education

Department:
Education
PROVINCE OF KWAZULU NATAL

# NATIONAL SENIOR CERTIFICATE

## GRADE 11

## NOVEMBER 2019

## LIFE SCIENCES P2

**MARKS:** 150

**TIME:** 2 ½ hours

This question paper consists of 14 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 EACH question on 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
7. Draw diagrams and flow charts ONLY when requested to do so
8. The diagrams in this question paper may NOT necessarily be drawn to scale
9. The use of graph paper is NOT permitted.
10. Non-programmable calculators, protractors and compasses may be used.
11. Write neatly and legibly.

## SECTION A

## QUESTION ONE

**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. – 1.1.10.) in your ANSWER BOOK, for example 1.1.11. D.**

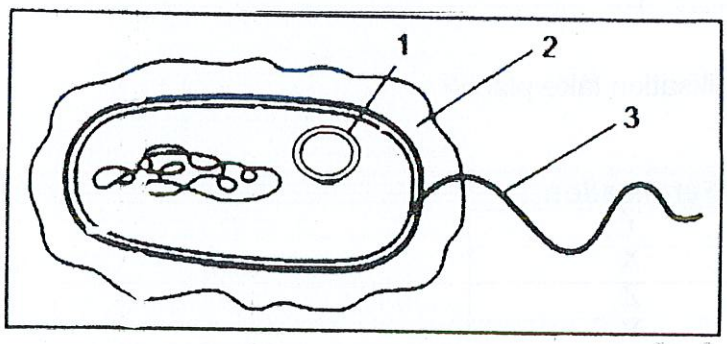
1.1.1. Disease-causing agents are called ...

A. Antibiotic
B. Vaccines
C. Antibodies
D. Pathogens

1.1.2. Mushrooms are a type of fungus. What characteristics of fungi makes them different from plants?

A. Fungal cells are eukaryotic
B. Fungi are multicellular
C. Fungi are heterotrophic
D. Fungi have cell walls

1.1.3. The diagram below represents a bacterial cell.



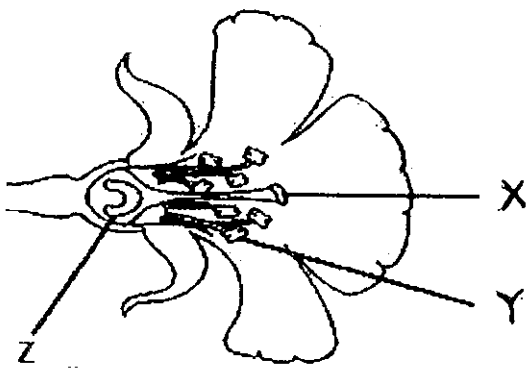

Which of the following represent parts 1, 2 and 3?

A. Plasmid, flagellum, capsule
B. Flagellum, capsule, plasmid
C. Plasmid, capsule, flagellum
D. Capsule, plasmid, flagellum

1.1.4. In gymnosperms pollination is exclusively by ...
A. Animals
B. Water
C. Wind
D. Insects

1.1.5. The part of the flower which becomes the fruit is the ...
A. Petals
B. Ovary
C. Ovule
D. Anther

1.1.6. The diagram shows the structure of a flower.




Where does pollination and fertilisation take place?

| | Pollination | Fertilisation |
|---|---|---|
| 1 | X | Y |
| 2 | Y | X |
| 3 | X | Z |
| 4 | Z | Y |

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

1.1.7. Name the microorganism that is not classified in a kingdom.
A. Virus
B. Fungus
C. Bacterium
D. Protozoa

1.1.8. The short – lived immunity that mothers pass to their babies is called ..... immunity.
A. Passive
B. Maternal
C. Innate
D. Active

1.1.9. Using natural resources so that they are not depleted.

A. Conservation
B. Sustainable use.
C. Poaching
D. Deforestation

1.1.10. Which of the following is present in the Bryophytes?

A. Seeds
B. Xylem
C. Spores
D. Flowers

( 2x 10 = 20 )

**1.2. Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1-1.2.10) in the ANSWER BOOK.**

1.2.1. An organism without a true nucleus

1.2.2. The type of alimentary canal which stretches from the mouth to the anus

1.2.3. Type of asexual reproduction in which a bacteria splits into two, as in mitosis.

1.2.4. Substances used to stimulate the production of antibodies and provide immunity against one or several diseases

1.2.5. A process in biotechnology that is used to convert sugar into alcohol and $C0_2$

1.2.6. The increase in the concentration of nutrients in an aquatic ecosystem, which leads to an increase in primary producers such as algae

