Basic Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

COMMON TEST

SEPTEMBER 2015

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS: 60

TIME: 1 hour

N.B. 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 the 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. ALL drawings should be done in pencil and labelled in blue or black ink.
8. Draw diagrams, flow charts or tables only when asked to do so.
9. The diagrams in this question paper are NOT necessarily drawn to scale.
10. Do NOT use graph paper.
11. You must use a non-programmable calculator, protractor and a compass where necessary.
12. 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 – D) next to the question number (1.1.1 – 1.1.5) in the answer book, for example 1.1.6 D.

1.1.1 Which ONE of the following statements is TRUE about the relationship between a predator and its prey?

A There is interspecific competition
B The size of the predator population is density dependent and is controlled by the prey population
C An increased number of predators lead to an increased number of prey
D A decreased number of predators lead to a decreased number of prey

( ) 1.1.2 In order to maintain a stable population in an area where emigration and immigration does not occur ...

A food supply must be increased.
B predators must be removed.
C the mortality rate must be lower than the natality rate.
D the mortality rate must be equal to the natality rate.

1.1.3 During inhalation and exhalation, friction is reduced by fluid between the ...

A pleural membranes.
B. alveoli and pleura.
C lungs and thoracic cavity.
D pleura and ribs.

1.1.4 The sequence of processes responsible for the composition and volume of

( ) urine produced is ...

A. reabsorption, excretion and filtration.
B. excretion, filtration and reabsorption.
C. excretion, reabsorption and filtration.
D. filtration, reabsorption and excretion.

1.1.5 The social organisation that enhances the survival of a species is ...

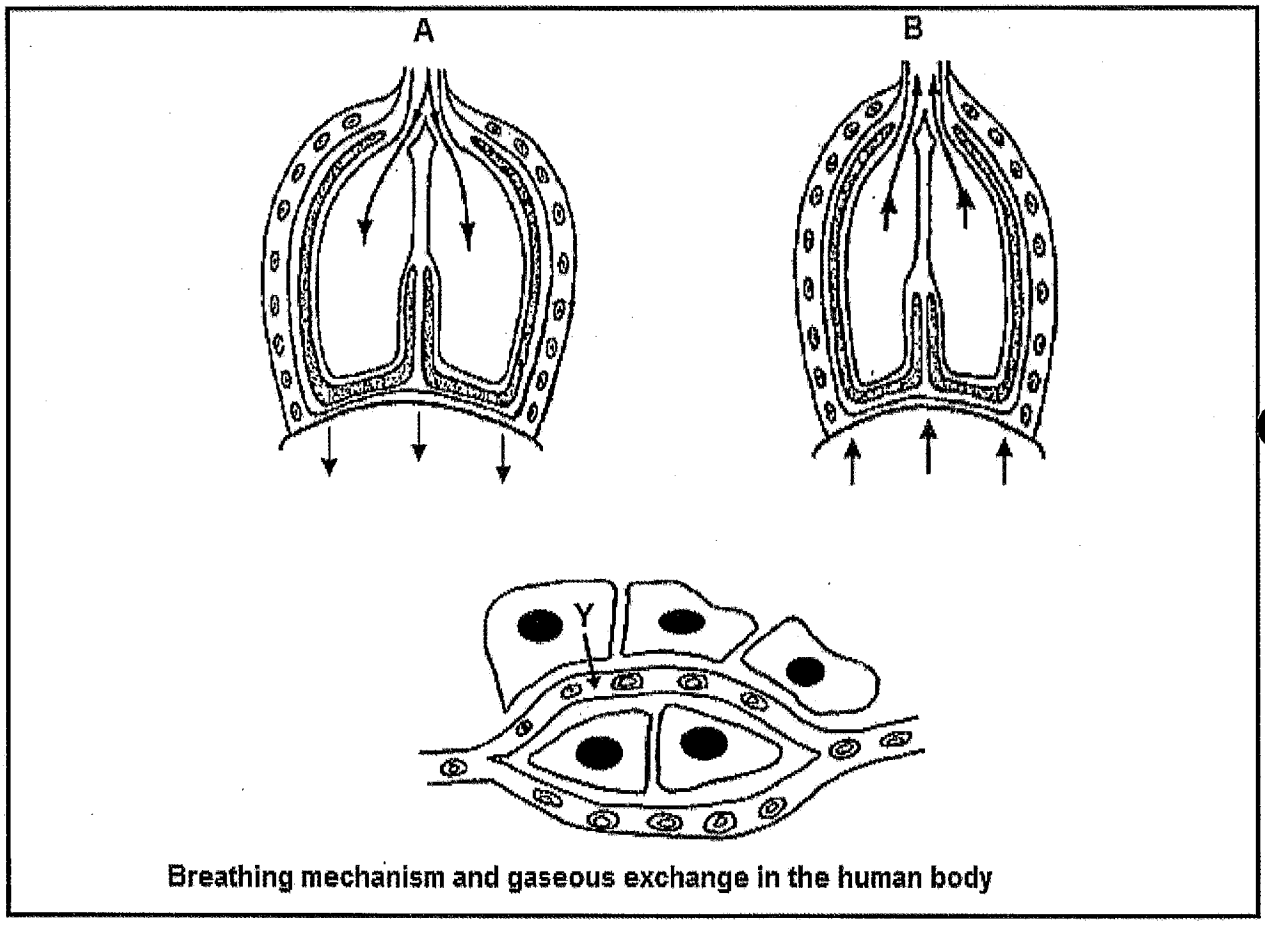
A. external fertilisation.
B. symbiosis between members of a species.
C. division of labour among members of a colony.
D. hunting individually.

