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education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 10

LIFE SCIENCES P2

NOVEMBER 2024

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages.

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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. Make 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 must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

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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 to 1.1.8) in your ANSWER BOOK, for example 1.1.9 D.

1.1.1 Which of the following is a biotic component?

A Soil
B Water
C Atmosphere
D Animals

1.1.2 The animal organ that pumps the blood to the rest of the body is known as …

A vein.
B heart.
C vena cava.
D artery.

1.1.3 The death of all individuals of a species in the world is known as …

A extinction.
B speciation.
C mortality.
D survival.

1.1.4 The correct sequence of the energy flow in terms of trophic levels, is:

A Primary consumers, producers, secondary consumers, tertiary consumers
B Producers, primary consumers, secondary consumers, tertiary consumers
C Tertiary consumers, producers, secondary consumers, primary consumers
D Secondary consumers, primary consumers, producers, tertiary consumers

1.1.5 A long geological period of a drastic decrease in temperature of the earth's surface and the atmosphere.

A Ice age
B Global warming
C Drought
D Climate change

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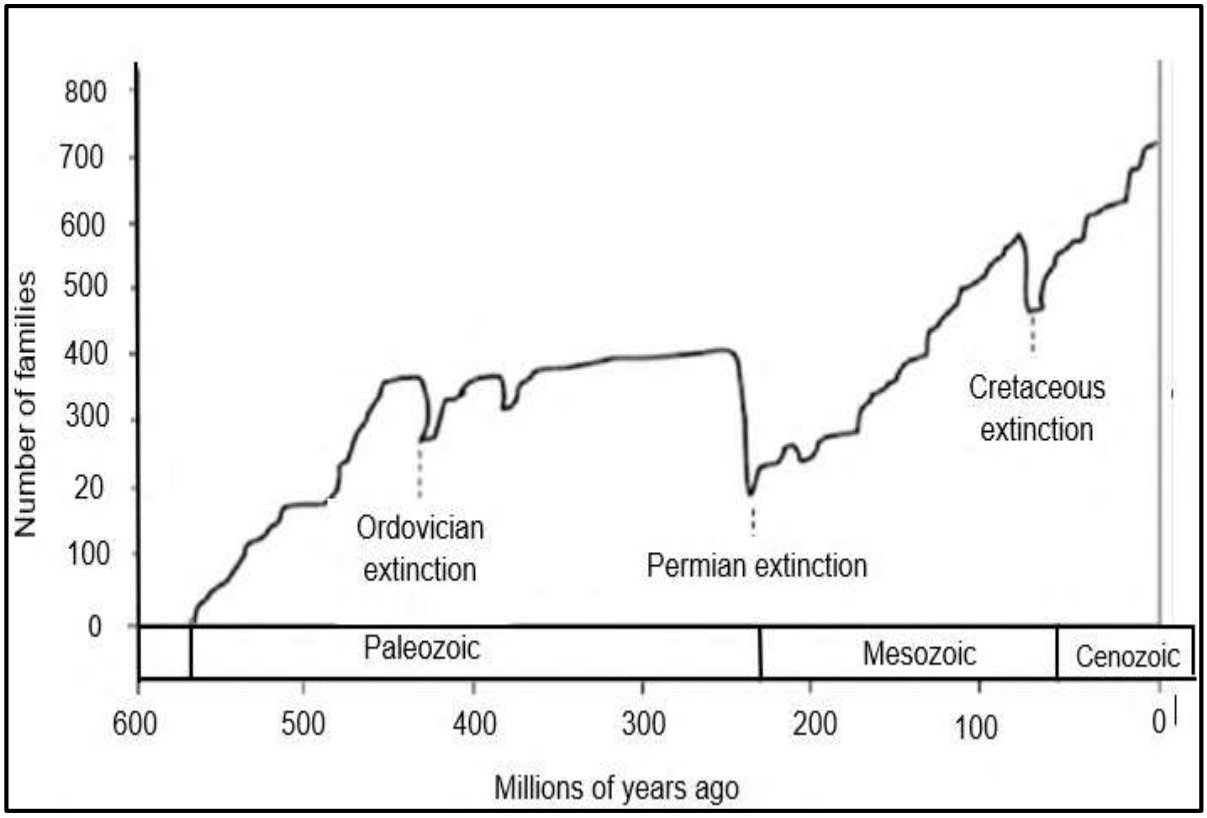
1.1.6 Variety of life forms that exist on earth

A Ecosystem
B Population
C Biodiversity
D Biome

QUESTIONS 1.1.7 and **1.1.8** are based on the diagram below.