1.2.7. The group of organisms such as bacteria and fungi that recycle nutrients in dead plants and animals

1.2.8. Cultivation of plant populations of a single species.

1.2.9. Viruses that infect bacteria.

1.2.10. The differentiation of the anterior end of an animal into a definite head.

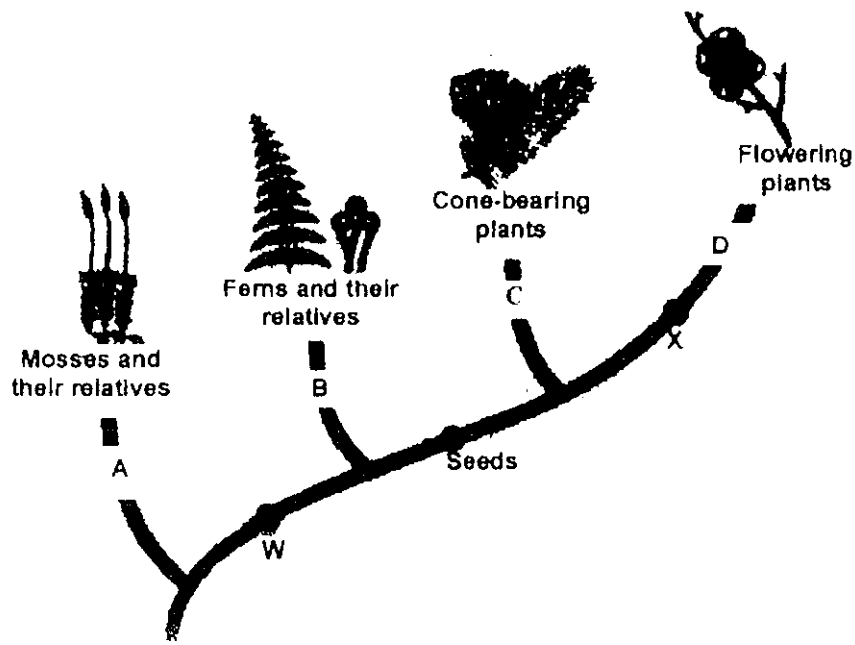
1 x 10 (10)

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 (1.3.1-1.3.3) in the ANSWER BOOK.

| *COLUMN I* | *COLUMN II* |
|---|---|
| 1.3.1 Naked seeds | A: Gymnosperms<br>B: Angiosperms |
| 1.3.2 Site constructed to dispose waste | A: Reservoir<br>B: Landfill |
| 1.3.3 Gametophyte is dominant. | A: Ferns<br>B: Mosses |

(3 x 2) (6)

1.4 The diagram below is a cladogram of plant evolution.




***Green algae ancestor***

1.4.1. Identify the plant <u>divisions</u> labelled **A, B, C** and **D.** (4)

1.4.2. Name the evolutionary features at **W** and **X,** respectively, that distinguishes:

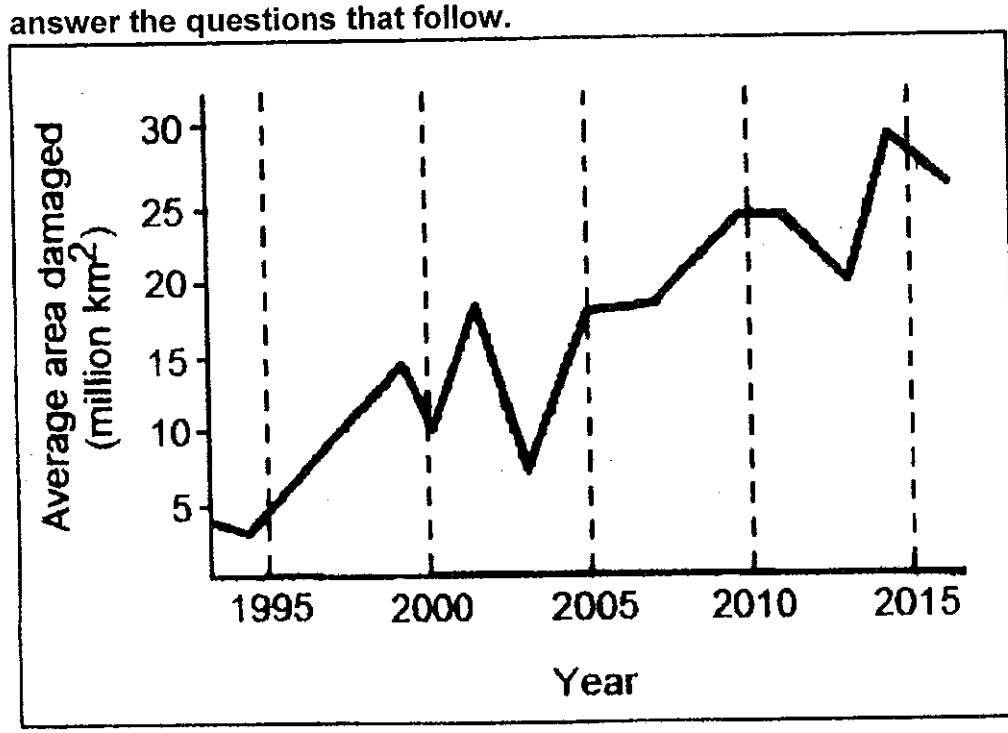
(a) Mosses and ferns (1)

