Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2023

LIFE SCIENCES P2

MARKS: **150**

TIME: **2½ hours**

This question paper consists of 15 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 provided.
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. 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. Round off all calculations to two decimal spaces.
12. 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–D) next to the question numbers (1.1.1 to 1.1.9) in the ANSWER BOOK, for example 1.1.10 D.

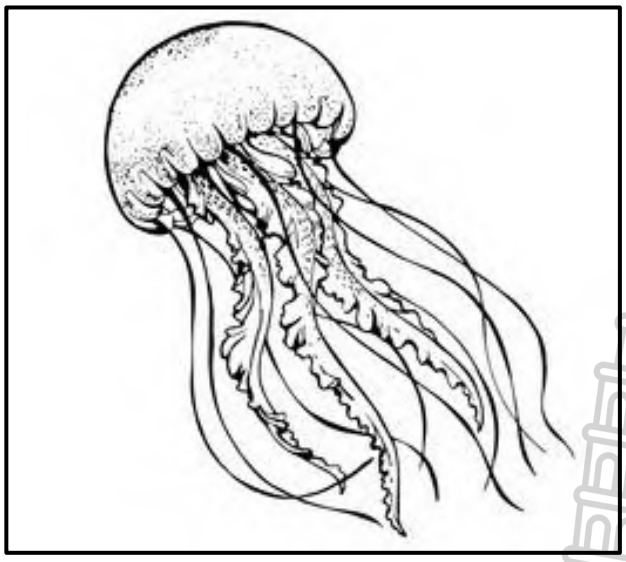
1.1.1 Vaccines work because …

A they contain antibodies that destroy disease causing organisms.
B they destroy disease causing organisms by dissolving their cell membranes.
C they trigger the body to produce antibodies to protect the body against disease causing organisms.
D it contains drugs that destroy disease causing organisms.

1.1.2 Which of the following phyla is diploblastic?

A Porifera
B Chordata
C Annelida
D Cnideria

1.1.3 Which characteristic best describes the organisms in the diagram below?



A Triploblastic
B Radially symmetrical
C Shows cephalization
D Has a notochord

1.1.4 Advantages of a coelom:

(i) Independent movement and digestive system
(ii) Needs a blood system
(iii) Coelomic fluid acts as a hydrostatic skeleton
(iv) More space for complex organs and organ systems

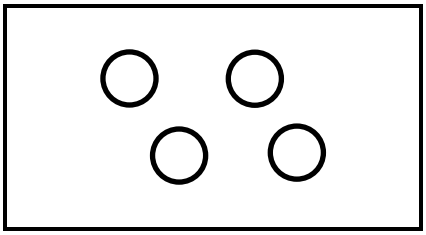
Which of the above statements represent advantages of having a true coelom?

A (i), (ii), (iv)
B (i), (iii), (iv)
C (ii), (iii), (iv)
D (i), (ii), (iii), (iv)

1.1.5 Which combination listed below represents wind-pollinated plants?

A Large bright petals and lots of nectar
B Brightly coloured petals and small, light pollen
C Large anthers and lots of nectar
D Small petals and large, feathery stigmas

1.1.6 The shape of the bacteria below can be classified as …

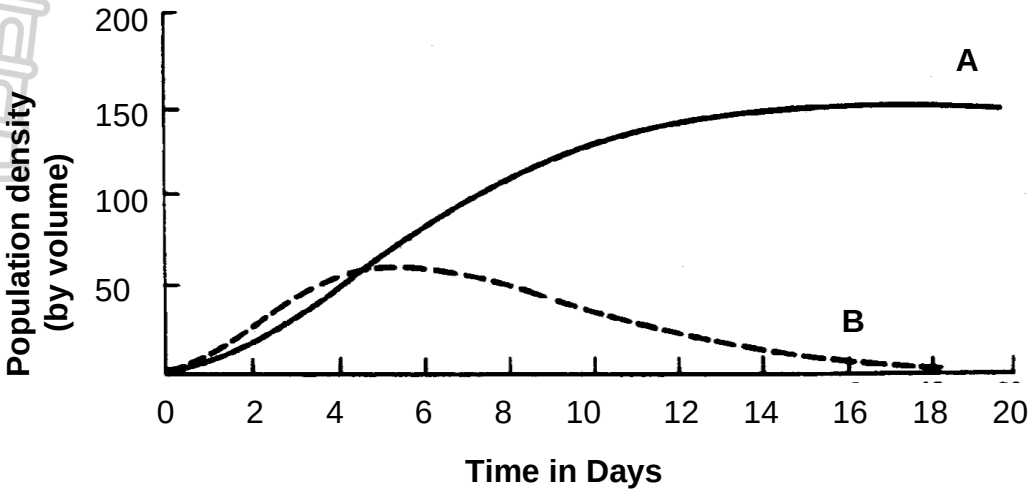


A coccus.
B bacillus.
C vibrio.
D spirillum.