1.1.7 The diagram above represents the …

A line graph.
B geological time scale.
C pedigree diagram.
D ordovician extinction graph.

1.1.8 In which era did the mass extinction cretaceous occur?

A Paleozoic era
B Mesozoic era
C Cenozoic era
D Permian extinction

(8 x 2) **(16)**

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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 1.2.7) in the ANSWER BOOK.

1.2.1 A blood vessel that supplies the heart tissues with oxygen and glucose

1.2.2 About 250 million years ago all continents were joint to one large continent known as …

1.2.3 The height of the land above the sea level

1.2.4 Part of the earth where living organisms occur and is a global sum of ecosystems

1.2.5 The position of an area in relation to the sun

1.2.6 A group of food chains arranged to show how feeding of organisms is connected

1.2.7 The process of finding out the ages of rocks and fossils using radioactive elements (7 x 1) **(7)**

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 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	To which kingdom does the lion belong	A: Animalia B: Plantae
1.3.2	Pumps the deoxygenated blood from the body to the lungs	A: Right ventricle B: Left ventricle
1.3.3	Type of fossil dating wherein sediment is laid down on top of each other and the oldest rock will be below the upper layers	A: Relative dating B: Radiometric dating
1.3.4	Abiotic factors	A: Light B: Temperature

(4 x 2) **(8)**

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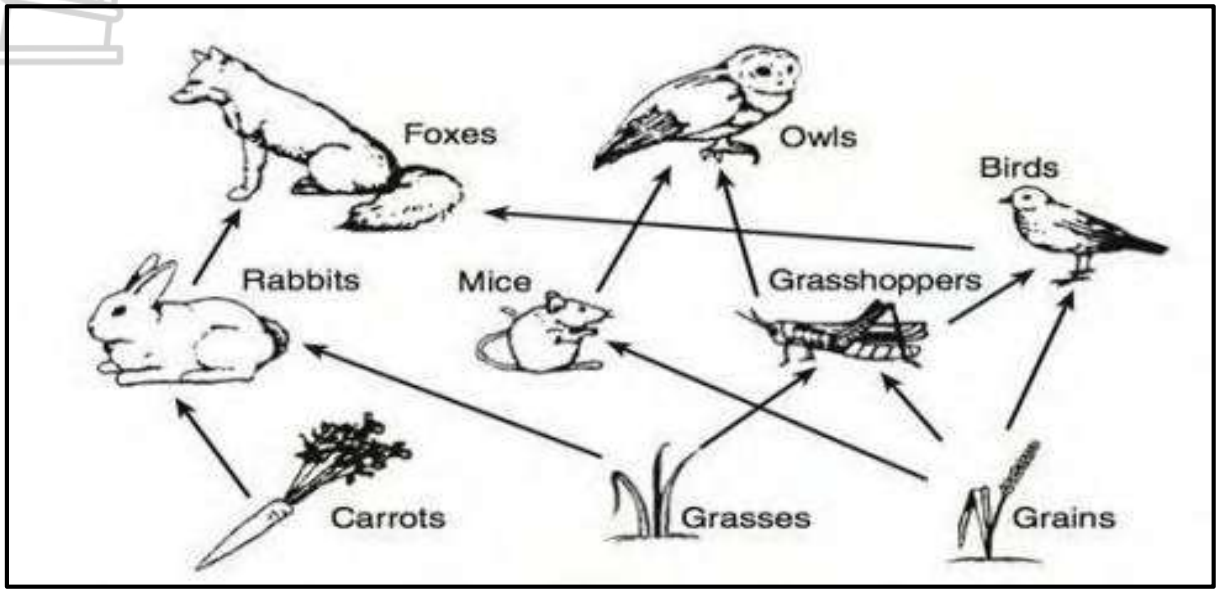
1.4 Organisms can be classified as eukaryotes and prokaryotes.

1.4.1 Tabulate THREE differences between eukaryotes and prokaryotes. **(7)**

1.5 The diagram below shows feeding relationships in an ecosystem.



1.5.1 Name the type of diagram shown. (1)

1.5.2 Define an *ecosystem.* (2)

1.5.3 Explain the changes that may result in the ecosystem if the carrots, grasses and grains are removed from the area. (2)

1.5.4 Draw a food pyramid to show three different trophic levels of organisms in the diagram above. (4)

1.5.5 Make a simple schematic diagram to show any THREE possible food chains from the diagram. (3)
(12)

TOTAL SECTION A: [50]

