



NATIONAL SENIOR CERTIFICATE

GRADE 11

SEPTEMBER 2025

LIFE SCIENCES

MARKS: 50

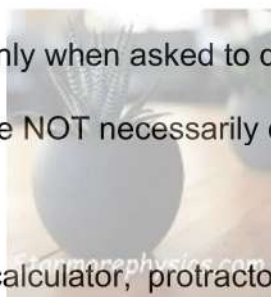
TIME: 1 hour

This question paper consists of 7 pages.

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 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 do so.
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 where necessary.
11. Write neatly and legibly.



SECTION A

QUESTION 1

- 1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.3) in the ANSWER BOOK, for example 1.1.4 D.

1.1.1 In which part of the respiratory system, does gaseous exchange takes place?

- A Larynx
- B Pharynx
- C Trachea
- D Alveoli

1.1.2 The net increase of a population can be determined by...

- A adding births and deaths and subtracting emigrations and immigrations.
- B adding births and emigrations and subtracting deaths and immigrations
- C adding births and immigrations and subtracting deaths and emigrations
- D adding deaths and immigrations and subtracting births and emigrations.

1.1.3 The following are the factors that influence the population size:

- (i) emigration
- (ii) immigration
- (iii) natality
- (iv) predation

Which of the following will cause a decrease in the size of a population?

- A (i) and (iii)
- B (ii) and (iv)
- C (i) and (iv)
- D (iii) and (iv)

(3 x 2)

(6)

- 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 1.2.7) in the ANSWER BOOK.

1.2.1 The structure of the nephron consisting of the glomerulus and the Bowman's capsule

1.2.2 The compound formed when carbon dioxide combines with haemoglobin enabling transport of carbon dioxide

1.2.3 The hormone that regulates the water content in the blood

1.2.4 A small flap that closes the opening of the trachea when swallowing
(4 x 1) **(4)**

- 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	The double membrane covering the lungs	A:	Plasma membrane
		B:	Pleural membrane
1.3.2	Carries urine from the kidney to the bladder	A:	Ureter
		B:	Urethra
1.3.3	Has C-shaped cartilaginous rings	A:	Bronchioles
		B:	Trachea

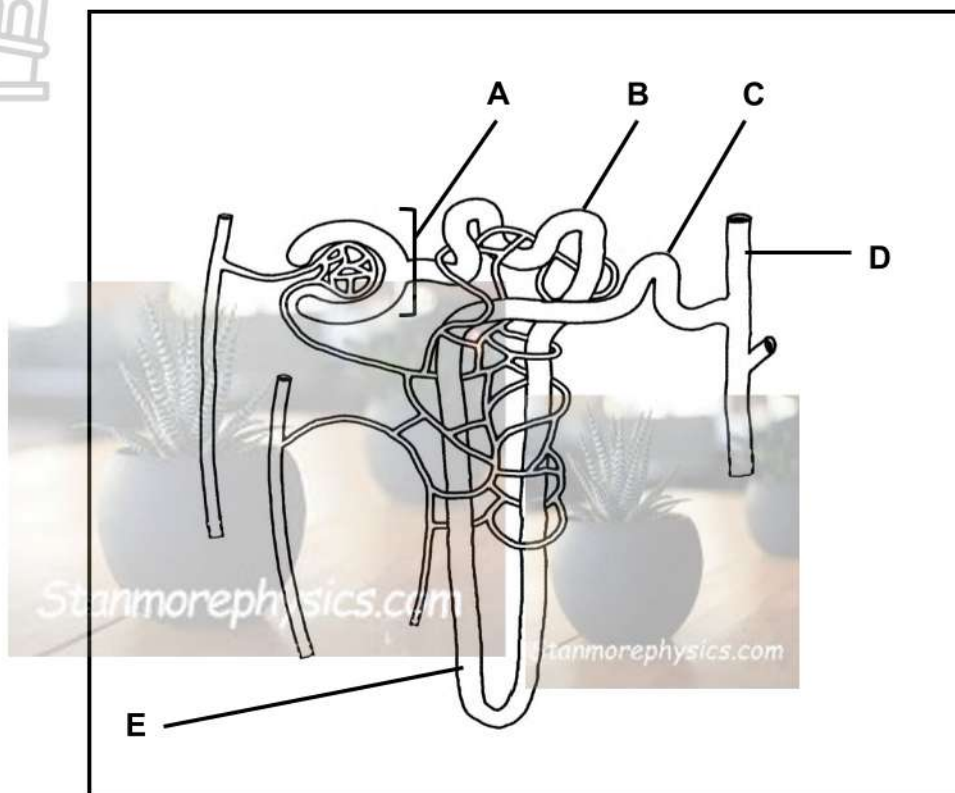
(3 x 2) **(6)**

TOTAL SECTION A: 16

SECTION B

QUESTION 2

2.1 The diagram below represents the structure of a nephron.



- 2.1.1 Give the LETTER and NAME of the part of the nephron where:
- (a) Tubular excretion/secretion occurs (2)
 - (b) Sodium (salt) is actively pumped out (2)
- 2.1.2 Explain THREE adaptations of structure **A** for efficient filtration (6)
- 2.1.3 Describe how the reabsorption of the following substances takes place from part **B**:
- (a) Glucose (2)
 - (b) Water (2)
- 2.1.4 Explain the role of the hormone secreted by the pituitary gland, in reference to its quantity, on structure **C** and **D** when the body is dehydrated (3)
- (17)**