(b) Cone-bearing plants and flowering plants (1)

1.4.3. Both cone-bearing plants and flowering plants are seed-bearing plants. What is the collective name used for seed-bearing plants? (1)

[7]

**1.5. Chloroflurocarbon (CFC) has unfortunately caused considerable damage to the ozone layer, resulting in the formation of big 'holes'. Study the graph below showing the extent of damage (area of the 'hole') in the Antarctic ozone layer and answer the questions that follow.**




1.5.1. During which year was the 'hole' in Antarctic area the:

(a) Largest? (1)

(b) Smallest? (1)

1.5.2. What was the area of the 'hole'(million km²) in the years:

(a) 2000 and (1)

(b) 2005? (1)

1.5.3. Sugguest THREE solutions to ozone depletion. (3)

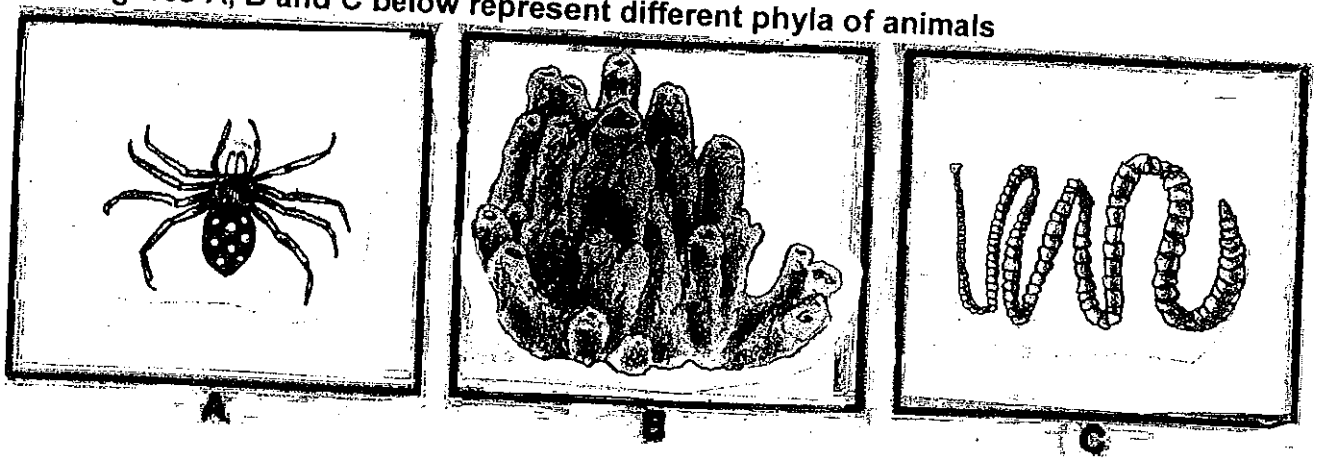
**[7]**

**TOTAL SECTION A: 50**

## SECTION B

## QUESTION 2

2.1 **Figures A, B and C below represent different phyla of animals**




2.1.1. Identify the phylum represented in figures **A, B** and **C**. Write the letter with the correct phylum. (3)

2.1.2. What type of symmetry does figure **A** have? (1)

2.1.3. Give ONE benefit of the type of symmetry mentioned in QUESTION 2.1.2. (1)

2.1.4. Which figure(s) has/have the following characteristics?
Write only the letters **A, B** or **C** for example 2.1.4(e) **D**

(a) Triploblastic
(b) Dorso-ventrally flattened
(c) Cephalisation
(d) Coelomate

(6)

2.1.5. Give ONE advantage of having a high surface area to volume ratio for animals. (1)

2.1 6. Draw a diagram of a cross section of a triploblastic body plan labelling each tissue layer, then indicate what each tissue layer gives rise to. (6)

2.2.

