Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

COMMON TEST

SEPTEMBER 2016

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS: 60

TIME: 1 hour

N.B. 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 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 The rate of breathing is regulated by the medulla oblongata, mainly ...

A under voluntary control.
B according to the oxygen level of blood.
C according to the blood pressure.
D according to the carbon dioxide level of blood.

1.1.2 The following events occur during eutrophication:

1. Aquatic algae grow rapidly
2. Bacteria use large amounts of oxygen
3. Nitrogen and phosphorus become highly concentrated in water
4. Algae prevent light from reaching lower levels
5. Fish die of suffocation

The correct order in which eutrophication occurs, is...

A	5	3	2	4	1
B	5	2	3	1	4
C	3	1	4	2	5
D	3	4	1	5	2

1.1.3 Which ONE of the following homeostatic functions of the kidney will be affected by damage to the hypothalamus of the brain?

A Salt regulation
B Excretion
C pH
D Osmoregulation

1.1.4 One of the dangers of landfills is the contamination of underground water sources. This is prevented by ...

A covering the rubbish with a layer of soil.
B lining the landfill with an impermeable barrier.
C spraying water on the soil to keep dust levels down.
D compacting the waste so that water cannot penetrate it.

1.1.5 An investigation was conducted to determine the concentration of *E.coli* bacteria in a sewage contaminated river.

The result of the investigation is given below:

Percentage of sewage/100ml	10	18	25	30
Percentage of *E. coli*/100ml	20	34	45	55

It can be concluded that ...

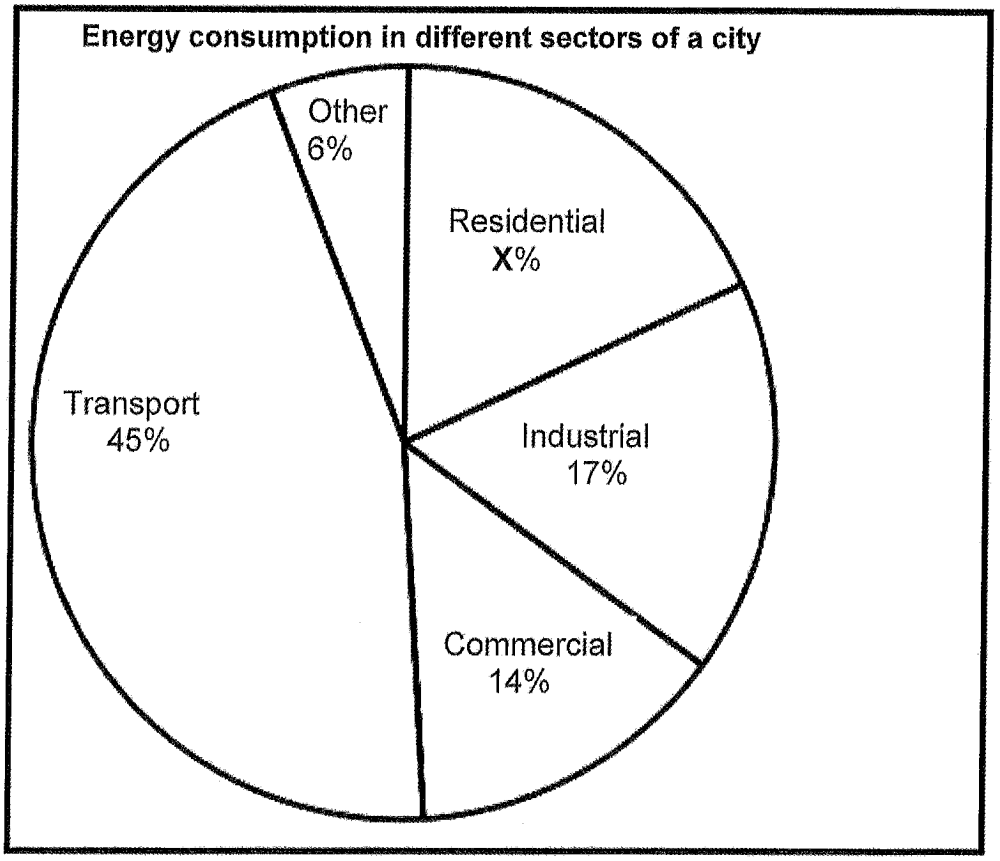
A as the percentage of sewage increases, the concentration of *E. coli* in the water increases.
B an increase in percentage of sewage has no effect on the percentage of *E.coli* in the water.
C as the percentage of sewage increases, the concentration of *E. coli* in the water *decreases.*
D as the percentage of sewage decreases, the concentration of *E. coli* in the water increases.