1.1.7 Which statement below best describes emigration?

A Increase in population size
B Migration of animals.
C Permanent movement of organisms out of a habitat.
D Movement of people from city to city.

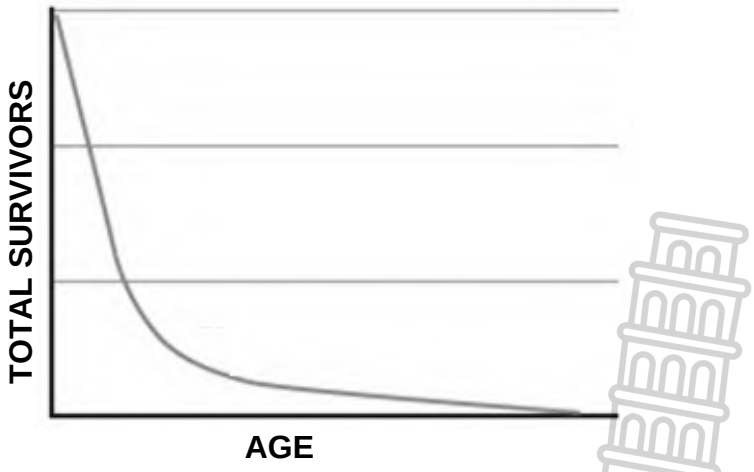
1.1.8 Two species of paramecium were found in a pond. The graph below shows the population growth of the two species (**A** and **B**) that feed on the same bacteria.



The graph above shows an example of …

A parasitism.
B resource partitioning.
C competitive exclusion.
D predator-prey relation.

1.1.9 Study the graph below.



The graph above best represents the survivor curve of …

A humans.
B frogs.
C birds.
D lions.

(9 x 2) (18)

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers (1.2.1 to 1.2.8) in the ANSWER BOOK.

1.2.1 An organism that captures and kills another organism for food

1.2.2 A direct method whereby all individuals in a human population are counted

1.2.3 A process in biotechnology that is used to convert sugar into alcohol and carbon dioxide

1.2.4 An organism without a true nucleus

1.2.5 A diagram showing the evolutionary relationship between organisms

1.2.6 A type of gut that is found in Annelids

1.2.7 A disease-causing organism

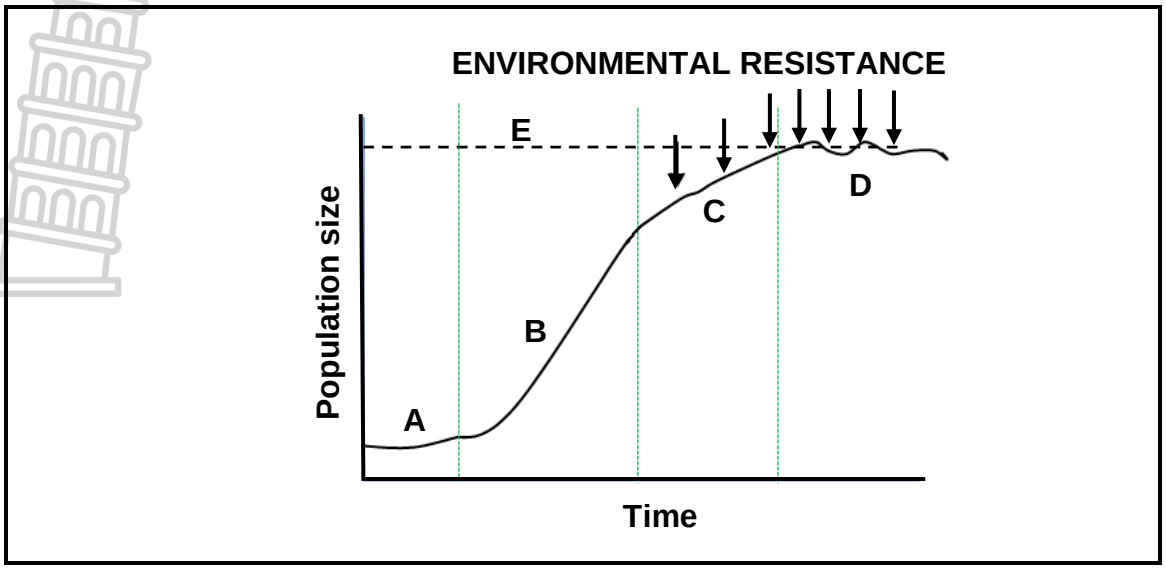
1.2.8 The access, by all people at all times, to adequate, safe and nutritious food (8 x 1) (8)

1.3 Indicate whether each of the statements 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 numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Tick on a dog	A: Symbiosis B: Parasitism
1.3.2 Decreases food security	A: Droughts B: GM foods
1.3.3 Characteristic of a population	A: Same species B: Live in the same habitat

(3 x 2) (6)

1.4 Study the population growth curve below.



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

1.4.2 Provide the following labels:

(a) Stage **D** (1)