(5 x 2 = 10)
TOTAL SECTION A: [10]

SECTION B

QUESTION 2

2.1 The following diagrams are based on the breathing mechanism and gaseous exchange in the human body. The arrows represent the movement of air/gases.



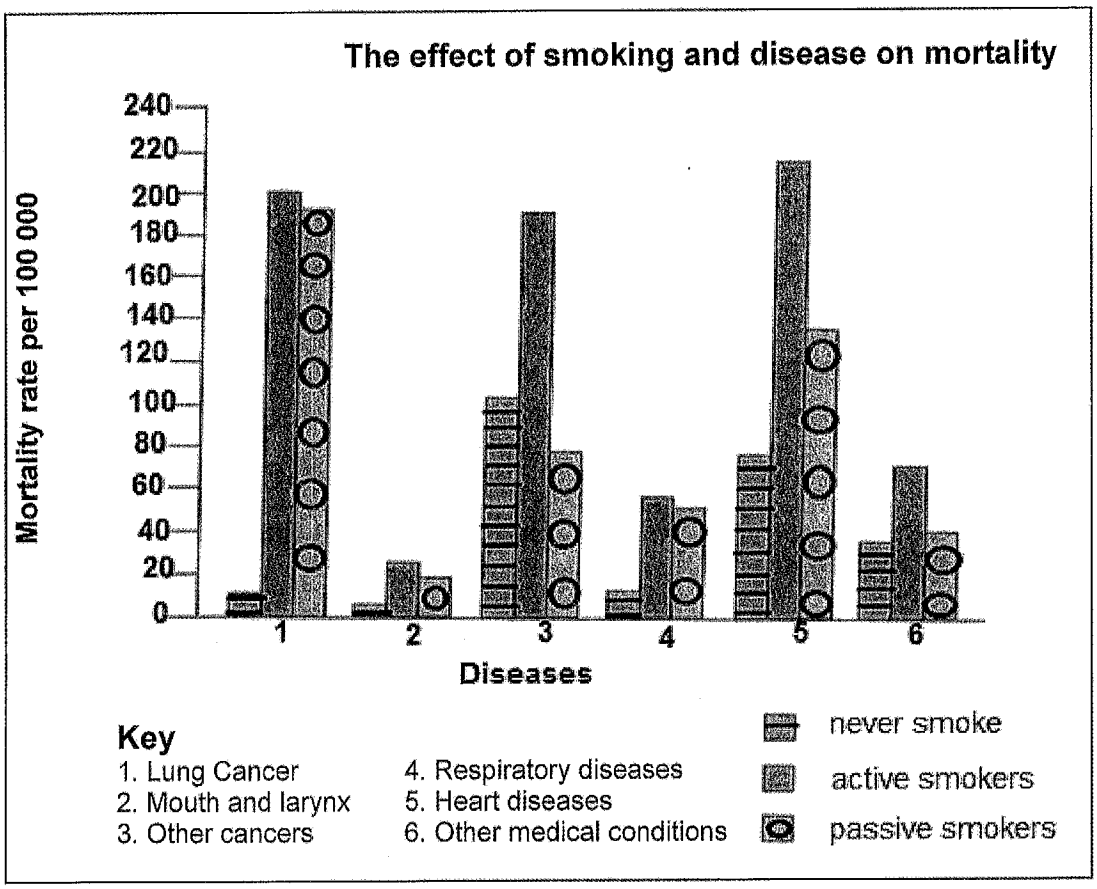
Breathing mechanism and gaseous exchange in the human body

2.1.1 Identify the phase in the breathing mechanism represented by **A.** (1)

2.1.2 Describe the changes that occur in the body to bring about the process represented by **B.** (5)

2.1.3 State TWO ways in which CO_2 is transported after it moves in the direction indicated **Y.** (2)
(8)

2.2 The following graph indicates the effect of smoking and diseases on mortality.



2.2.1 Identify ONE:

(a) Independent variable (1)

