KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS: 60

TIME: 1 hour

This question paper consists of 9 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 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. 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.
11. Write neatly and legibly.

SECTION A

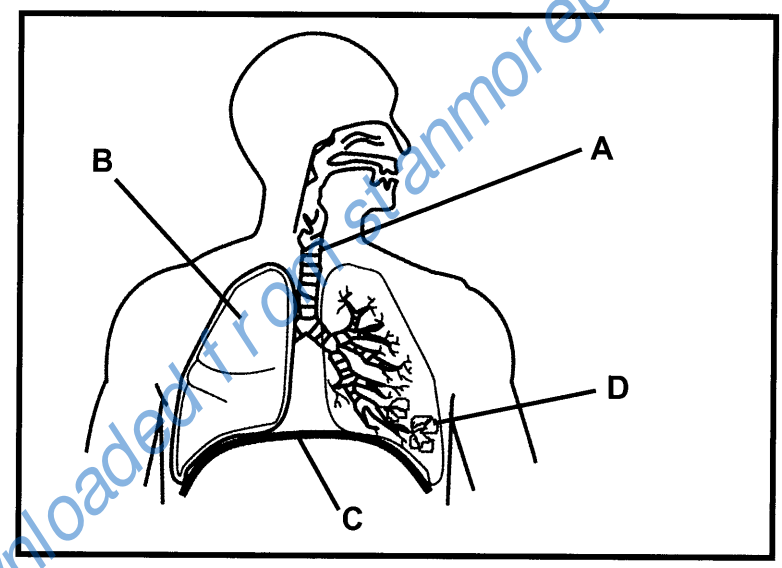
QUESTION 1

1.1 Various options are provided 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 The following are density dependent factors that can affect population size, except ...

A predation.
B competition.
C volcanoes.
D spread of disease.

QUESTION 1.1.2 AND 1.1.3 REFER TO THE DIAGRAM SHOWING THE HUMAN THORAX BELOW.



1.1.2 Which ONE of the following combinations is correct labels for **A**, **B** and **D** respectively?

A Larynx, Rib cage, Bronchiole
B Bronchus, Lung, Alveolus
C Trachea, Lungs, Alveolus
D Larynx, Intercostal muscles, Bronchiole

1.1.3 Which ONE of the following correctly refers to structure function of structure **C** in the diagram above?

A During inhalation it contracts and during exhalation it contracts
B During inhalation it contracts and during exhalation it relaxes
C During inhalation it relaxes and during exhalation it contracts
D During inhalation it relaxes and during exhalation it relaxes.

(3 x2) **(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 1.2.4) in the ANSWER BOOK.