QUESTION 3

3.1 Grade 11 learners carried out an investigation to determine the effect of physical activity on the heart rate and breathing rate of humans.

The procedure for the investigation was as follows:

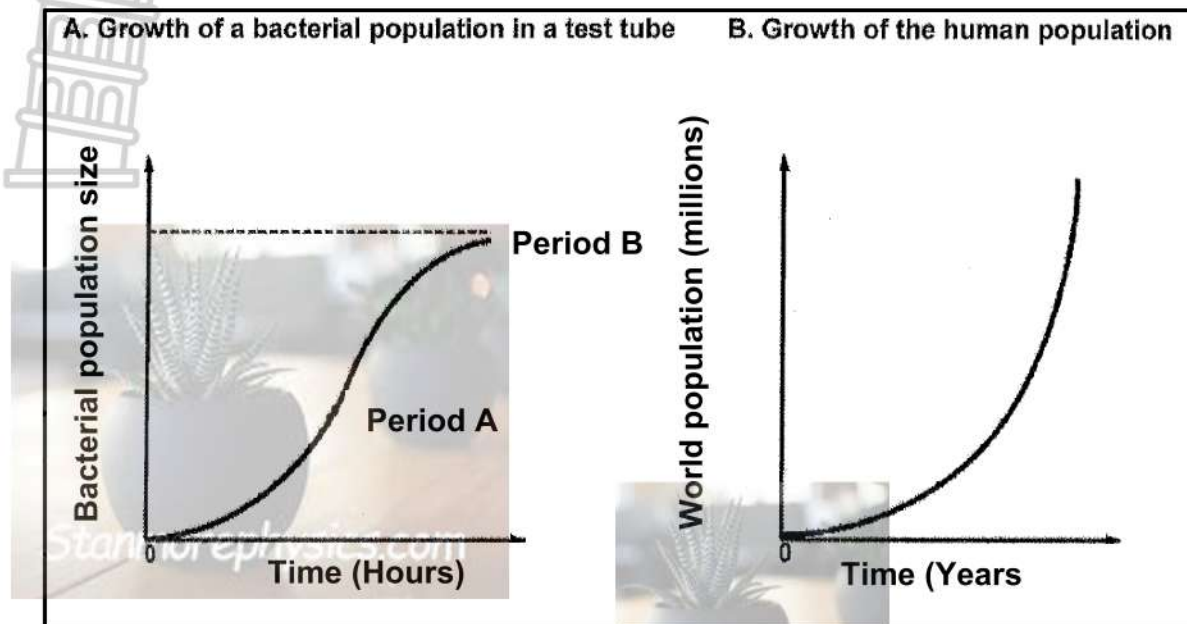
- They chose 5 learners of the same age to participate in their investigation.
- They measured the heart rate and breathing rate of each learner before the physical activities
- The learners each walked 500 metres and ran a distance of 500 metres.
- They measured the heart rate and breathing rate of each learner after walking and running.
- All the values were recorded and the average for each activity was calculated

The results of the investigation are shown in the table below:

Activity	Average heart rate (beats per minute)	Average breathing rate (beats per minute)
Rest	71	12
Walking	88	13
Running	120	17

- 3.1.1 Identify the independent variable in the investigation. (1)
- 3.1.2 State TWO planning steps learners considered for this investigation. (2)
- 3.1.3 State ONE way in which the learners ensured validity of their investigation (1)
- 3.1.4 State the effect of running on the breathing rate, using the results in the table above. (1)
- 3.1.5 Give a reason for the change in the breathing rate stated in Question 3.1.4. (1)
- 3.1.6 Calculate the difference in the learner's heart rate between rest and running, (2)
- 3.1.7 State the conclusion that can be drawn from the result of the investigation. (2)
- (10)**

- 3.2 Graph **A** is a representation of a number of bacteria in growth culture, over a period of time. Graph **B** shows changes in the human population size over a period of time.