(b) Dependent variable (1)

2.2.2 State how many active smokers per 100 000 die of heart diseases. (1)

2.2.3 Indicate the ratio between active smokers and non-smokers that die of respiratory disorders. (2)

2.2.4 State TWO ways in which the validity of this investigation can be ensured. (2)
(7)
[15]

QUESTION 3

3.1 A researcher wanted to know how many fish were in a dam. He caught 20 fish and marked them by clipping out a small section of their tail fins. He then released them back into the dam. A few days later he caught 25 fish and found that 8 had been marked. He then used the following formula:

$$P = \frac{F \times S}{M}$$

P = Estimated total number of fish in the population

F = Number of fish caught and marked in the first catch

S = Number of fish caught in the second catch

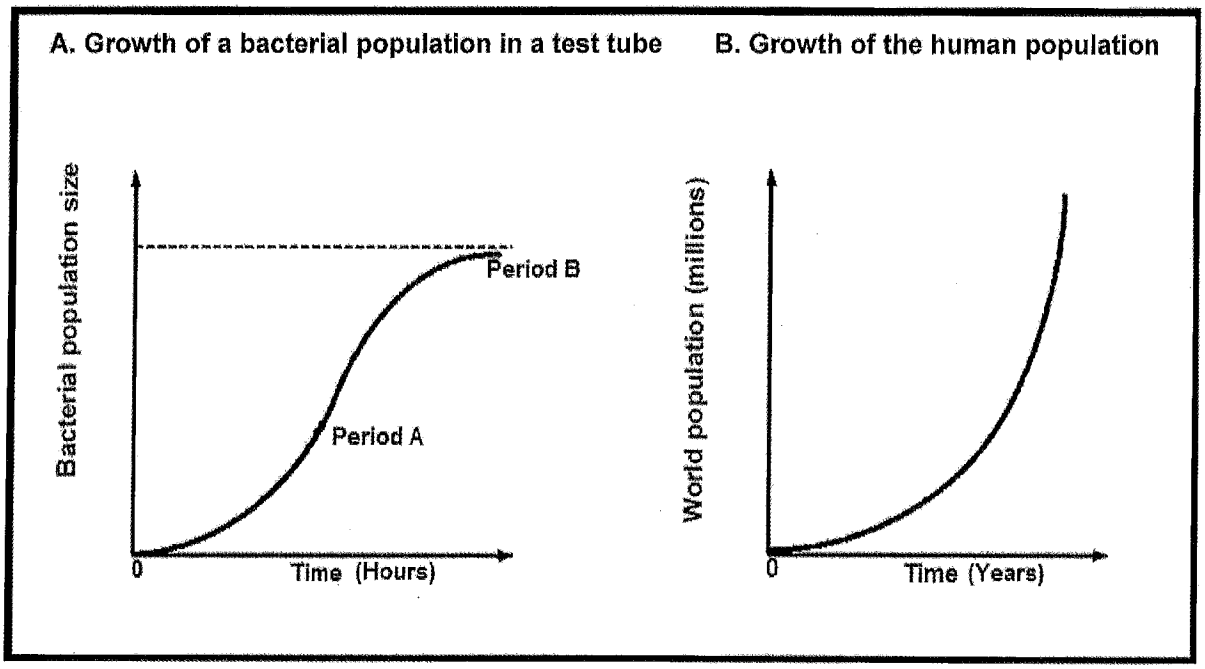
M = Number of marked fish in the second catch

3.1.1 Estimate the total number of fish in the dam by using the above formula. Show ALL working (3)

3.1.2 Explain ONE way in which the method used by the researcher to mark the fish could have resulted in an inaccurate estimate of the fish population in the dam. (2)

3.1.3 Explain ONE way in which the researcher could have increased the reliability of his estimate of the fish population in the dam. (2)
(7)

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



3.2.1 During which period (**A** or **B**) did natality exceed mortality? (1)

3.2.2 According to the graphs, in what way is the growth of the human population similar to that of the bacterial population? (2)

3.2.3 Explain why it may take the human population longer to reach the type of growth shown by the bacteria population in Period **B**. (3)

3.2.4 State TWO measures which can be implemented in South Africa to slow down the growth in the population. (2)
(8)
[15]

TOTAL SECTION B: [30]

SECTION C

QUESTION 4

If the water level in the renal artery is below normal, describe the functioning of the different parts of the nephron in raising the water level back to normal.

Content: (17)
Synthesis: (3)

NOTE: No marks will be awarded for answers in the form of flow charts, tables or diagrams.

