

# SMARTWIZ

## GRADE11 LIFE SCIENCE EXAM

**MARKS: 100**

**TIME: 2 HOURS**

**SCHOOL** \_\_\_\_\_

**CLASS (eg. 4A)** \_\_\_\_\_

**SURNAME** \_\_\_\_\_

**NAME** \_\_\_\_\_

MARKS	
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### Instructions for Learners:

- Read all instructions carefully before you begin the exam.
- Write your full name and student number clearly on the answer sheet/book.
- Answer all questions unless otherwise instructed.
- Show all your work/calculations where necessary.
- Write neatly and clearly.
- Use only a blue or black pen. Do not use correction fluid or tape.
- Electronic devices (calculators, cell phones, etc.) are not allowed unless explicitly permitted.
- Raise your hand if you have any questions.
- Do not talk to other learners during the exam.
- Any form of cheating will result in immediate disqualification from the exam.

**This exam consists of six pages, including the cover page.**

## ● SECTION A: MULTIPLE CHOICE & MATCHING (20 MARKS)

### QUESTION 1: MULTIPLE CHOICE ( $5 \times 1 = 5$ marks)

Choose the correct answer. Write only the letter (A–D):

1.1 Which structure allows gases to enter and leave the leaf?

- A) Xylem
- B) Stomata
- C) Cuticle
- D) Guard cell

1.2 What is the final product of cellular respiration?

- A) Glucose
- B) Oxygen
- C) Energy (ATP)
- D) Water

1.3 Which hormone promotes growth in plant stems?

- A) Auxin
- B) Gibberellin
- C) Insulin
- D) Adrenaline

1.4 Which phase of mitosis involves chromosomes lining up at the equator?

- A) Prophase
- B) Metaphase
- C) Anaphase
- D) Telophase

1.5 What is a population?

- A) All abiotic factors in an area
- B) Organisms of the same species in an area
- C) Interacting food chains
- D) A group of ecosystems

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### QUESTION 2: MATCHING COLUMNS ( $5 \times 1 = 5$ marks)

Match Column A with Column B. Write only the letter.

Column A	Column B
2.1 Nucleus	A. Site of protein synthesis
2.2 Ribosome	B. Genetic control center of the cell
2.3 Chloroplast	C. Breaks down waste in animal cells

2.4 Mitochondrion	D. Site of respiration
2.5 Lysosome	E. Site of photosynthesis

### QUESTION 3: DEFINE THE FOLLOWING ( $5 \times 2 = 10$ marks)

3.1 Osmosis

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3.2 Invasive species

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3.3 Natural selection

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3.4 Excretion

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3.5 Chromosome

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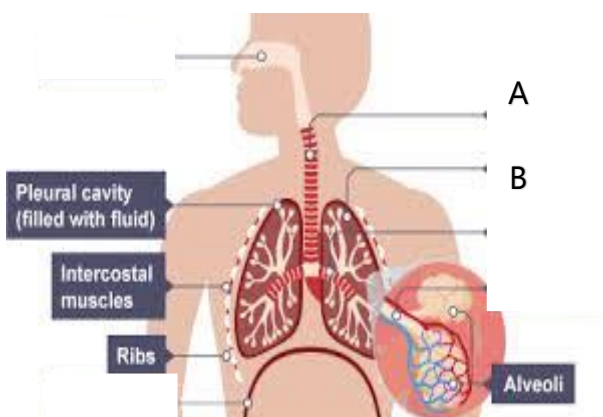



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## ● SECTION B: STRUCTURES, FUNCTIONS & PROCESSES (30 MARKS)

### QUESTION 4: RESPIRATION & GAS EXCHANGE (10 marks)

Look at the diagram below of the human respiratory system:



 (Insert labelled diagram showing: Nose, Trachea, Bronchi, Lungs, Diaphragm)

4.1 Label parts A and B.

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4.2 What is the function of the diaphragm during inhalation?

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4.3 Give TWO ways alveoli are adapted for gas exchange.

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4.4 Differentiate between aerobic and anaerobic respiration.

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4.5 State the balanced equation for **aerobic respiration**.

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### **QUESTION 5: PHOTOSYNTHESIS EXPERIMENT (10 marks)**

A learner conducts an experiment to test for starch in a leaf.

5.1 State the hypothesis of this experiment.

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5.2 Describe the steps to test for starch in a leaf.

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5.3 Why is the leaf boiled in ethanol?

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5.4 Which chemical is used to test for starch?

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5.5 What colour indicates the presence of starch?

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## QUESTION 6: GENETICS – INHERITANCE (10 marks)

In cats, black fur (B) is dominant over white fur (b).

A homozygous black male (BB) is crossed with a white female (bb).