1.2.1 The relationship between two species that live in close contact with each other for part or all their lives

1.2.2 The control of water content in the blood

1.2.3 Movement of individuals of a population out of a habitat

1.2.4 The blood vessel that carries oxygenated blood filled with waste to the kidney.

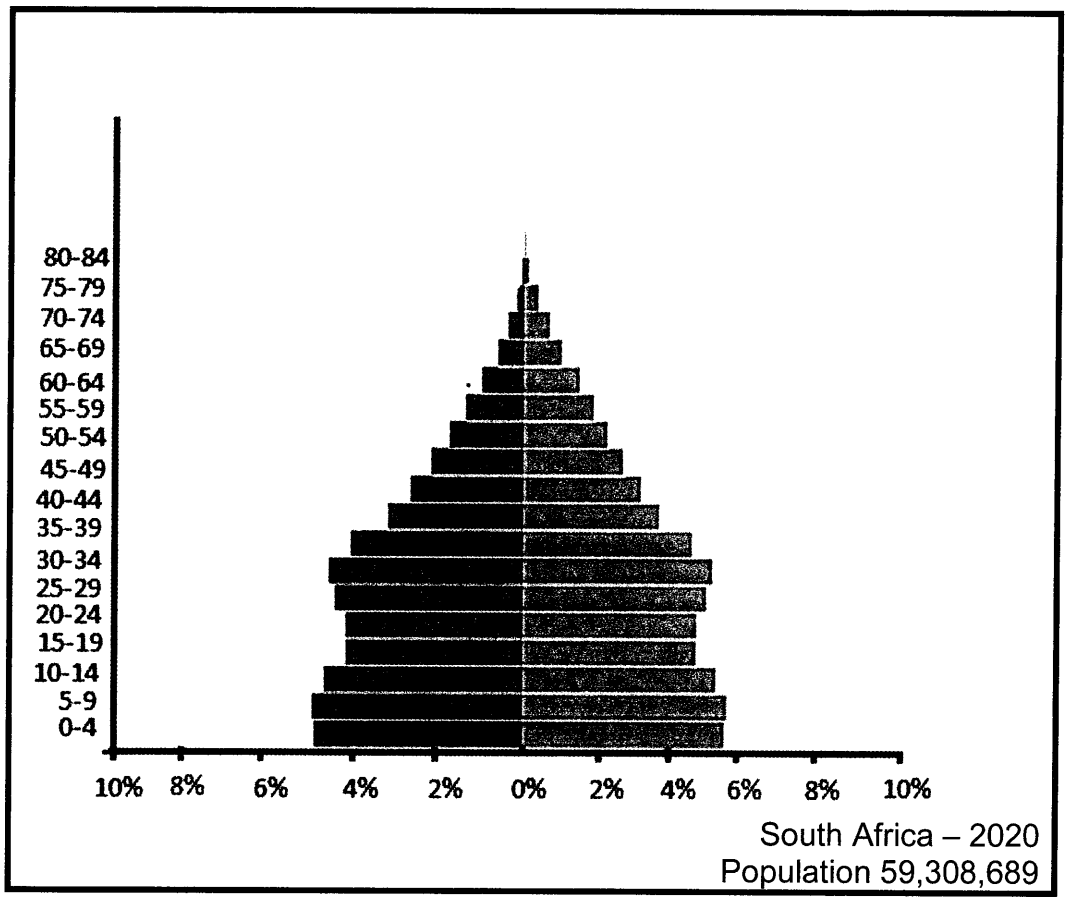
(4 x 1) **(4)**

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	One of the species benefits and the other is unaffected	A: Commensalism B: Mutualism
1.3.2	Carries urine from the kidney to the bladder	A: Ureter B: Urethra
1.3.3	Number of organisms of a particular kind that can be supported by resources in the environment	A: Census B: Population density

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

1.4 The population pyramid below represents the age and gender distribution in South Africa in the year 2020



1.4.1 State whether South Africa is a **developed** or **developing** country, by referring to the pyramid above. (1)

1.4.2 State ONE visible reason for your answer in QUESTION 1.4.1. (1)

1.4.3 Identify the gender that lives the longest from the pyramid. (1)

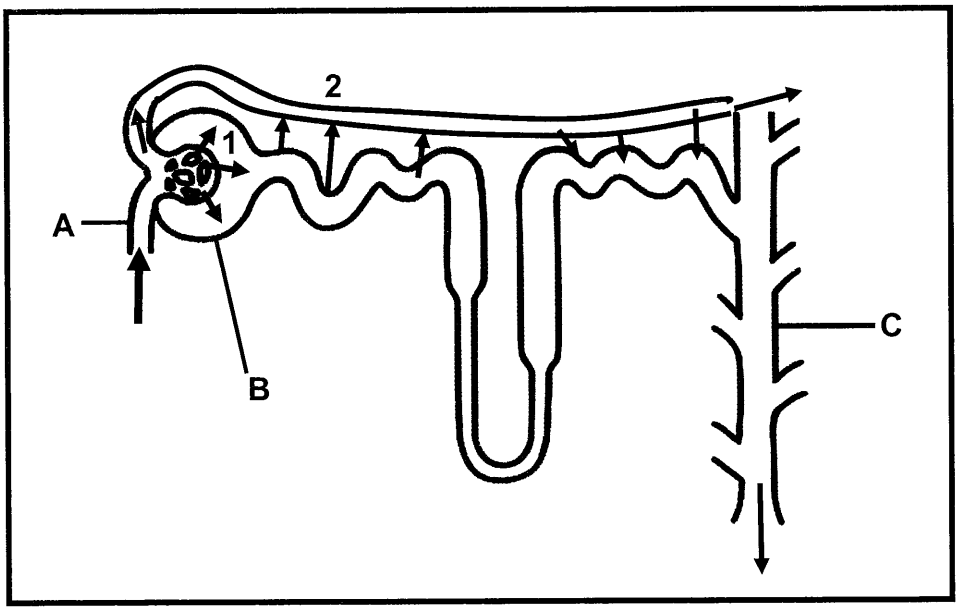
1.4.4 Give ONE reason why the South African government must have access to this population pyramid. (1)
(4)

TOTAL SECTION A: 20

SECTION B

QUESTION 2

2.1 The diagram below represents the structure of the nephron.



2.1.1 Identify part:

(a) **A** (1)

(b) **B** (1)

2.1.2 Identify the process indicated by:

(a) **1** (1)

(b) **2** (1)

2.1.3 Explain presence of proteins in the substance passing through **C** about the functioning of the nephron. (2)

(6)