TOTAL SECTION C: [20]
GRAND TOTAL: [60]

(Incl Grades 10 + 11)

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LIFE SCIENCES
GRADE 11
MEMORANDUM
SEPTEMBER 2015

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS : 60

TIME : 1 hour

This Memorandum consists of 4 pages.

SECTION A

QUESTION 1

1.1

1.1.1 B✓✓
1.1.2 D ✓✓
1.1.3 A ✓✓
1.1.4 D ✓✓
1.1.5 C✓✓

(5 x 2 = 10)
TOTAL SECTION A: [10]

SECTION B

QUESTION 2

2.1
2.1.1 Inhalation✓ (1)

2.1.2
- The diaphragm relaxes✓
- The external intercostal muscles relax✓
- Internal intercostal muscles contract✓
- Rib-cage moves inward✓
- Volume of thoracic cavity decreases✓
- Pressure on the lungs increases✓
- Air is forced out of the lungs✓

(Any 5) (5)

2.1.3
- As bicarbonate ions✓
- As carbhaemoglobin✓
- Dissolved in the plasma✓

(Any 2) (2)
(8)

2.2
2.2.1
(a) Smoking✓/Disease (1)
(Mark first ONE only)

(b) Mortality rate✓ (1)
(Mark first ONE only)

2.2.2 220✓ (1)

2.2.3 6 active smokers✓: 1 non-smoker ✓ (2)

2.2.4
- Use people of the same age in the survey✓
- The sample should be from the same socio-economic group✓
- The sample should include people from the same sex✓
- All cases recorded should be for the same area✓

(Any 2) (2)
(7)
(15)

QUESTION 3

3.1

3.1.1

$$P = \frac{F \times S}{M}\checkmark$$

$$= \frac{20 \times 25}{8}\checkmark$$

$$= 62.5/\ 63\checkmark \quad (3)$$

3.1.2 Cutting off a portion of a tail fin✓ would have affected the ability of the fish to swim causing fish to die ✓

OR

Cutting off a portion of a tail fin✓ prevents movement thus preventing mixing of marked and unmarked fish✓ (2)

(Mark first ONE only)

3.1.3 Repeat the catches of the second samples✓ apply the formula each time Then take average✓ to get more reliable estimate of the number of fish (2)

(Mark first ONE only)

(7)

3.2

3.2.1 A✓ (1)

3.2.2

- Starts slowly✓
- and then increases rapidly✓ (2)

3.2.3

- Human population has not reached carrying capacity✓ yet
- Due to attempts to increase availability of resources such as food✓
- Using advancements in agricultural technology✓
- And the production of GMO's using biotechnology✓ (Any 3) (3)

3.2.4

- Regulation of population growth by proper family planning✓
- Allocation of subsidies to people that have small families✓
- Educating people regarding the advantages of having small families✓

(Mark first TWO only) (Any 2) (2)

(8)

[15]

TOTAL SECTION B: 30

SECTION C

QUESTION 4

- Blood moves from the renal artery into the afferent arteriole✓
- Since the afferent arteriole is wider than the efferent arteriole✓
- the resulting pressure✓
- in the glomerulus✓
- causes various substances including water✓
- to filter out from the capillaries✓
- through tiny pores of the endothelium✓
- and the slit pores of the Bowman's Capsule✓
- into the capsular space✓
- This is known as the glomerular filtrate✓

- As the filtrate passes through the proximal convoluted tubule✓,
- some water is re-absorbed✓
- into the second capillary network✓

- When the Loop of Henle✓
- pumps sodium ions✓ into the medulla
- a gradient is created✓
- allowing water to move by osmosis✓
- from the tubule into the medulla✓
- from where it is re-absorbed into the second capillary network✓

- The hypothalamus✓/hypophysis
- produces/secretes more ADH✓
- which increases the permeability of the renal tubule✓
- so that more water is re-absorbed✓
- into the secondary capillary network✓
- from the distal and collecting tubules✓
- In this way the level of water in the blood increases to normal✓
- and less water is lost in the urine✓/concentrated urine is formed.

(max.15)

Content: (17)
Synthesis: (3)
(20)

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logical sequence	Comprehensive
All information provided is relevant to the topic	Ideas arranged in a logical/cause-effect sequence	Answered all aspects required by the essay
Only information relating to the role played by the nephron in increasing the water level back to normal is provided (There is no irrelevant information)	Logical sequence of events in the role played by nephron in increasing the water level back to normal.	Includes information on the role of ALL of the following: - Bowman's capsule - Proximal Tubule - Loop of Henle - ADH - Distal and Collecting tubule
1	1	1
R	C	L

TOTAL SECTION C: (20)
GRAND TOTAL: [60]