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

SECTION B

QUESTION 2

2.1 Energy in South Africa is mainly generated from coal power stations. The pie chart below shows the energy consumption in different sectors of a South African city in 2007.



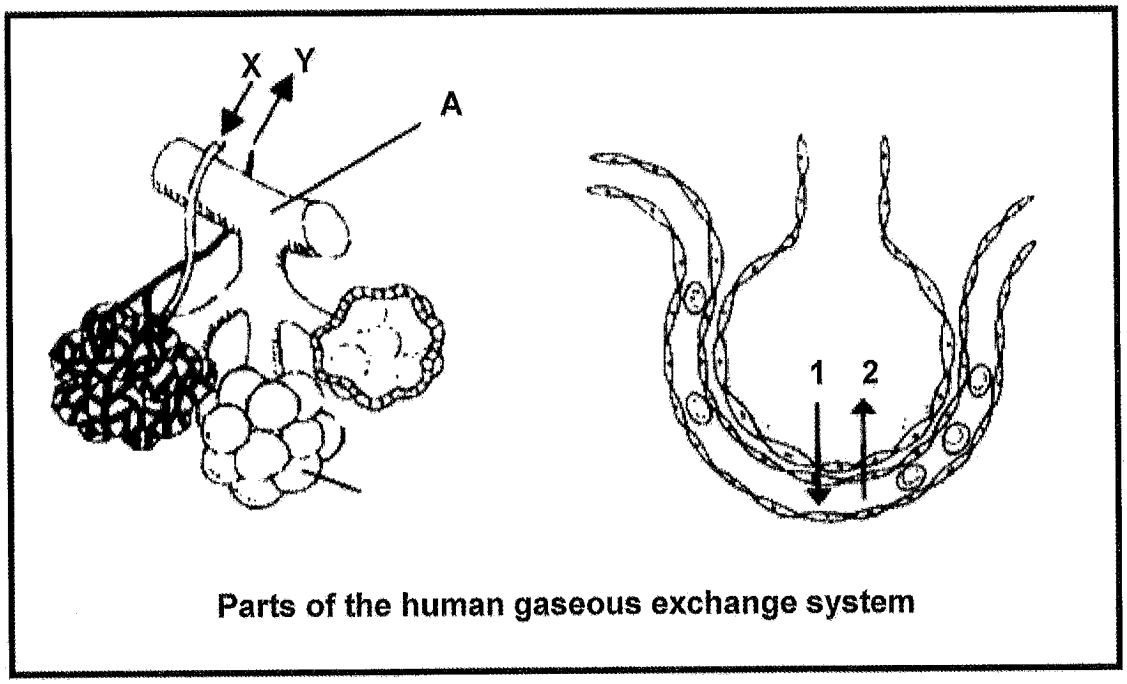
2.1.1 Determine the value of **X**. Show ALL calculations. (2)

2.1.2 The residential energy consumption in this city increased by 3% in 2009. Give ONE possible reason for this increase. (1)

2.1.3 Explain the impact of the increased use of energy generated from coal power stations on global warming. (4)

2.1.4 Explain ONE strategy that could be implemented by the South African government to achieve a reduction in its CO_2 output. (2)
(9)

