Malnutrition discussions tend to focus on undernutrition and undernourished children, the overweight children are often excluded.

Below are the percentages of malnutrition in children in South Africa, against the World Health Organisation (WHO) Africa region and the world. South Africa's numbers are from the 2016 South African Demographic and Health Survey (DHS).

	Percentage of children affected			
	Wasted growth	Stunted growth	Underweight	Overweight
South Africa	2.5	27.4	5.9	13.3
WHO Africa Region	7	33.1	17.1	3.5
World	7.3	21.9	13.4	5.9

Adapted from https://africacheck.org/factsheets/factsheet-child-malnutrition-in-south-africa/

2.2.1	What is malnutrition?	(1)
2.2.2	What kind of diet leads to obesity?	(1)
2.2.3	Name any TWO disorders that obesity can lead to.	(2)
2.2.4	Name a disorder that is a result of a shortage of proteins in children.	(1)
2.2.5	How does malnutrition increase the chance of having the worst symptoms of COVID-19?	(2)
2.2.6	Draw a bar graph to compare malnutrition in children in South Africa and the world.	(6) (13)

2.3 An investigation was carried out to study the effect of varying light intensities on the rate of photosynthesis in pondweed. The apparatus was set up as shown in the diagram below.



oxygen bubbles released per minute counted. The lamp is then moved to a new position (80 cm from the plant) and the rate of bubbling noted (once the plant has had a short time to become acclimatised to this new higher light intensity). The process is repeated by placing the lamp closer to the plant e.g. 60cm, then 40cm, etc.

The results are given in the table below

Distance from plant (cm)	Light intensity (units)	Rate of photosynthesis (Number of oxygen bubbles released per minute)
100	4	4
80	11	10
60	25	19
40	45	22
30	64	25
20	100	25

2.3.1 Name the

- (a) Dependent variable
- (b) Independent variable
- 2.3.2 Name the gas that is released in the test tube. (1)
- 2.3.3 Explain the precautionary measure visible in the diagram, that was taken to ensure the reliability of the results. (3)

(2)

Life Sciences/P1 Exe	mplar Grade 11 11	GDE/Nov2020
2.3.4	Name TWO other environmental factors that could have influenced the results.	(2)
2.3.5	Regarding the results given above, what deduction can be about the relationship between the light intensity and the ra photosynthesis?	made ate of (2)
2.3.6	State TWO reasons why the process of photosynthesis is biologically important.	(2) (12)
21 The diad	ram below represents a section through an alveolus and	2

2.4 The diagram below represents a section through an alveolus and a surrounding blood capillary in the human body. Study the diagram and answer the questions.



(4)

12

alveolus is structurally suitable for its function.

2.4.6 From a medical perspective, smoking is a damaging habit that destroys the cilia in the breathing tract. Explain the consequence of the destroyed cilia to a smoking person. (3) (13)

[50]

QUESTION 3

3.1 The flow diagram below represents two biochemical processes.



3.2 Living organisms produce carbon dioxide as a by-product of cellular respiration. The following experiment was set up to test whether carbon dioxide is the by-product of cellular respiration.





3.3.4	How is part C structurally adapted for the process mentioned in QUESTION 3.3.3 above?	(4) (10)
3.3.3	Name the process of urine formation that takes place in ${f C}$.	(1)
3.3.2	Label the parts numbered B , C , D and E .	(4)
3.3.1	Identify the structure shown in the diagram above.	(1)

3.4 The table below shows the concentrations of fluids at regions **A**, **C**, **D** and **F** in the diagram above (QUESTION 3.3). Study the table and answer the questions that follow.

Substance	Solute concentration(g/100cm ³)				
	Region A	Region C	Region D	Region F	
Glucose	0.9	0.9	0.2	0.0	
Proteins	82.0	0.0	0.0	0.0	
Salts	8.0	8.0	9.6	16.5	
Urea	0.2	0.2	0.2	20.0	

3.4.1 Name the substance(s) in the table that:

- (a) Has molecules that are too large to be filtered.
 (b) Has molecules that are small enough to be filtered but is
 - completely reabsorbed from the fluid in the tubules. (1)
- (c) Increases in concentration as the fluid moves along the tubules. (2)
- 3.4.2 Explain how the concentration of glucose at region **D** would change if the person had diabetes.

(2) (6)

3.5 The dialysis machine contains a semi-permeable membrane that separates the machine into two compartments. One compartment contains the dialysis solution and the other compartment contains blood. Blood leaves the patient through a catheter and enters the dialysis machine to be filtered. The filtered blood is returned to the patient via the catheter. This type of dialysis involves diffusion of solutes across a semi permeable membrane and filtration. It uses counter current flow which is the transfer of a solute from one flowing current of fluid to another fluid across a semi permeable membrane



3.5.4	Name TWO disadvantage of dialysis.	(2) (8) [50]
3.5.3	The coiled tubing is immersed in a bathing liquid that must be frequently replaced with fresh liquid that is always kept at 37°C. What is the reason for keeping the temperature of 37°C?	(2)
3.5.2	Explain why the tube is coiled rather than straight	(2)
3.5.1	Describe what dialysis is.	(2)

TOTAL SECTION B: 100

GRAND TOTAL: 150