Garlic is known to have the ability to fight bacteria and viruses It is known to be effective against a wide range of bacteria and has the ability to combat the common cold. The antimicrobial substance in garlic is called *allicin* To maintain the antibacterial properties of garlic, it must be consumed or applied as raw garlic because cooking will destroy the *allicin.*

Scientists wanted to investigate the effectiveness of garlic in killing bacteria. They conducted the experiment as follows:

- They used three petri dishes prepared with blood agar and stored these in a refrigerator.
- Before the start of the experiment, they removed the petri dishes from the refrigerator to allow them to reach room temperature
- They prepared three test specimens and labelled them as described below:
  - The three test tubes were labelled **A, B** and **C**.
  - The contents of the test tubes were measured and mixed as shown in the table below:

| Test tube | Contents of the test tubes | | |
|---|---|---|---|
| | 100 mℓ milk | 5 mℓ *E.coli* bacterium | Garlic extract |
| A | √ | X | X |
| B | √ | √ | X |
| C | √ | √ | √ |

- The petri dishes were labelled **A, B** and **C**.
- They removed the lid in petri dish **A** and used the syringe to extract 10 mℓ of the sample from test tube **A** and placed it in the centre of petri dish **A**
- In the same way, using a new syringe a 10 mℓ sample was extracted from test tube **B** and placed in petri dish **B** and the procedure was repeated for petri dish C

- The petri dish lids were replaced and the petri dishes were stored in a cool and shaded place
    - The diameter of the *E.coli* colony was measured every day for 5 days and recorded in the table below

| Petri dish | Diameter of bacteria colony (mm) | | | | |
|---|---|---|---|---|---|
| | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
| A | 0 | 1,7 | 3,0 | 4,6 | 7,1 |
| B | 0 | 4,2 | 8,4 | 15,1 | 36,5 |
| C | 0 | 0 | 0 | 0 | 0 |

2.2.1. State:
(a) The independent variable (1)
(b) The dependent variable (1)
(c) Two factors that need to be controlled to improve validity (2)

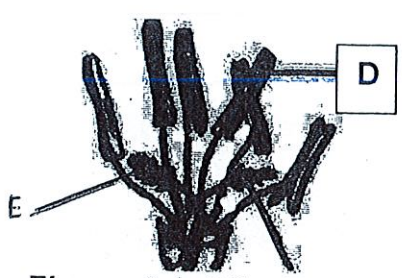
2.2.2. Use the information from the table to draw THREE line graphs showing results of petri dish A, B and C (6)

2.2.3. Explain why the petri dishes were kept in the fridge before the start of the experiment. (2)

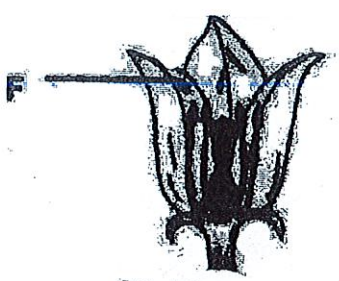
2.2.4. Describe and explain the results obtained in Petri dish C (3)

(15)

**2.3. Study the diagrams of the structures of two flowers below :**



Flower A (x 20) E



Flower B (x 0,5)

2.3.1. Provide labels for D, E , F . (3)

2.3.2. Which flower ( A or B ) is probably pollinated by insects ? (2)

2.3.3. Which flower's ( A or B ) actual size is bigger ? (2)

(7)

**[40]**

## QUESTION THREE

**3.1. Figure 1 below shows the averages of carbon dioxide concentration in the atmosphere since January 2009, as measured at the Mauna Loa Observatory in Hawaii.**

