

# 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 & VOCABULARY (20 MARKS)

### QUESTION 1: MULTIPLE CHOICE (5 × 1 = 5 marks)

Choose the correct letter (A–D).

1.1 Which part of the brain controls voluntary muscle movements?

- A) Cerebellum
- B) Medulla oblongata
- C) Cerebrum
- D) Hypothalamus

1.2 What is the function of red blood cells?

- A) Fight infection
- B) Produce hormones
- C) Carry oxygen
- D) Digest food

1.3 A reflex arc involves:

- A) Only the brain
- B) Brain and spinal cord
- C) Only sensory neurons
- D) Sensory, motor, and relay neurons

1.4 The part of the eye that controls the amount of light entering is:

- A) Retina
- B) Iris
- C) Lens
- D) Optic nerve

1.5 A decomposer is an organism that:

- A) Eats only plants
- B) Breaks down dead matter
- C) Hunts other animals
- D) Makes its own food

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### QUESTION 2: TERMINOLOGY MATCH (5 × 1 = 5 marks)

Match the term in Column A with its definition in Column B.

Column A	Column B
2.1 Myelin sheath	A. Maintains water balance in the body
2.2 Synapse	B. Covers axons and speeds up impulses
2.3 Osmoregulation	C. Junction between two neurons

2.4 Retina	D. Detects light and sends signals to brain
2.5 Enzyme	E. Speeds up chemical reactions

Write only the letter (e.g., 2.1 – B).

### QUESTION 3: DEFINITIONS (5 × 2 = 10 marks)

3.1 Phototropism

3.2 Endocrine gland

3.3 Eutrophication

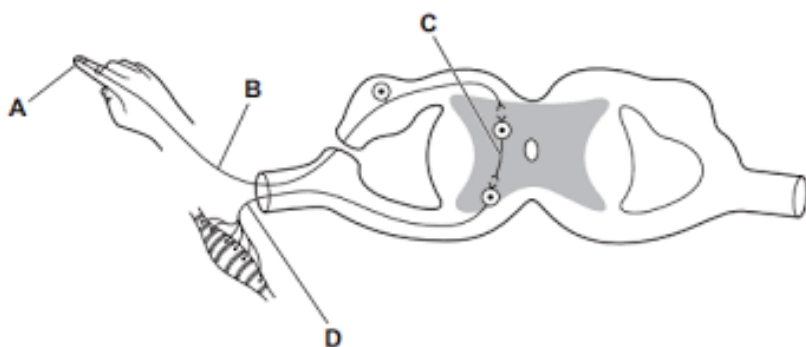
3.4 Gene

3.5 Immune response

## SECTION B: DIAGRAMS, ANALYSIS & INTERPRETATION (30 MARKS)

### QUESTION 4: HUMAN NERVOUS SYSTEM (10 marks)

Study the diagram of a reflex arc and answer the questions:



4.1 Label parts A, B and C.

A: \_\_\_\_\_

B: \_\_\_\_\_

C: \_\_\_\_\_

4.2 What is the function of the spinal cord in this arc?

\_\_\_\_\_

4.3 Give ONE reason why reflex actions are important.

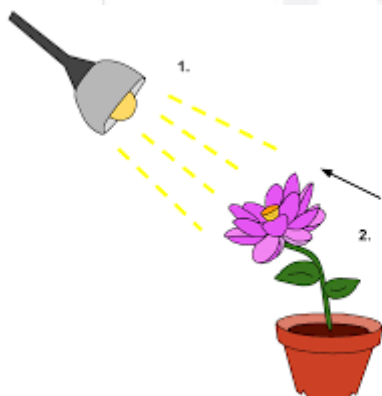
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4.4 State the difference between a voluntary and a reflex action.

\_\_\_\_\_

### QUESTION 5: PLANT RESPONSES TO STIMULI (10 marks)

Look at the diagram below showing plant shoots responding to light.



5.1 What type of plant response is shown?

\_\_\_\_\_

5.2 Name the hormone responsible for this response.

\_\_\_\_\_

5.3 Where is this hormone produced in the plant?

\_\_\_\_\_

5.4 State ONE benefit of this response to the plant.

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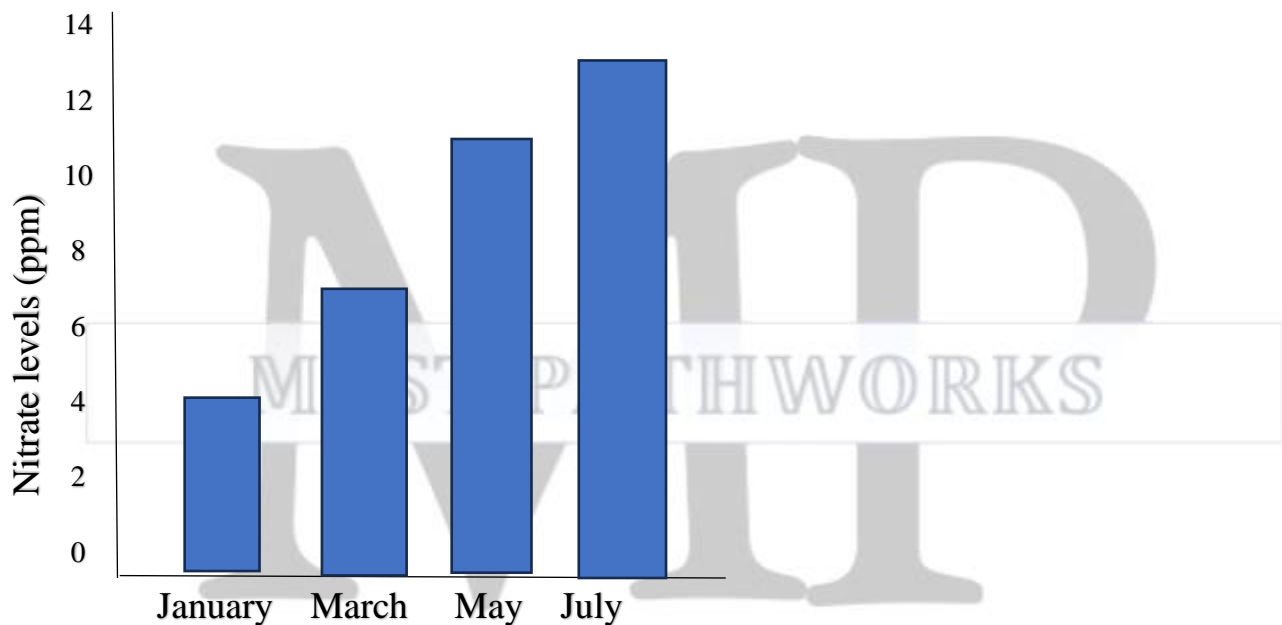
5.5 How is this response different from geotropism?