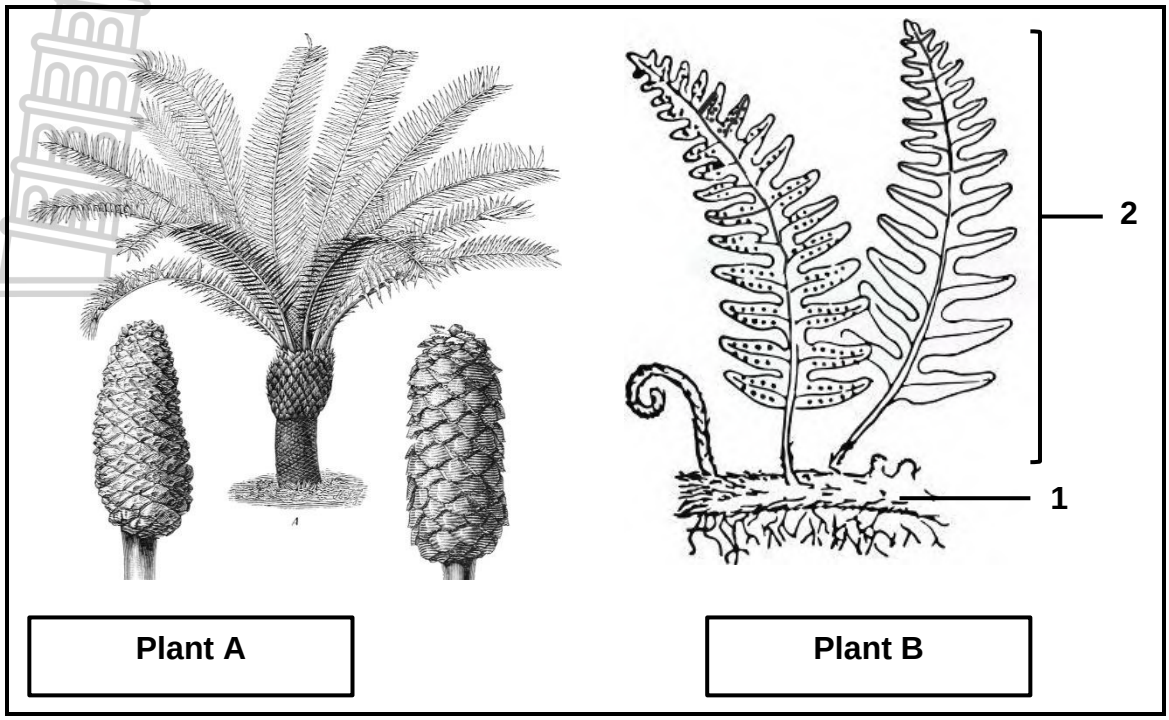
(b) Line **E** (1)

1.4.3 Explain why the growth at stage **A** is slow. (2)

1.4.4 Name TWO factors that could form part of environmental resistance. (2)

1.4.5 Name TWO inherent factors that would cause an increase in population size. (2)

1.5 Study the diagrams below.



1.5 1.5.1 Name the plant division to which plant **A** belongs. (1)

1.5.2 Give TWO characteristics found in both plant **A** and **B**. (2)

1.5.3 Explain why plant **A** is less reliant on water than plant **B**. (3)

1.5.4 Provide labels for the following:

(a) **1** (1)

(b) **2** (1)

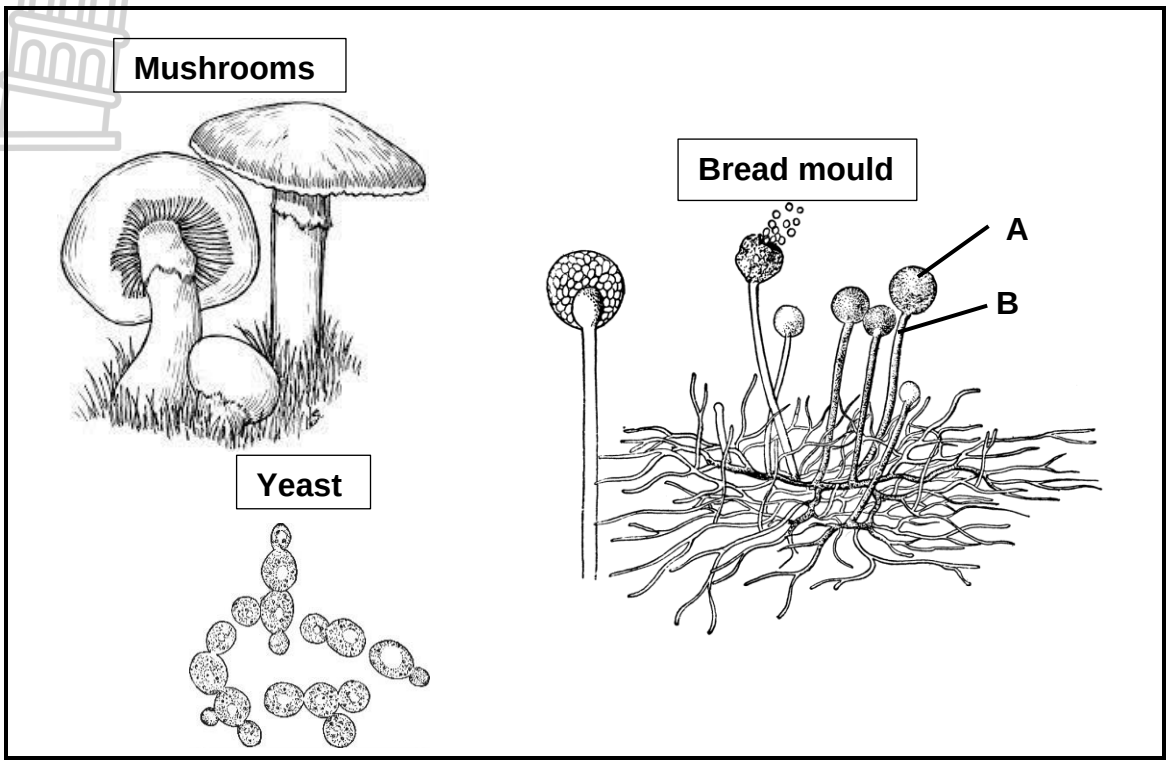
1.5.5 Why is the plant in generation **B** NOT considered a thallus plant? (1)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the diagrams below.