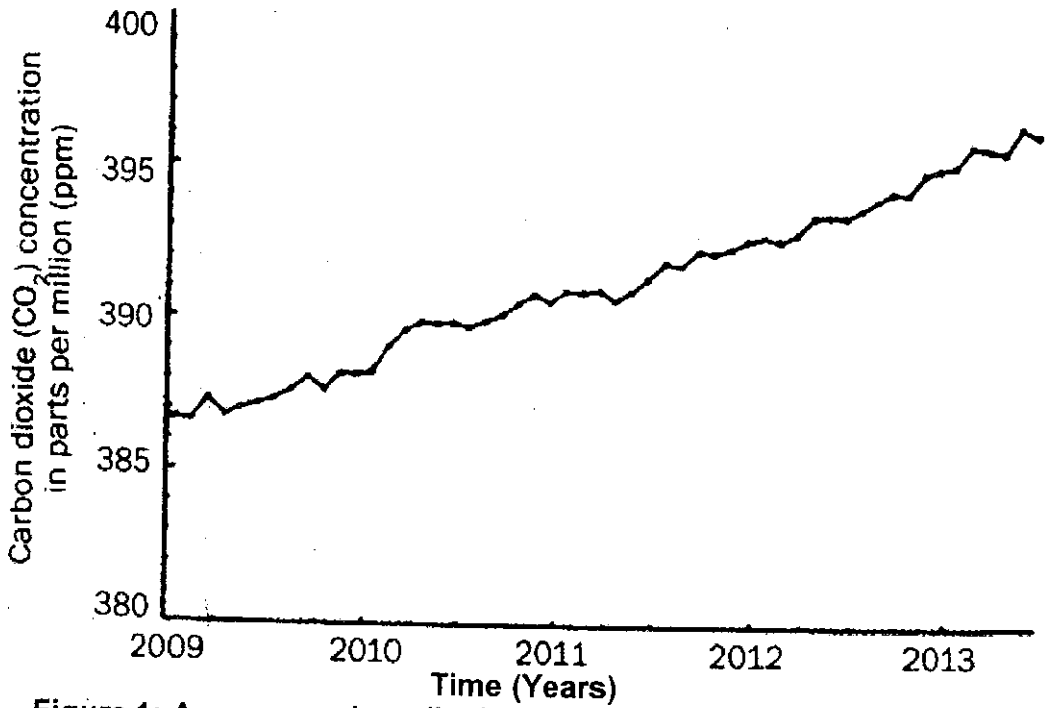



**Figure 1: Average carbon dioxide concentration in the atmosphere since January 2009, at Mauna in Hawaii**

3.1.1. Describe how deforestation could lead to an increase in the carbon dioxide concentration in the atmosphere. (2)

3.1.2. Mention ONE human activity that might have led to the increase in carbon dioxide concentration as seen in the graph. (1)

3.1.3. What was the carbon dioxide concentration in the atmosphere in July 2012? (2)

3.1.4. What is the dependent variable in this investigation? (1)

3.1.5. Explain how the excess carbon dioxide in the atmosphere could lead to climate change (4)

3.1.6. Mention ONE way in which humans can reduce the amount of carbon dioxide released into the atmosphere. (1)

**[11]**

3.2. Read the extract below.

A new study in Kuala Lumpur showed that hunting wild animal for food and recreational sports like hiking and mountain biking pose the two biggest threats to the world's protected areas.

Ten researchers studied data collected over the last decade by managers at about 2 000 protected areas, including untouched forests and national parks or reserves.

They found out that hunting posed the biggest threat in developing countries, while recreational activities such as quad-biking, cross-country skiing, mountain biking, hiking and even dog-walking were most damaging to protected areas in more wealthy nations.

The study showed that the hunting of 'wild meat', such as birds, insects, monkeys and snakes occurred in 61% of all areas. The animals are often sold to meet the demands for food or medicine in urban areas. The increase in the number of wild animals being hunted is partly because of an increase in urban demand - big cities and towns are growing and the demand for wildlife to eat is growing.

Another factor is that the road networks are expanding into forest areas, making them more accessible.

[Adapted from an article 'From hunting to hiking: biggest threats to protected areas identified, Reuters, 2018)

3.2.1. What is the illegal hunting and killing of animals called? (1)

3.2.2. Give TWO reasons for the increase in the number of wild animals being hunted. (2)

3.2.3. Explain how the increase in the killing of wildlife will influence the environment. (3)

3.2.4 Suggest TWO possible solutions to each of the following threats:

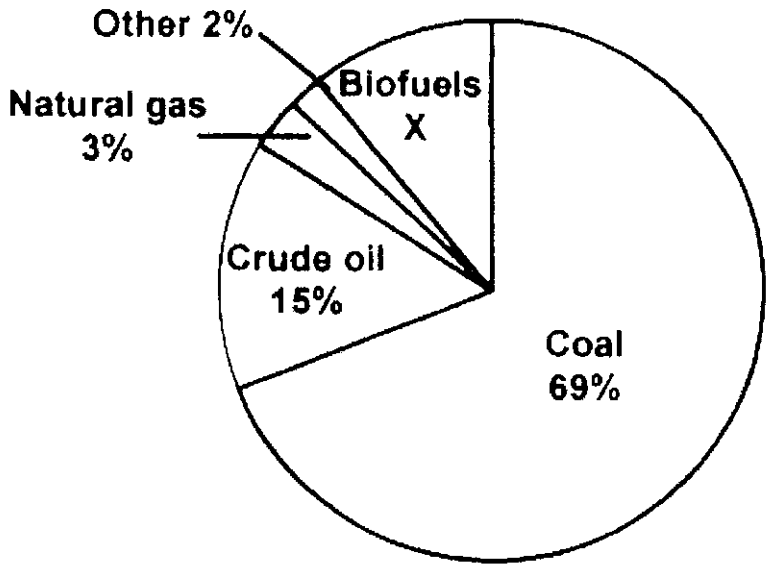
(a) Over-hunting (2)