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### QUESTION 6: WATER POLLUTION DATA (10 marks)

Study the graph below showing nitrate levels in a river system:



6.1 In which month was the nitrate concentration highest?

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6.2 What is a possible source of these nitrates?

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6.3 Describe TWO effects of high nitrate levels on aquatic ecosystems.

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6.4 Suggest ONE method to reduce nitrate pollution.

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6.5 Why is nitrate pollution a concern for human health?

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## ● SECTION C: ESSAY (30 MARKS)

### QUESTION 7: ESSAY – IMMUNE SYSTEM & DISEASE

Write an essay (250–300 words) on the topic:

**"How the human immune system defends the body against pathogens and how vaccinations help prevent disease."**

Include:

- First and second lines of defense
- Role of white blood cells
- Examples of pathogens
- How vaccines work
- Importance of herd immunity

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● END OF EXAM

**TOTAL : 100**

## MEMO

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

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

- 1.1 C – Cerebrum
  - 1.2 C – Carry oxygen
  - 1.3 D – Sensory, motor, and relay neurons
  - 1.4 B – Iris
  - 1.5 B – Breaks down dead matter
- [5 marks]

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

- 2.1 B – Myelin sheath → Speeds up impulses
  - 2.2 C – Synapse → Junction between neurons
  - 2.3 A – Osmoregulation → Maintains water balance
  - 2.4 D – Retina → Detects light
  - 2.5 E – Enzyme → Speeds up chemical reactions
- [5 marks]

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

- 3.1 **Phototropism:** A plant's growth response toward or away from light.
  - 3.2 **Endocrine gland:** A gland that secretes hormones directly into the bloodstream.
  - 3.3 **Eutrophication:** The excessive richness of nutrients in a body of water, often due to runoff, causing dense plant growth and death of animal life from lack of oxygen.
  - 3.4 **Gene:** A unit of heredity made up of DNA that codes for a specific trait.
  - 3.5 **Immune response:** The body's defense mechanism involving recognition and attack against pathogens.
- [10 marks]

## ● SECTION B: DIAGRAMS, ANALYSIS & INTERPRETATION (30 MARKS)

### QUESTION 4: HUMAN NERVOUS SYSTEM (10 marks)

4.1

A – Receptor

B – Interneuron (or Relay neuron)

C – Effector

**(3 marks)**

4.2 The spinal cord transmits the impulse to the brain and back or directly processes reflex actions.

**(2 marks)**

4.3 Reflexes protect the body by providing fast, automatic responses to harmful stimuli.

**(2 marks)**

4.4

- Reflex action: Involuntary, automatic, fast (e.g., touching a hot surface)
- Voluntary action: Conscious control, slower (e.g., picking up a pen)

**(3 marks)**

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### **QUESTION 5: PLANT RESPONSES TO STIMULI (10 marks)**

5.1 Positive phototropism

**(1 mark)**

5.2 Auxin

**(1 mark)**

5.3 Tips of shoots

**(1 mark)**

5.4 Allows the plant to grow toward light for photosynthesis

**(2 marks)**

5.5 Phototropism = response to light; Geotropism = response to gravity

**(2 marks)**

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### **QUESTION 6: WATER POLLUTION DATA (10 marks)**

6.1 July

**(1 mark)**

6.2 Fertilizer runoff from farms

**(2 marks)**

6.3



- Algal blooms reduce oxygen in water
- Fish and aquatic life may die  
(2 marks)

6.4 Reduce fertilizer use, use organic farming, buffer zones  
(2 marks)

6.5 High nitrate levels can contaminate drinking water, leading to health problems (e.g., methemoglobinemia or “blue baby syndrome”)  
(3 marks)

## ● SECTION C: ESSAY – IMMUNE SYSTEM (30 MARKS)

### QUESTION 7: MARKING GUIDELINE

Component	Marks
<b>Introduction</b> (Immune system overview)	3
<b>First line of defense</b> (skin, mucus, etc.)	5
<b>Second line</b> (inflammation, phagocytosis)	6
<b>Role of white blood cells</b>	4
<b>Vaccines explained clearly</b>	6
<b>Herd immunity + examples</b>	4
<b>Logical structure, correct terminology</b>	2

[Total: 30 marks]

✓ TOTAL MARKS: 100