2.1.1 To which kingdom do all the above organisms belong? (1)

2.1.2 Provide labels for **A** and **B**. (2)

2.1.3 Name the thread-like filaments that make up the body of a bread mould. (1)

2.1.4 Name TWO conditions needed for bread mould to grow. (2)

2.1.5 Name TWO products that yeast is used for. (2)

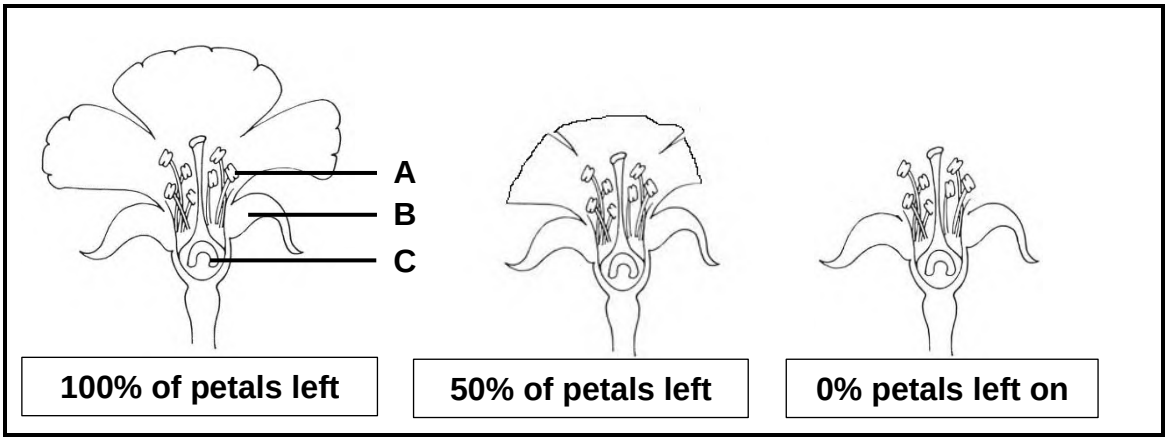
2.1.6 Explain ONE way in which organisms in this kingdom play an important role in the environment. (2)

2.2 An investigation was done to determine if the amount of petals affects the fertilisation of the ovule.
When flowers are self pollinated, the pollen tube grows only a little way into the stigma and style and fertilisation does not occur. When cross pollination occurs by pollinators then the pollen tubes grow all the way down and fertilisation of the ovule can occur.

The investigation was conducted as follows:

- 30 flowers were used. 10 flowers with 100% petals, 10 flowers with 50% of the petals removed and 10 flowers with 0% petals
- flowers were placed in an area with pollinators for 2 days
- after 2 days the flowers were prevented from further pollination
- after 7 days the amount of pollination and fertilisation in each flower was recorded

The diagrams below show the appearance of the flowers used.



The results are shown in the table below.

	NUMBER		
	Flower with 100% of petals	**Flower with 50% of petals**	**Flower with no petals**
Pollen on stigma	158	149	25
Pollen tubes in the style	86	82	8
Ovules fertilised	38	40	4

2.2.1 For this investigation give the:

(a) Independent variable (1)

(b) Dependant variable (1)

2.2.2 Supply labels for:

(a) Structure **A** (1)

(b) Whorl **B** (1)

(c) Structure **C** (1)

2.2.3 Explain why there was more pollen on the flowers with petals. (2)

2.2.4 Explain why there are more pollen tubes present in the style of all flowers than the number of ovules fertilised. (2)

2.2.5 Give TWO ways the validity of this experiment could be improved. (2)

2.2.6 Write a conclusion for this experiment. (2)

2.2.7 State TWO ways in which angiosperms are better adapted to terrestrial life than bryophytes. (2)

2.2.8 Name the plant division to which angiosperms belong. (1)

2.2.9 Give TWO advantages of sexual reproduction. (2)

2.3 Read the extract below.

Malaria is a deadly disease caused by *Plasmodium sp*. and transmitted through the female Anopheles mosquito. In 2020, 627 000 people around the world died from malaria.