2.2 Name the hormone responsible for regulating water in the blood and describe its role when there is a shortage of water in the blood. **(5)**

2.3 Read the extract below.

Sable antelope are grazers (feeding on grasses). They live in herds of up to 25 members. Young Sable antelope are vulnerable to predation by lions, hyenas, leopards, and crocodiles. There is competition amongst the members of the Sable antelope population. Sable antelope prefer to feed during the day because of high risk of predation at night. Sable antelope also

2.3.1 Name the type of competition that occurs between the members of Sable antelope population. (1)

2.3.2 State ONE resource mentioned in the passage that members of Sable antelope can compete for. (1)

2.3.3 Give ONE reason why feeding during the day increases Sable antelopes' chances of survival. (1)

2.3.4 Explain why chances of the population of the Sable antelope and the population of their predators reaching carrying capacity are limited. (2)
(5)

2.4 The population of species **Z** was determined in a particular area and the results are illustrated in the table below.

Number captured, marked and released in the first sample	Number captured in the second sample-(C)	Number marked in the recaptured second sample
23	29	11

2.4.1 Name the technique used to determine the population of species **Z**. (1)

2.4.2 Estimate the total population of species **Z** in the area using the formula: (3)

$$P = \frac{M \times C}{R}$$

Show all working. **(4)**

[20]

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 five 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 a distance of 5km and also ran a distance of 5km
- They measured the heart rate and breathing rate of each learner after walking and running.

The table below shows the result of their investigation.

Physical activity	Average heart rate (beats per minutes)	Average breathing rate (breaths 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 the learners considered for this investigation. (2)

3.1.3 State ONE way in which the learners ensured validity of their investigation. (1)

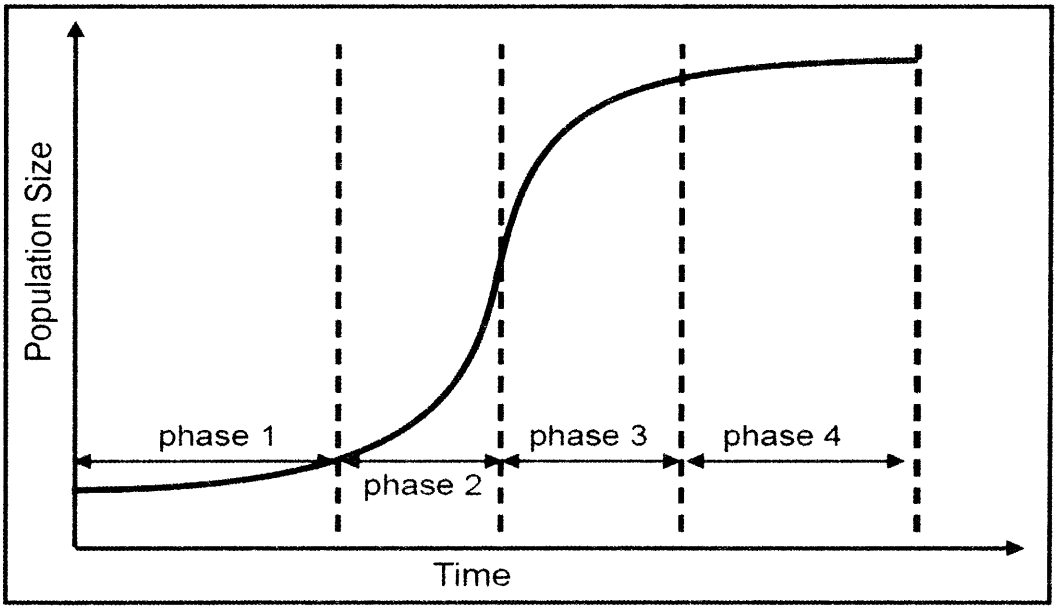
3.1.4 State the effect of running on the breathing rate, using the results in the table above. (1)

3.1.5 Explain your answer in OUESTION 3.1.4. (2)

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)
(11)

3.2 The graph below shows the growth pattern of a population over time.



3.2.1 Name the type of growth form shown in the graph. (1)

3.2.2 Identify phase **1** and state a reason for your answer. (2)

3.2.3 Identify the phase from the graph above where:

(a) natality is equal to mortality (1)

(b) population growth is the fastest (1)

(c) environmental resistance comes into effect (1)

(d) natality exceeds mortality to the greatest extent (1)

3.2.4 Explain why it may take longer for the human population to reach the type of growth shown above. (2)
(9)
[20]

TOTAL SECTION B: 40

GRAND TOTAL: 60

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GRADE 11

LIFE SCIENCES

PROVINCIAL COMMON TEST

MARKING GUIDELINE
SEPTEMBER 2022

MARKS: 60

TIME: 1 hour

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, 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 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 national 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. 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 a caption.