(b) Recreational activities (2)

**[10]**

3.3. **The pie chart below represents the various sources of energy in South Africa and their contribution in the total primary energy supply.**

**Total Primary Energy Supply in South Africa in 2012**




3.3.1. Determine the value of X. Show ALL calculations. (3)

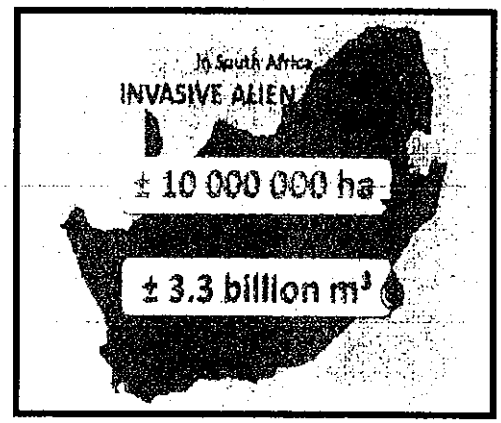
3.3.2. Name the flammable natural gas that is produced in landfill sites. (1)

3.3.3. Give TWO ways in which the gas mentioned in QUESTION 3.3.2 is useful to humans. (2)

3.3.4. Name TWO alternative energy sources that make up the 2% of 'other sources. (2)

3.3.5. Describe how the mining of coal impacts on biodiversity in South Africa. (3)
**[11]**

*3.4.* **Study the diagram below about invasive alien plants in South Africa. It is estimated that they cover 10 million hectares (ha) in South Africa. Every year they use approximately 3,3 billion cubic metres ($m^3$) of water more than the amount of water used by indigenous plants.**




3.4.1. Differentiate between *alien plants* and *indigenous plants.* (2)

3.4.2. Describe the impact on **water quality** if alien plants cover such a large area of South Africa as shown in the picture above. (4)

3.4.3. Define and differentiate between *biological control* and *chemical control* of invasive alien plants. (2)

**[8]**

**TOTAL SECTION B:**

## SECTION C

## QUESTION FOUR

**4.1 Write an essay in which you explain what is meant by the concept of food security. Describe also the ways in which poor crop farming practices pose a threat to food security in South Africa. Finally mention how genetically modified food may help to address the problem of food shortage.**

**Content (17)**

**Synthesis (3)**

**(20)**

**NOTE:** NO marks will be awarded for answers in the form of flow charts or diagrams.

**TOTAL SECTION C: 20**

**GRAND TOTAL: 150**

PHOENIX NORTH LIFE SCIENCES CLUSTER

NOVEMBER EXAMINATION 2019

**LIFE SCIENCES PAPER 2**

**GRADE : 11**

**MARKING MEMORANDIUM :**

**SECTION : A**

**QUESTION : 1.**

1.1.1. D√√
1.1.2. C√√
1.1.3. C√√
1.1.4. C√√
1.1.5. B√√
1.1.6. C√√
1.1.7. A√√
1.1.8. A√√
1.1.9. B√√
1.1.10.C √√ (20)

1.2.1. prokaryotic √
1.2.2. through-gut√
1.2.3. binary fission√
1.2.4.antigens/ vaccines√
1.2.5. fermentation√
1.2.6. eutrophication√
1.2.7. decomposers/ saprophytes√
1.2.8. monoculture√
1.2.9. bacteriophages√
1.2.10.cephalization √ (10)

1.3.1. A only√√
1.3.2. B only√√
1.3.3. B only √√ (6)

1.4 1.4.1 **A** – Bryophytes ✓
**B** – Pteridophytes ✓ / Pteridophyta
**C** – Gymnosperms ✓
**D** – Angiosperms ✓ (4)

1.4.2 (a) Vascular ✓/ Water conducting tissue / conducting tissues (1)

(b) Flowers ✓/ Seeds enclosed in fruit (1)

1.4.3 Spermatophytes ✓ (1)

1.5 1.5.1 (a) 2014 ✓ (1)

(b) 1994 ✓ (1)

1.5.2 (a) 9 – 10 ✓ (1)

(b) 17 – 18 ✓ (1)

1.5.3
- Monitoring the elimination of CFC's as a propellant in aerosols. ✓
- Increasing public awareness of ozone depletion. ✓
- Investigating new ozone-friendly propellants. ✓
- International agreements e.g. the Montreal Protocol to reduce CFC production . (Any other correct solutions)

**(Mark first THREE only)** (3)

**TOTAL SECTION A: 50**

**SECTION B**

**QUESTION 2**

2.1 2.1.1 **A** Arthropoda ✓
**B** Porifera ✓
**C** Platyhelminthes ✓ (3)