- | | | | |
|-----|-------|---|-------------|
| 3.2 | 3.2.1 | Define the term population | (2) |
| | 3.2.2 | During which period (A or B) did natality exceed mortality? | (1) |
| | 3.2.3 | According to the graphs, in what way is the growth of the human population similar to that of the bacterial population? | (2) |
| | 3.2.4 | Account for the pattern of growth in period B. | (2) |
| | | | (7) |
| | | TOTAL SECTION B: | [34] |
| | | GRAND TOTAL: | 50 |



NATIONAL SENIOR CERTIFICATE

GRADE 11

SEPTEMBER 2025

LIFE SCIENCES **AMENDED MARKING GUIDELINE**

Stanmorephysics.com

MARKS: 50

TIME:

This marking guideline consists of 6 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, more examples, 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 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. Marking guidelines 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
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
19. No changes must be made to the marking memoranda.

SECTION A

QUESTION 1

1.1	1.1.1	D✓✓	<i>Don't accept if 2 letter given e.g. D/A X</i>	(3 x 2)	(6)
	1.1.2	C✓✓			
	1.1.3	C✓✓			
1.2	1.2.1	Malpighian body✓ / renal corpuscle			
	1.2.2	Carbamino haemoglobin✓ / Carbhaemoglobin			
	1.2.3	Anti-diuretic hormone/ADH✓			
	1.2.4	Epiglottis✓		(4 x 1)	(4)
1.3	1.3.1	B only ✓✓	<i>B,A X B✓</i>	(3 x 2)	(6)
	1.3.2	A only ✓✓			
	1.3.3	B only ✓✓			
TOTAL SECTION A:					16

SECTION B

QUESTION 2



2.1.1

- (a) C✓ – Distal Convolute Tubule✓
B✓ – Proximal Convolute Tubule ✓
D✓ – Collecting duct✓ any 1 x 2 (2)
- (b) E✓ – Ascending limb of Henle✓ / Loop of Henle (2)

2.1.2

- (Glomerular) capillary has (microscopic) pores✓
Only allowing smaller components of the blood through✓
- Dense capillary network✓
Increasing the `surface area✓
- Afferent arteriole wider than efferent arteriole✓
Placing blood under pressure within the glomerulus✓ for ultra- filtration
- Glomerulus is in close contact with the Bowmans cavity✓
Reducing distance to be moved by filtrate✓
- Thin endothelium (wall) on the glomerulus is semi-permeable✓
For easy movement of substances across✓
- Bowman's capsule lined with podocytes✓
which form filtration slits for easy movement filtrate to move into capsular space✓
- Bowman's capsule is C-shaped✓
to increase surface area✓

(Mark first THREE only)

Any (3 x 2) (6)

2.1.3

- (a) Active reabsorption✓ / transport
- Energy/ATP produced by the mitochondria in the cuboidal epithelial cells is used✓ / pulling of glucose against concentration gradient (2)
- (b) Passive Reabsorption✓ / Osmosis
- Water moves from a region of high-water potential to a region of low water potential✓ (2)

- Any (3)

(17)

QUESTION 3

- 3.1 3.1.1 Physical activity✓ *NOT "The effect of ..."/ type of activity/ just "activity"* (1)
- 3.1.2
- Asked learners' permission✓ / asked for permission from the teacher/ principal/ school / "relevant authority"
 - Decided on the type of (physical) activity✓
 - Decide on distance run/walked✓/ duration of activity / 500m walked/run
 - Decide on time of day of (physical) activity✓
 - Decided on the venue✓
 - Decided on the number of learners to use✓/ to use 5 learners
 - Decided on the apparatus/ equipment / method to measure heart rate✓/ breathing rate
 - Design recording sheet ✓/ decided how to record data
 - Decided to all learners should be healthy✓/same fitness /random sampling
 - Decided on the age group to use✓
- (Mark first TWO only) Any (2)
- 3.1.3
- Learners were of the same age✓
 - All learners walked the 500m✓/ same distance
 - All learners ran a distance of 500m✓/ same distance
 - Heart rate and breathing rate measured before physical activity / baseline reading was taken
- (Mark first ONE only) Any (1)
- 3.1.4 Learners' breathing rate increased✓ (1)
- 3.1.5 Enables more carbon dioxide to be exhaled✓/allows for CO₂ To be exhaled quickly / to decrease high carbon dioxide levels / high carbon dioxide levels in the blood (1)
- 3.1.6 $120 - 71 = 49$ beats per minute✓ (2)
- 3.1.7 Physical activity increases heart rate and breathing rate✓✓ (2)
- (10)
- 3.2 3.2.1 A group of organisms of the same species occupying the same area/habitat at the same time✓✓ *all or nothing 2 marks, no 1 marks* (2)
- 3.2.2 A✓ *MUST BE "A" don't accept exponential growth phase* (1)
- 3.2.3
- Starts slowly✓/ have a lag phase and
 - increase rapidly✓/ exponential growth phase
- (2)



3.2.4

- The population has reached carrying capacity✓ / due to environmental resistance / natality equals mortality
- Growth slows down✓ / does not increase further / fluctuates around carrying capacity

(2)

(7)

[17]

TOTAL SECTION B: 34

GRAND TOTAL: 50