DDT is a pesticide used to control mosquito populations in malaria areas. In the early 1990s there was a worldwide ban on the use of DDT. DDT is non-biodegradable. It affects animals at the top of the food chain. It caused the decline of many birds of prey as it made the shells of their eggs very thin.

The number of deaths due to malaria rose from 19 in 1991 to 450 in 2000. The South African government decided to lift the ban and started using DDT again. By 2020 there were only 38 deaths due to malaria.

2.3.1 Name the kingdom to which the malaria parasite belongs. (1)

2.3.2 Give evidence from the passage that the use of DDT has a negative effect on the environment. (1)

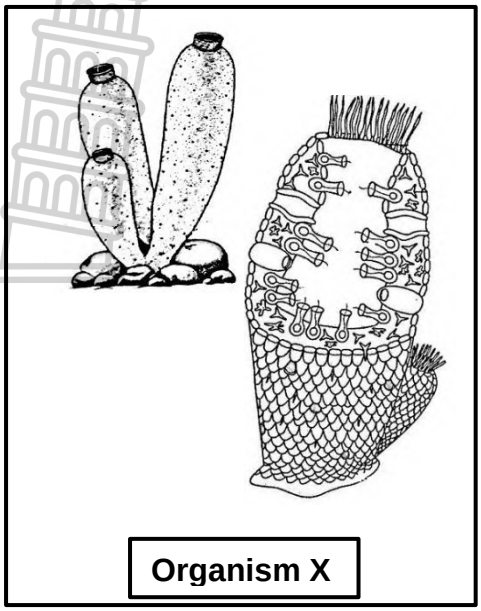
2.3.3 Explain the economic impact to a country if there is a high percentage of people suffering from malaria. (2)

2.3.4 Explain how the Anopheles mosquito transmits malaria. (2)

2.3.5 Give TWO precautions besides killing mosquitoes that people can take to prevent getting malaria. (2)

2.3.6 Name the TWO different human body cells that the plasmodium parasite attacks. (2)

2.4 The diagrams below show animals that belong to two different phyla.



Organism X

Organism Y

2.4.1 Name the phyla to which Organism **X** belongs. (1)

2.4.2 For each of the statements below, write only **X** or **Y**.

(a) Organism that has a through gut (1)

(b) Organism that has no organs (1)

(c) Organism that is sedentary (1)

2.4.3 What type of symmetry is shown by Organism **Y**? (1)

2.4.4 Describe how the body plan of Organism **Y** is suited to an organism that actively moves from one environment to another. (3)

2.4.5 Draw a simple labelled diagram of a cross section through the body wall to show the tissue layers found in Organism **Y**. (4)

[50]

QUESTION 3

3.1 The table below shows the average atmospheric carbon dioxide level over 60 years.

The table showing the contribution of different sources of electricity in 2021 and the planned contribution of different sources to electricity in South Africa in 2030.

Source	Contribution to electricity consumption in 2021 (%)	Planned contribution to electricity consumption in 2030 (%)
Coal	84,4	46
Gas	0,8	16
Wind	3,4	15
Solar	2	11
Hydro	2,8	10
Nuclear	5,3	2
Other	1,4	0

3.1.1 Which source provided the most electricity in South Africa in 2021? (1)

3.1.2 Explain how coal generated electricity increases global warming. (4)

3.1.3 Explain why Eskom wants to increase the amount of wind and solar generated electricity. (2)

3.1.4 Draw a pie chart showing the planned sources of electricity for 2030. (7)

3.1.5 What is the difference between the percentage of gas generated electricity used in 2021 and 2030? (2)

3.2 Dandelions are weeds that often grow on schools sports fields. The groundsman at a school is responsible for making sure that the soccer field is well maintained and has no weeds.

He wanted to calculate the number of dandelion weeds on their soccer field.

- The size of the soccer field is 2 500 m^2.
- He used 1 m x 1 m (1 m^2) quadrats and took 15 samples across the field.
- The number of dandelions in each sample were recorded in the table below.