2.2 Study the diagram showing parts of the human exchange system and answer questions that follow.



Parts of the human gaseous exchange system

2.2.1 Identify part **A**. (1)

2.2.2 Identify the process represented by **1** and **2**. (1)

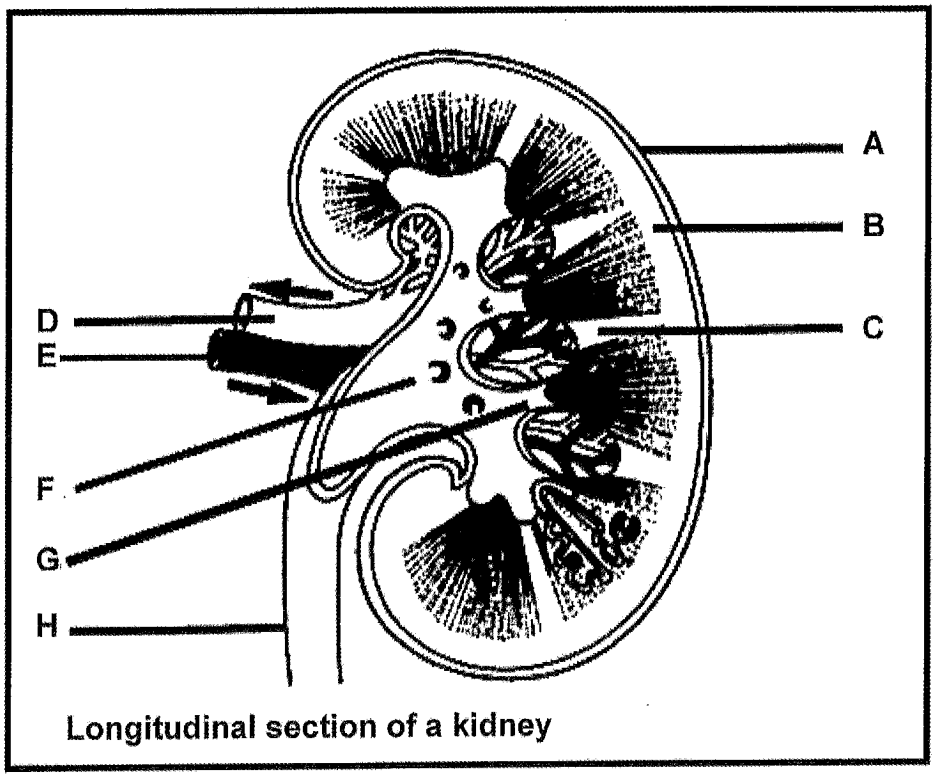
2.2.3 With regard to carbon dioxide and oxygen concentrations, which one will be the highest at:

(a) **X** (1)
(b) **Y** (1)

2.2.4 List TWO features visible on the diagram which make the above structure an efficient respiratory surface. (2)
(6)
[15]