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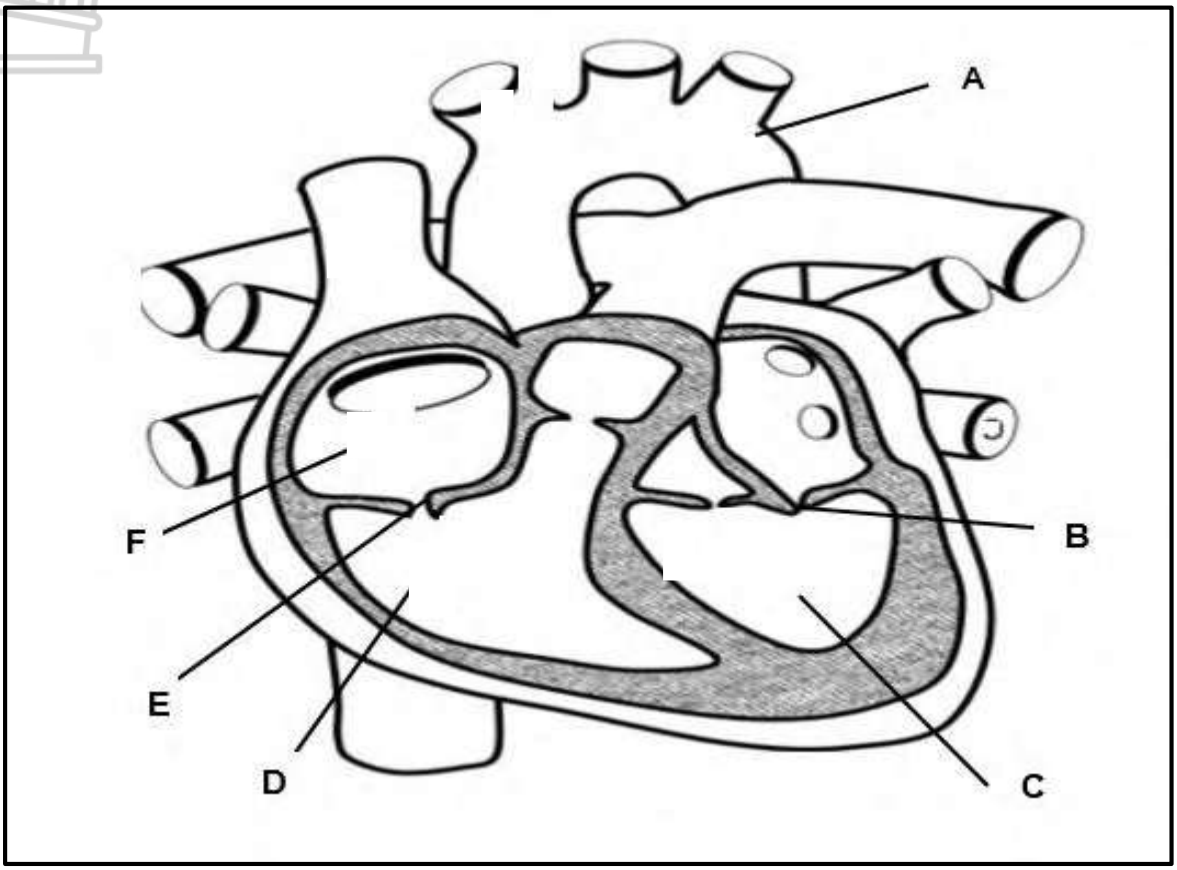
SECTION B

QUESTION 2

2.1 The diagram below shows the structure of a heart.



2.1.1 Identify the parts labelled **A, B** and **C**. (3)

2.1.2 Give a **LETTER** and a **NAME** of the part that:

(a) Receives blood from the superior vena cava. (2)

(b) Prevents backflow of blood from the right ventricle into the right atrium. (2)