18. **Code-switching of official languages (terms and concepts)**
    A single word or two that appear(s) 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 1.1.1 C✓✓
1.1.2 C✓✓
1.1.3 B✓✓
(3 x 2) **(6)**

1.2 1.2.1 Symbiosis ✓
1.2.2 Osmoregulation✓
1.2.3 Emigration✓
1.2.4 Renal artery✓
(4 x 1) **(4)**

1.3 1.3.1 A only✓✓
1.3.2 A only✓✓
1.3.3 None✓✓
(3 x 2) **(6)**

1.4 1.4.1 Developing country✓ (1)

1.4.2 - High birth rate/high natality rate/ more individuals in young age✓
- Lower life expectancy✓/Less people reaching old age Any (1)
(Mark first ONE only)

1.4.3 -Female✓ (1)

1.4.4 -To make better plans for the future needs of the country✓
- Plan for schools, Housing, Hospital, etc that will be needed✓ Any (1)
(Mark first ONE only) **(4)**

20

TOTAL SECTION A:

SECTION B
QUESTION 2

2.1	2.1.1	(a) Afferent arteriole✓	(1)
		(b) Bowman's Capsule✓	(1)
	2.1.2	(a) Glomerular filtration/ Ultrafiltration✓	(1)
		(b) Tubular reabsorption / Re-absorption✓	(1)
	2.1.3	- The ultrafiltration membranes are damaged✓ - making plasma proteins to filtered through✓ **OR** - Blood pressure is much higher than normal✓ - making plasma proteins to filtered through✓ **(mark first ONE only)** Any 1 x 2	(2)
		Anti-diuretic hormone✓*/ ADH	**(6)**
2.2		- The pituitary gland secretes more ADH into the blood ✓ - ADH increases the permeability of the kidney tubules✓/distal convoluted tubules and collecting tubules - Causing more water to leave the filtrate by osmosis into the medulla✓ - The water in the medulla is reabsorbed into the blood capillaries✓ - The amount of the water in the blood increases to normal✓ (**compulsory*1 + Any 4**)	**(5)**
2.3	2.3.1	Intraspecific competition✓	(1)
	2.3.2	- Grass✓ - Water✓ **(Mark first ONE only)**	(1)
	2.3.3	-High chances of being eaten by predators at night✓ **(Mark first ONE only)**	(1)
	2.3.4	- The population of the Sable antelope and the population of their predators influence each other✓ - When the population of Sable antelope increases, the population of their predators increase due to availability of food source✓ OR - When the population of Sable antelope increases, the population of their predators increase due to availability of food source✓ - Increased population of predators leads to decrease in the population of Sable antelope due to increased predation✓	(2) **(5)**
2.4	2.4.1	Mark and recapture method✓	(1)
	2.4.2	Estimated Population = $\frac{23 \times 29}{11}$✓ = 61✓	(3) **(4)**
			[20]

QUESTION 3

3.1	3.1.1	Physical activity✓		(1)
	3.1.2	- Asked learners' permission✓ - Decided on the type of physical activities✓ - Decided how to measure the heart rate and breathing rate✓ - Decided on how to record the result of the investigation✓ - Decided the venue✓ **(Mark first TWO only)**	Any	(2)
	3.1.3	- learners are same age✓ - learners walked same distance✓/ 5km - Learners ran same distance✓/5km **(Mark first ONE only)**	Any	(1)
	3.1.4	The learners' breathing rate increased✓		(1)
	3.1.5	Enables more carbon dioxide to be removed out of the body quickly✓✓ /exhaled		(2)
	3.1.6	120 - 71✓ = 49 beats per minute✓		(2)
	3.1.7	Physical activities increase heart rate and breathing rate✓✓		(2) **(11)**
3.2	3.2.1	Logistic growth form✓		(1)
	3.2.2	- Lag phase✓* - Gradual/Little/no increase in population size✓ (**compulsory*1+1**)		(2)
	3.2.3	(a) Phase 4✓ (b) Phase 2✓ (c) Phase 3✓ (d) Phase 2✓		(1) (1) (1) (1)
	3.2.4	- Humans are able to overcome limiting factors✓ - By use of mechanized agriculture to produce enough foods✓ **OR** - Humans are able to overcome environmental resistance✓ - By development of medicines for treatment of diseases✓ Any 1x2		(2) **(9)** **[20]**

40

TOTAL SECTION B:
GRAND TOTAL: **60**