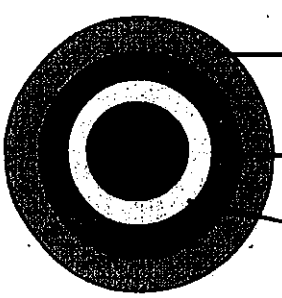
2.1.2 Bilateral ✓ symmetry (1)

2.1.3
- The animal is able to move through the environment ✓ in a consistent direction,
- with a definite front and rear end and a left and right side. ✓
- This helps with feeding or escaping from predators. (Any 1) (1)

2.1.4 (a) A ✓ and C ✓
(b) C ✓
(c) A ✓ and C ✓
(d) A ✓ (6)

2.1.5 Animals don't need any special means to circulate nutrients/gasses to different parts of body, ✓ it takes place through diffusion. (1)

2.1.6



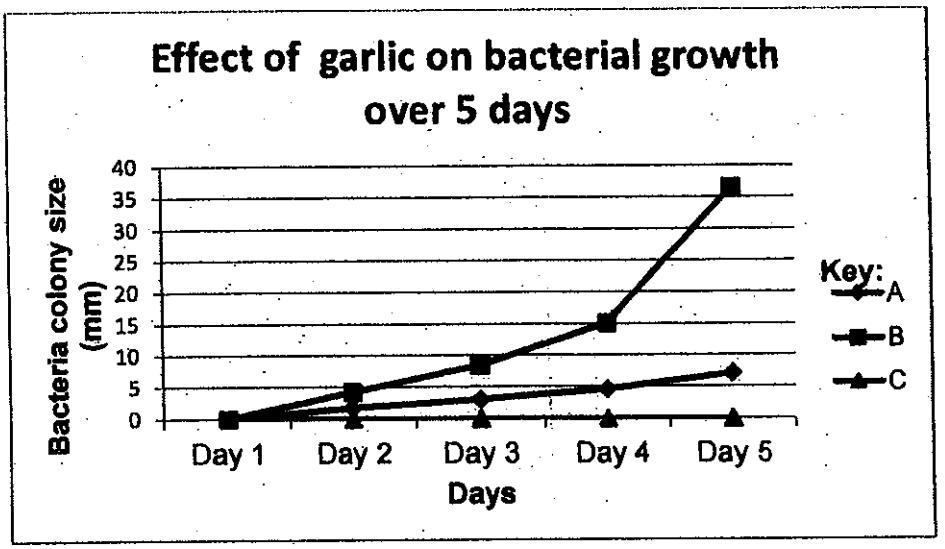
Ectoderm ✓ - gives rise to epidermis and nervous system ✓

Mesoderm ✓- gives rise to body systems and organs ✓ and nervous system ✓

Endoderm ✓ - forms lining of the alimentary canal and digestive glands ✓ (6)

2.2 2.2.1 (a) Composition of the test specimen ✓ / Garlic extract or no garlic extract
(b) Growth of the bacteria colony ✓ (1)
(c) Same amount of milk ✓
Same period/ time ✓ to do investigation
Same environmental conditions ✓/temperature ✓ (Any 2) (2)

2.2.2




**Guidelines for assessing the graph:**

| | |
|---|---|
| Three line graphs on the same set of axes | 1 |
| Title of graph | 1 |
| Correct label and scale for X-axis | 1 |
| Correct label, unit and scale for Y-axis | 1 |
| Drawing of line graphs | 1: 1 to 2 lines plotted correctly<br>2: All 3 lines plotted correctly |

(6)

2.2.3 To avoid growth of bacteria ✓ before the start of the experiment as most bacteria do not grow in cold conditions ✓ (2)

2.2.4
- Petri dish **C** with milk, the *E.coli* specimen and garlic extract did not show any signs of bacterial growth. ✓
- The *allicin* ✓/antimicrobial substance in the garlic extract destroyed the bacteria ✓ hence there was no growth in Petri dish **C**. (3)

**2.3.1. D- anther√ E – stigma√ F- corolla/ petals√**

**2.3.2. B√√**

**2.3.3. B√√**

**(7)**

**(40)**

**QUESTION: 3**

**3.1.1. Cutting down of trees decreases the amount of carbon dioxide √ taken up by the plants during photosynthesis. √** **(2)**

**3.1.2. Burning of fossil fuels √** **(1)**

**3.1.3. 395,5 √ ppm √** **(2)**

**3.1.4. Carbon dioxide concentration in ppm√** **(1)**

**3.1.5. Carbon dioxide is a greenhouse gas√**

**which absorbs long wave radiation emitted from the earth√**

**and prevents it from escaping back into the atmosphere.√**

**An increase in the concentration of carbon dioxide leads to an increase in the greenhouse effect. √**

**which may result in global warming.√**

**Reduce the need for heating by insulating the walls√**

**Building energy efficient homes√** **any (4)√**

**3.1.6. Drive less √/ use public transport/ walking/ bicycle more**

**Reuse and recule √ ( Any suitable answer)** **any (1)√**

**(11)**

*3.2.1.* Poaching ✓ (1)