Sample number	Number of dandelion plants
1	22
2	3
3	7
4	4
5	15
6	0
7	3
8	0
9	12
10	3
11	0
12	14
13	4
14	7
15	2

Dandelion plant

3.2.1 What is this method of estimating population size called? (1)

3.2.2 The grounds man did not know where to place the quadrats on the field. Explain how he should go about determining where to place them. (2)

3.2.3 Calculate the total number of dandelions on the field. (5)

3.2.4 Why were fifteen samples taken instead of five? (1)

3.2.5 Give ONE reason why the groundsman would want to know the total number of weeds on the field. (1)

3.3 Tabulate TWO differences between *a developed country* and *a developing country* that affects their population growth curves. (5)

3.4 Read the extract below.

> Acid mine drainage has a negative effect on the environment. Mines often use lime to neutralise the acidic water before it is pumped into rivers and streams. But lime needs to be mined especially for this purpose.
>
> It contaminates soil so that the plants do not get enough of the required nutrients to grow, it contaminates drinking water, disrupts the growth and reproduction of aquatic animals and corrodes buildings and structures like bridges.
>
> New research shows that slag, a very alkaline waste product made from mining, is effective in neutralising the acidic water.

3.4.1 Describe how acid mine drainage forms. (3)

3.4.2 Give TWO negative effects of acid mine drainage on the environment mentioned in the extract. (2)

3.4.3 Explain why it is economically better to use slag to neutralise the acidic water than lime. (4)

3.4.4 Give ONE other way mining affects the quality of water. (1)

3.5 Alien plants such the water hyacinth (*Eichhomia sp.)* have become invasive in South Africa, blocking water ways and reducing water quality.

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

3.5.2 Why do alien plants become invasive in an ecosystem? (1)

3.5.3 State TWO ways that the government could use to control alien plants. (2)

3.5.4 Describe how alien plants may affect aquatic animals by reducing water quality. (4)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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GRADE 11

NOVEMBER 2023

LIFE SCIENCES P2
MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 11 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. Marking guideline 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	D ✓✓		
	1.1.3	B ✓✓		
	1.1.4	B ✓✓		
	1.1.5	D ✓✓		
	1.1.6	A ✓✓		
	1.1.7	C ✓✓		
	1.1.8	C ✓✓		
	1.1.9	B ✓✓	(9 x 2)	(18)
1.2	1.2.1	predator ✓		
	1.2.2	census ✓		
	1.2.3	(alcoholic) fermentation ✓		
	1.2.4	prokaryotic ✓		
	1.2.5	phylogenetic tree ✓/ cladogram		
	1.2.6	through ✓ gut		
	1.2.7	pathogen ✓		
	1.2.8	food security ✓	(8 x 1)	(8)
1.3	1.3.1	Both A and B ✓✓		
	1.3.2	A only ✓✓		
	1.3.3	Both A and B ✓✓	(3 x 2)	(6)
1.4	1.4.1	Logistic ✓/S-shaped		(1)
	1.4.2	(a) Equilibrium ✓/ stationary phase		(1)
		(b) carrying capacity ✓		(1)
	1.4.3	The population is sexually immature ✓ They are getting used to the environment ✓ They are still looking for mates ✓	(Any 2 x 1)	(2)
	1.4.4	disease ✓ competition/lack for/of food ✓ competition/lack for/of water ✓ competition/lack for/of space ✓ predation ✓ parasitism ✓	(Any 2 x 1)	(2)
	1.4.5	natality ✓ immigration ✓		(2)
1.5	1.5.1	Gymnosperms ✓ / Spermatophyte		(1)
	1.5.2	They have well developed vascular tissue ✓ They have true roots, stems and leaves ✓/ not thallus		(2)

1.5.3 Plant **A** does not need water for fertilisation ✓/reproduction.
Gametes are transported by wind ✓
Plant **B** requires water for male gamete to swim to female gamete ✓ (3)

1.5.4 (a) rhizome ✓ (1)

(b) frond ✓ (1)

1.5.5 It has true roots, stems and leaves ✓ (1)
[50]

TOTAL SECTION A: 50

QUESTION 2

2.1 2.1.1 Fungi ✓ (1)

2.1.2 **A** – sporangium ✓
B – sporangiophores ✓ (2)

2.1.3 hyphae ✓ (1)

2.1.4 warm ✓
moist ✓
dark ✓
(Mark first TWO only) (Any 2 x 1) (2)

2.1.5 wine ✓ / beer / alcoholic drinks
bread ✓
soy sauce ✓
cheese ✓/ yoghurt / maas
(Mark first TWO only) (Any 2 x 1) (2)

2.1.6
- Act as decomposers breaking down dead/decaying organic ✓ matter returning recycled nutrients to the soil ✓
- Mushrooms are a food source ✓ for other animals ✓
- Fungi have mutualistic relationship ✓ with algae to form lichen ✓
- Mycorrhiza fungi live on roots of plants and act as root hairs for the plants ✓
- They grow on rocks and are pioneer plants, ✓ starting the process of soil formation ✓
- They are pathogenic ✓ and cause diseases in plants and animals ✓

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

2.2 2.2.1 (a) (amount of) petals ✓ (1)

(b) fertilisation of ovule ✓ (1)

2.2.2 (a) anther ✓ (1)

(b) sepal ✓/ calyx (1)