6.1 Draw a genetic cross to show the genotypes of the F1 generation.



6.2 What is the phenotype of all the offspring?

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6.3 What is the genotype ratio of the offspring?

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6.4 If two F1 cats are crossed, what is the expected **phenotypic** ratio of the F2?

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6.5 State one example of a genetic disorder in humans.

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## ● SECTION C: ESSAY (30 MARKS)

### QUESTION 7: ESSAY – NUTRITION IN PLANTS

Write an essay (250–300 words) on:

**"How the structure of a leaf is adapted to its function in photosynthesis and gas exchange."**

Include:

- Structure of leaf: upper/lower epidermis, palisade cells, stomata
- Functions of each part
- Link between structure and photosynthesis

- Conclusion: why these adaptations are important
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● **END OF EXAM**

**TOTAL : 100**



## MEMO

## ● SECTION A: MULTIPLE CHOICE & MATCHING (20 MARKS)

### QUESTION 1: MULTIPLE CHOICE ( $5 \times 1 = 5$ marks)

- 1.1 B – Stomata
- 1.2 C – Energy (ATP)
- 1.3 A – Auxin
- 1.4 B – Metaphase
- 1.5 B – Organisms of the same species in an area

[5 marks]

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### QUESTION 2: MATCHING COLUMNS ( $5 \times 1 = 5$ marks)

- 2.1 Nucleus – B
- 2.2 Ribosome – A
- 2.3 Chloroplast – E
- 2.4 Mitochondrion – D
- 2.5 Lysosome – C

[5 marks]

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### QUESTION 3: DEFINITIONS ( $5 \times 2 = 10$ marks)

- 3.1 **Osmosis:** The movement of water molecules from a region of high water concentration to a region of low water concentration across a semi-permeable membrane.
- 3.2 **Invasive species:** Non-native species introduced to an ecosystem that can outcompete native species and cause harm to the environment.
- 3.3 **Natural selection:** The process whereby organisms better adapted to their environment tend to survive and produce more offspring.
- 3.4 **Excretion:** The removal of metabolic waste products from the body.
- 3.5 **Chromosome:** A thread-like structure made of DNA that carries genetic information in the form of genes.

[10 marks]

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## ● SECTION B: STRUCTURES, FUNCTIONS & PROCESSES (30 MARKS)

### QUESTION 4: RESPIRATION & GAS EXCHANGE (10 marks)

4.1

- A = Trachea
  - B = Lung
- (2 marks)**

4.2 Function of diaphragm: Contracts and flattens to increase chest cavity volume, causing air to enter the lungs.

**(2 marks)**

4.3 Alveoli adaptations:

- Thin walls for easy diffusion
  - Surrounded by capillaries for efficient gas exchange
- (2 marks)**

4.4

- Aerobic: Uses oxygen, produces more ATP
  - Anaerobic: No oxygen, less ATP, produces lactic acid or ethanol
- (2 marks)**

4.5 Equation:

Glucose + Oxygen → Carbon dioxide + Water + Energy



**(2 marks)**

### QUESTION 5: PHOTOSYNTHESIS EXPERIMENT (10 marks)

5.1 Hypothesis: A green leaf contains starch after photosynthesis.

**(2 marks)**

5.2 Steps:

- Boil leaf in water (kill it)
  - Boil in ethanol (remove chlorophyll)
  - Rinse and test with iodine
- (3 marks)**



5.3 To remove chlorophyll for a clear colour change  
(2 marks)

5.4 Iodine solution  
(1 mark)

5.5 Blue-black  
(2 marks)

## QUESTION 6: GENETICS (10 marks)

6.1 Cross:  
 $BB \times bb \rightarrow \text{all } Bb$   
(2 marks)

6.2 All offspring are black  
(1 mark)

6.3 Genotype ratio: 100% Bb  
(1 mark)

6.4 Phenotypic ratio ( $F1 \times F1$ ): 3 black : 1 white  
(2 marks)

6.5 Example: Cystic fibrosis, albinism, Down syndrome  
(Any valid example – 1 mark)  
(3 marks)

## ● SECTION C: ESSAY (30 MARKS)

### QUESTION 7: ESSAY ON LEAF STRUCTURE AND FUNCTION

**Marking Rubric:**

Criteria	Marks
Structure of leaf (e.g., cuticle, palisade, spongy)	6
Function of each part	8
Explanation of photosynthesis process	6
Link between structure and function	6
Logical flow, correct terminology, conclusion	4
<b>Total</b>	<b>30</b>

**Key Points Expected:**

- Epidermis protects the leaf
  - Cuticle prevents water loss
  - Palisade cells contain many chloroplasts
  - Stomata allow gas exchange
  - Guard cells control opening/closing
  - Structure supports efficient light absorption and CO<sub>2</sub> entry
  - Connection to photosynthesis efficiency
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✅ **Total: 100 marks**