*3.2.2.* Increase in urban demand ✓/ big cities and towns are growing. Easy access to wild animals due to road networks expanding to forests. ✓ (2)

*3.2.3.*
- Disturbs the ecosystem ✓
- because food chains are affected ✓
- leading to the extinction of some species ✓ in the ecosystem
- and will eventually lead to the loss of biodiversity. ✓

(Any 3 x 1) (3)

*3.2.4.* (a)
- Regulating hunting ✓
- working with local communities to manage and protect their resources from outsiders. ✓
- Promoting sustainable sources of food ✓ (Any 2 x 1) (2)

(b) Better management of the numbers of people visiting protected areas. ✓
Better management of the activities of people visiting the protected areas. ✓ (2)

(10)

3.3 3.3.1 100 ✓ - (69 + 15 + 3 + 2) ✓ = 11 ✓ (3)

3.3.2. Methane ✓ (1)

3.3.3. It is burnt to:
- provide heat ✓/cook food
- generate electricity ✓

(2)

3.3.4.
- Nuclear power ✓
- Hydroelectric power ✓
- Solar power ✓
- Wind power ✓

(Any 2) (2)

3.3.5 Biodiversity is decreased ✓ as mines destroy habitats ✓ and the animals that live there die ✓/move away.

**OR**

Biodiversity decreases ✓ as mines release chemicals ✓/pollutants into the environment which poisons plants and animals. ✓ (3)

3.4. 3.4.1. Alien plants are plants that do not naturally live/originate in a particular habitat/country. ✓
Indigenous plants are plants that are naturally found in a particular habitat/country. ✓ (2)

3.4.2.
- Blocked waterways. ✓
- Light is not able to enter. ✓
- Photosynthesis cannot occur. ✓
- Plants die and decompose. ✓
- Bacteria deplete oxygen supply in water. ✓
- Aquatic animals die. ✓

(Any 4 × 1) (4)

3.4.3.
- Biological control is controlling alien plants through use of natural pests. ✓
- It is a more environmentally friendly and safe ✓ way of controlling alien plants.
- Chemical control is the use of chemicals ✓ to prevent the spread of alien plants.
- It can kill desirable plant and animal species. ✓

(2)

**[40]**

**TOTAL SECTION B: 80**

**SECTION C**

**QUESTION 4**

4.1 **Food security**.

- The state of having reliable access ✓ to a sufficient quantity of affordable, nutritious food. ✓ (2)

**Poor crop farming practices**

- monoculture ✓ planting the same crop over and over ✓
- because it is cost effective ✓, but
- it attracts more pests ✓ and it
- reduces quantity of crop produced ✓
- this makes food more expensive to buy ✓/ less affordable
- pest reduce the quality of crop ✓ making
- it necessary to use more pesticides, ✓ more money spent
- pesticides / insecticides kill useful crops also ✓
- pesticides are bad for human health ✓/ affects nerves
- they also cause pollution ✓ and it
- also reduces biodiversity ✓
- monoculture causes top soil erosion, ✓ leading to
- more fertilisers to be used ✓
- over fertilisation causes oxygen deprived soil ✓
- leads to less production of crops ✓ in future
- and also produces greenhouse gases ✓
- poor irrigation ✓/ poor infrastructure used due to
- lack of awerness ✓/ education / experience / motivation Max. (10)

**Genetically modified food**

- genes for desired traits are removed ✓ from one plant and
- introduced into another plant ✓ to make better crop
- examples of desired traits – resistance to diseases ✓
- short maturity ✓
- higher yield ✓
- cheaper food ✓
- increases nutritional value ✓
- longer shelf life ✓
- bigger and more attractive food, ✓etc.
- helps poor / starving / famine people ✓
- to make food accessible and available ✓ Max. (5) (17)

| Relevance (R) | Logical Sequence (L) | Comprehensive (C) |
|---|---|---|
| All information provided are relevant to the essay i.e only the 3 points are discussed. | Ideas are arranged in a logical manner i.e starting with food security followed by poor crop farming practices followed by genetically modified food. | In the body of the essay, minimum 6 relevant points out of the 10 for poor farming practices and a minimum of 3 points for genetically modified food are obtained. |

Synthesis (3)

**TOTAL SECTION C: 20**
**GRAND TOTAL: 150**