QUESTION 3

3.1 Study the diagram below of a longitudinal section through a kidney and answer the questions that follow.



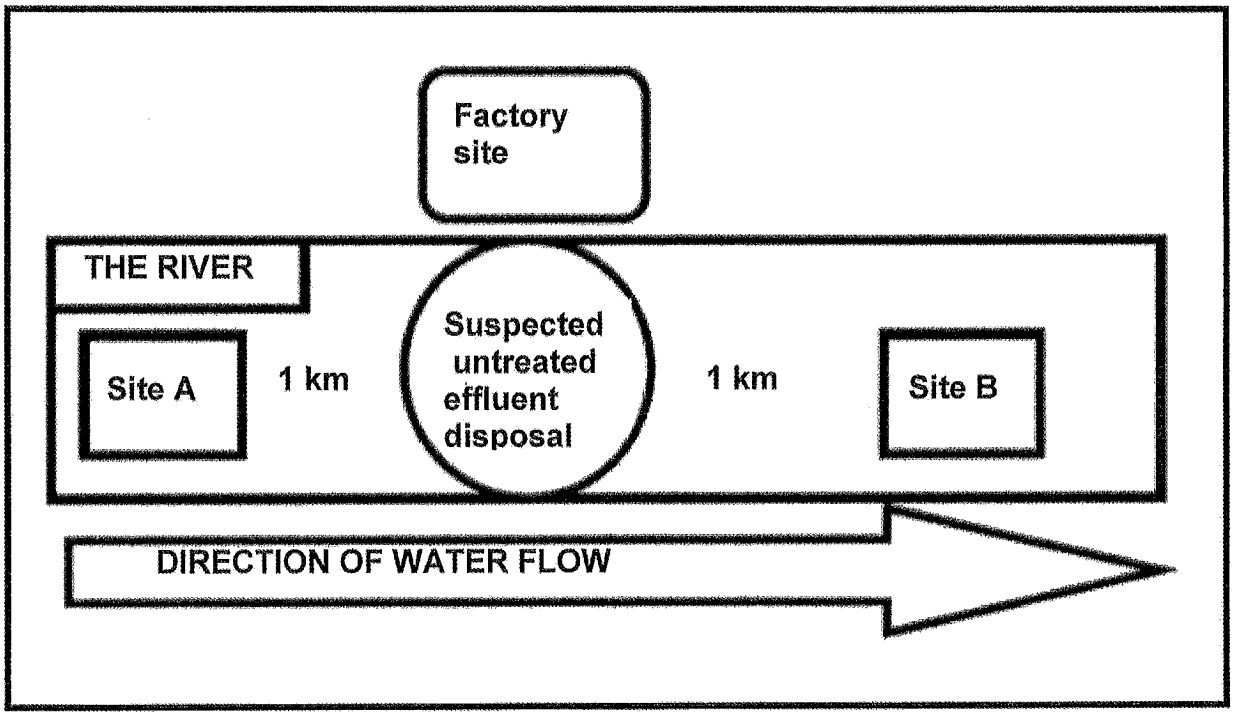
Longitudinal section of a kidney

3.1.1 Identify parts **A** and **G**. (2)

3.1.2 State the **LETTER** and **NAME** of the blood vessel that contains the highest percentage of waste products. (2)

3.1.3 Explain why urine in part **H** is sometimes very concentrated. (5)
(9)

3.2 A certain community living close to an industrial area witnessed the unexplained death of many fish and other aquatic organisms in the nearby river. Many members of the community accused the local chemical factory of disposing untreated acid containing effluent into the river. This incident triggered an investigation by learners at nearby school. The learners were instructed to monitor and record pH levels of two different sites **A** and **B** as indicated in the site diagram below, on a daily basis, for three weeks.



A summary of the recorded data is below. Study the information below and answer the questions that follow.

	pH of water at Site A	pH of water at Site B
Week 1	6,5	4,1
Week 2	6,8	3,5
Week 3	6,4	3,2

3.2.1 State the aim of the above investigation. (2)

3.2.2 Mention any TWO steps to be considered when planning this investigation. (2)

3.2.3 Provide a reason for also testing the pH of water at Site **A**. (1)

3.2.4 State ONE way in which this investigation can be made more reliable. (1)
(6)

[15]

TOTAL SECTION B: 30

SECTION C

QUESTION 4

Describe how habitat loss through various human activities may lead to a loss of biodiversity.

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]

Basic Education

KwaZulu-Natal Department of Basic Education

REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

GRADE 11

MEMORANDUM

SEPTEMBER 2016

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS : 60

TIME : 1 hour

This Memorandum consists of 5 pages.

SECTION A
QUESTION 1

1.1

1.1.1- D✓✓

1.1.2 C ✓✓

1.1.3 D ✓✓

1.1.4 B ✓✓

1.1.5 A✓✓

(5 x 2 = 10)

TOTAL SECTION A: [10]

SECTION B

QUESTION 2
2.1

2.1.1 100 – (17+14+45+6) / 82✓
= 18%✓ (2)

2.1.2
- Increased number of houses built✓/ increased population increased urbanisation
- More houses received electricity connectivity✓
- More street lamps provided by municipality✓
- A very cold winter✓

(Mark FIRST ONE only) Any 1 (1)