(c) ovary ✓/ ovule (1)

2.2.3 Pollinators are attracted by the petals ✓ and therefore visit the flowers with petals more ✓ (2)

2.2.4 self-pollination occurred ✓
the pollen tube did not reach the ovary ✓ (2)

2.2.5 ensure all flowers have same exposure to insects ✓
use same species of flower ✓
use same colour flower ✓
(Mark first TWO only) (Any 2 x 1) (2)

2.2.6 The greater the number of petals the greater the chance/amount of fertilisation ✓✓

OR

The number of petals increases the chance/amount of fertilisation that occurs ✓✓ (2)

2.2.7 Angiosperms
have seeds ✓
have vascular tissue ✓
have a cuticle ✓
Do not rely on water for reproduction ✓
(Mark first TWO only) (Any 2 x 1) (2)

2.2.8 Spermatophytes ✓ (1)

2.2.9. offspring genetically different ✓
zygote covered in thick protective coat ✓ (2)

2.3 2.3.1 Protozoa ✓/ Protista (1)

2.3.2
- It is non-biodegradable ✓
- It builds up in the food chain and affects animals at the top of the food chain ✓
- It caused the decline of many birds of prey as it made the shells of their eggs very thin

(Mark first ONE only) (Any 1 x 1) (1)

2.3.3
- It will have a negative impact on the economy ✓
- Because there will be less people working ✓/ earning money/ more money spent on medical care (2)

2.3.4
- The mosquito sucks up blood containing plasmodium from infected person ✓
- When it bites another person the mosquito spits some of it's saliva containing plasmodium into it's victim's blood ✓ (2)

2.3.5
- Take medication before entering the malaria area ✓
- Prevent mosquito from biting them ✓/ or an example (2)

2.3.6
- Liver ✓ cells
- Red blood ✓ cells / erythrocytes (2)

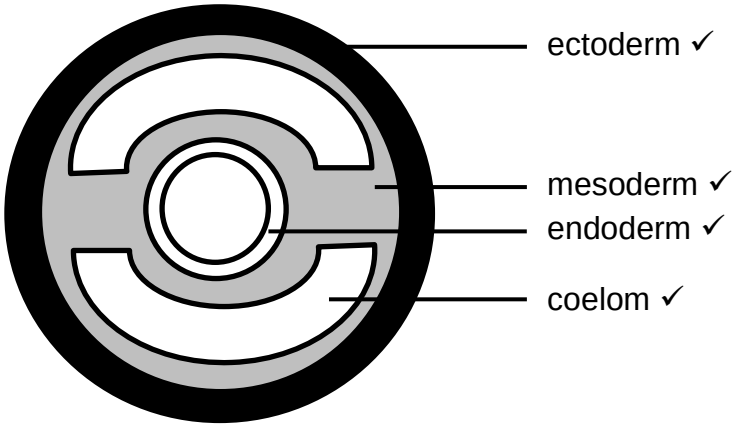
2.4 2.4.1 Porifera ✓ (1)

2.4.2 (a) **Y** ✓ (1)
(b) **X** ✓ (1)
(c) **X** ✓ (1)

2.4.3 Bilateral ✓ (1)

2.4.4
- They have sense organs accumulated in the area that enters the new environment first ✓/ **show cephalization.**
- They have developed a mesoderm from which muscles originate. ✓
- They have **a coelom** that separates the body wall from the gut wall so muscles can work independently. ✓ (3)

2.4.5 Caption: **Body Plan of organism Y (fly) showing tissue layers** ✓
Correct drawing ✓
Any 2 correct labels ✓✓
(Body layers must be in correct position to be awarded mark)



(4)
[50]

QUESTION 3

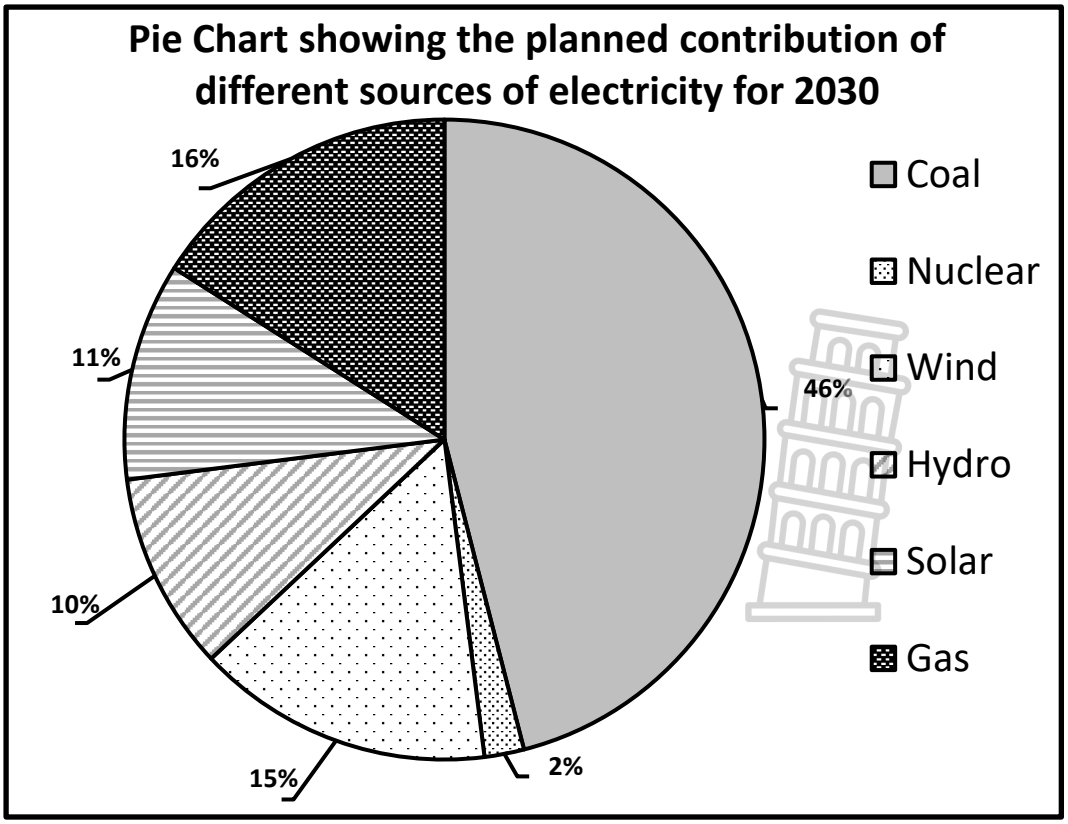
3.1 3.1.1 Coal ✓ (1)

3.1.2
- Burning coal releases carbon dioxide ✓
- Carbon dioxide is a greenhouse gas ✓
- An increase in carbon dioxide traps more heat in the atmosphere ✓
- This increases the atmospheric temperature ✓ (4)

3.1.3
- Coal is a non-renewable resource ✓/ there is a limited amount of coal / coal is expensive / it pollutes the atmosphere.
- Wind and solar power are free resources ✓ / cost of wind and solar generated electricity is lower / it does not pollute the environment. (2)

3.1.4 **Mark allocation**

Caption **(C)**	Caption has both dependant and independent variables	✓
Type of graph **(T)**	Pie chart drawn	✓
Calculations	1–5 calculations correct ✓ All 6 calculations correct ✓✓	✓✓
Portions correct size **(S)**	1–5 portion drawn to correct size ✓ All portions are drawn to correct size ✓✓	✓✓
Segments are labelled **(L)**	Labels on chart or in key	✓



(7)

3.1.5 16 – 0,8 ✓ = 15,2 ✓% (2)

3.2 3.2.1 Simple sampling ✓/ Quadrat method (1)

3.2.2 Samples should be random ✓
They should represent the whole area ✓ (2)

3.2.3 Average number of dandelions:

(22+3+7+4+15+0+3+0+12+3+0+14+4+7+2) ✓ / 15 = 6,4 ✓

Total number of dandelions:

$$\frac{6{,}4 \times 2\,500\ m^2\ ✓}{1\ m^2\ ✓} = 16\,000\ ✓ \text{ dandelion weeds}$$ (5)

3.2.4 To increase reliability ✓ (1)

3.2.5
- To know how much weedkiller/herbicide to use ✓
- To know how long it would take him to pull out all the weeds ✓

(Mark first ONE only) (Any 1 x 1) (1)

3.3

Developed country	Developing country
Good medical care ✓	Poor medical care ✓
Low birth rate ✓	High birth rate ✓
Low death rate ✓	High death rate ✓
High economic standards ✓/ high standard of living	Low economic standards ✓/ low standard of living

Table ✓ + (Any 2 x 2) (5)

3.4 3.4.1 Water seeps through the pyrite rock ✓
And dissolves the sulphur ✓ in the rock,
Forming sulphuric acid ✓ (3)

3.4.2
- It contaminates soil so that plants do not get the required nutrients to grow ✓
- It contaminates drinking water, disrupts the growth and reproduction of aquatic organisms ✓ (2)

3.4.3
- Lime must be mined ✓ which would cost more money ✓
- Slag is a waste product ✓ and is therefore free ✓/would not cost more (4)

3.4.4
- Causes thermal pollution ✓ (1)

3.5 3.5.1 **Alien plants** do not grow naturally in an area ✓
Indigenous plants grow naturally in an area ✓ (2)

3.5.2 They use a lot of water and nutrients and grow quickly ✓/ they have no predators and pathogens (1)

3.5.3 Chemical control ✓/ or example
Mechanical control ✓/ or example
Biocontrol ✓/ or example
(Mark first TWO only) (Any 2 x 1) (2)

3.5.4 It blocks out the sun light ✓
plants cannot photosynthesise ✓
reduces the oxygen in the water ✓
and causes organisms to die ✓* (4)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150