2.1.3
- It creates more CO_2 ✓
- which is released into the atmosphere✓
- High concentration of CO_2 in the atmosphere traps more heat✓
- causing 'enhanced greenhouse effect'✓
- that eventually causes a rise in the atmospheric temperature✓

Any 4 (4)

2.1.4
- Invest in alternative forms of fuel✓/ energy generation/solar/wind/nuclear that will limit dependence on fossil fuels✓
- Improve public transport system✓/encourage people to use public transport to reduce the number of cars on the roads✓
- Introduce legislation✓ to penalise offending industries✓/ to allow incentives to industries that adhere to legislation to reduce CO_2 emissions.
- Educating people✓ on strategies to reduce CO_2 output✓

(Mark FIRST ONE only) Any 1 x 2 (2)

(9)

2.2

2.2.1 A - Bronchus/bronchioles✓ (1)

2.2.2 Gaseous Exchange/diffusion✓ (1)

2.2.3 (a) Carbon dioxide✓ (1)

(b) Oxygen✓ (1)

2.2.4 alveoli cup shaped/
- Numerous alveoli✓/ large surface area for exchange of gases
- Thin epithelium made of single layer of cells✓ for rapid diffusion
- Presence of blood capillaries✓ for transport of gases

(Any 2) (2)

(Mark FIRST TWO only)

(6)
[15]

QUESTION 3

3.1

3.1.1
- A: Renal capsule✓
- G: Renal calyx✓ (2)

3.1.2 E✓ - Renal Artery ✓ (2)

3.1.3
- When the body loses too much water✓/ water in blood is low
- the hypothalamus is stimulated✓
- It secretes more ADH✓
- which makes the kidney tubules more permeable✓
- allowing for more water to be re-absorbed into the blood✓
- thus causing less water to be lost in the urine✓ (Any 5) (5)

(9)

3.2

3.2.1 To compare the pH at two sites✓ before and after effluent disposal ✓ (2)

3.2.2
- Formulate a hypothesis for testing✓
- Seek expert advice from relevant people✓
- Decide on suitable site for sampling✓
- Organise all the required chemicals and equipment before the start of the sampling process✓
- Design a relevant recording sheet✓
- Obtain permission to enter the area if it is required✓
- Organise protective clothing such as gloves and boots✓
- Decide on the volume of daily samples, depth at which sample is collected and time of sample taking✓ Any 2 (2)

(Mark first TWO only)

3.2.3 Sample from Site A is used as a control✓/to compare the variations of pH at site B. (1)

3.2.4
- Repeat the investigation✓
- Take more samples at each site✓ Any 1 (1)

(Mark first ONE only)

(6)
[15]

TOTAL SECTION B: 30

SECTION C

QUESTION 4

1
- As a result of urbanisation✓
- land is cleared for housing, industries and roads✓
- leading to habitat fragmentation✓

2
- In monoculture✓
- many species are removed✓
- for the purpose of planting crop of a single species✓

3
- As a result of overgrazing✓
- the loss of topsoil/erosion increases✓
- decreasing soil fertility✓
- decreasing the potential for plant✓ life

4
- When pesticides are used to kill pests✓
- the chemicals enter the ground water✓

- and may affect plant-life in an area✓

5
- When fertilizers are added to soil✓
- it may be washed into rivers✓
- causing algal bloom✓
- which eventually leads to a depletion of oxygen in the water✓
- making it difficult to sustain life✓

6
- As a result of mining✓
- the pH of water may be affected✓
- and toxic gases may be emitted into the atmosphere✓
- The environment is altered such that organisms can no longer exist in the area✓

7
- An increase in deforestation✓
- as a result of the demand for wood products✓
- destroys the ecosystems within the forest area✓

8
- Destruction of wetlands and grasslands✓
- to make way for agriculture✓/human inhabitation
- reduces the biodiversity of organisms surviving on wetlands or grasslands✓ Any (17)

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 loss of biodiversity through habitat destruction is provided (There is no irrelevant information)	Effects on the habitat are appropriately linked to the cause	At least five causes of habitat destruction should be fully described (5 x 2 = 10 marks).
1 mark	1 mark	1 mark