2.1.3 Explain why the wall of part **C** is thicker than that of part **D**. (2)

2.1.4 Explain the meaning of a double, closed circulatory system. (2)

2.1.5 Describe the heart events of cardiac cycle during the general diastole. (5)
(16)

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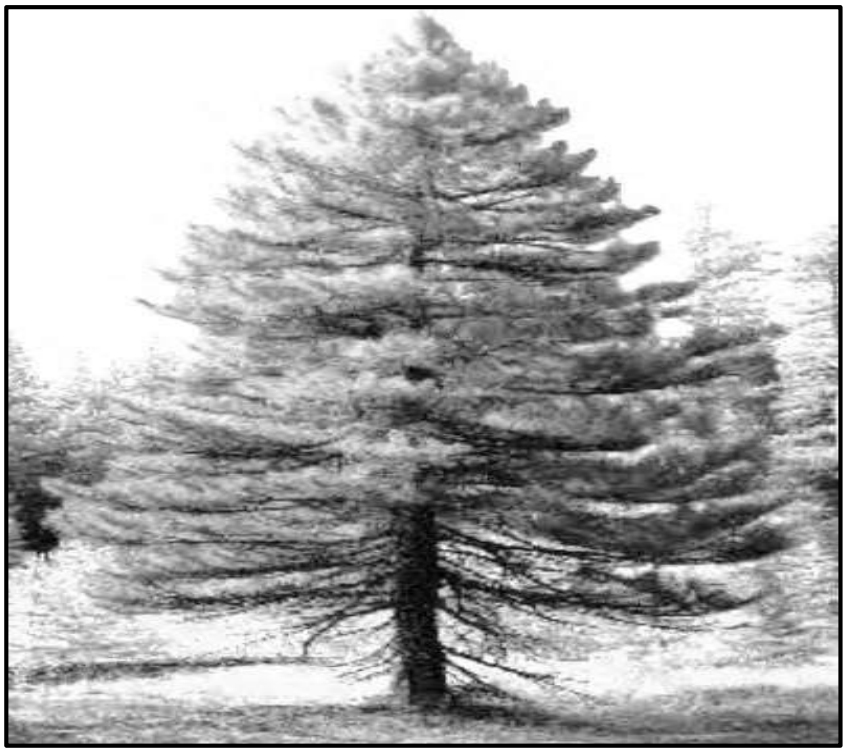
2.2 A plant commonly known as a Pine tree is classified as follows:
Plantae, Pteridophyta, Gymnospermae, Corniferales, Pinaceae, *Pinus, ponderosa*



2.2.1 Give the name of the scientist and the type of system he used to name organisms using the genus and the species. (2)

2.2.2 To which Kingdom, Order and Family does the Pine tree belong? (3)

2.2.3 Write the scientific name of the Pine tree. (2)

2.2.4 The five-kingdom system is the most common classification system that was proposed by Robert Whitaker in 1969.

In light with the above statement give 5 kingdoms that were proposed by Robert Whitaker. (5)
(12)

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2.3 Read the extract below.

> The Cape floral kingdom is the smallest of the world's floral kingdoms. It is home to more endemic (species that occur in one region and nowhere else in the world) and indigenous plants than in any other region in South Africa. Approximately 70% of the 9 000 plant species in this area are found nowhere else in the world. The vegetation of this biome, which is mostly small bushes, grows in nutrient poor soil.
>
> They also survive the long dry summer conditions, as well as frequent fires. The flora of the Cape is threatened, amongst others, by habitat destruction by humans. Already numerous species are extinct from this biome. Hence, its conservation is a national conservation priority. In a bid to save this biome, there are several projects aiming at encouraging responsible travel to natural areas in order to conserve the environment, as well as improving the well-being of local communities.

2.3.1 What does endemic species mean? (1)

2.3.2 Which biome is discussed by the extract above? (1)

2.3.3 What did the conservation group do in order to save this biome? (2)

2.3.4 Calculate the total number of species that are endemic to this biome. Show your working. (3)

2.3.5 Describe the type of climate and vegetation found at this biome. (3)
(10)

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2.4 Study the table below that shows the decay of carbon-14 over time.

DECAY OF CARBON-14							
Years from the present	0	5730	11460	17190	22920	**A**	34380
Number of half-lives elapsed	0	1	2	3	4	5	6
Percentage of original carbon-14 remaining	100	50	25	**B**	6.25	3.125	1.56

2.4.1 Name ONE type of a method used to determine the age of fossils other than carbon-14 dating. (1)

2.4.2 Find the value of:

(a) **A** (2)

(b) **B** (2)

2.4.3 Explain why it would not be possible to date a fossil which existed 80 million years ago using the decay of carbon-14. (2)

2.4.4 Describe how carbon-14 decay/radiometric dating is performed. (5)
(12)

[50]

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QUESTION 3

3.1 The table below shows the results of a study that investigated the effect of temperature and light on the yield of potatos in two greenhouses on a farm.

TEMPERATURE ^{O}C	AVERAGE YIELD OF POTATOS PER PLANT (KG)	
	LOW LIGHT LEVELS	HIGH LIGHT LEVELS
5	0,5	0,5
10	1,5	2,5
15	3	5
20	3,6	8,5
25	3,5	7,8
30	2,5	6,2

3.1.1 State TWO steps the investigator may have taken into consideration during the planning stage of the investigation. (2)

3.1.2 Identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.1.3 State TWO ways in which the scientists could have improved the reliability of the investigation. (2)

3.1.4 Plot bar graphs on the same system of axes showing the results of the average yield of the potatos from 20 ^{o}C to 30 ^{o}C for both light levels. (6)

(12)

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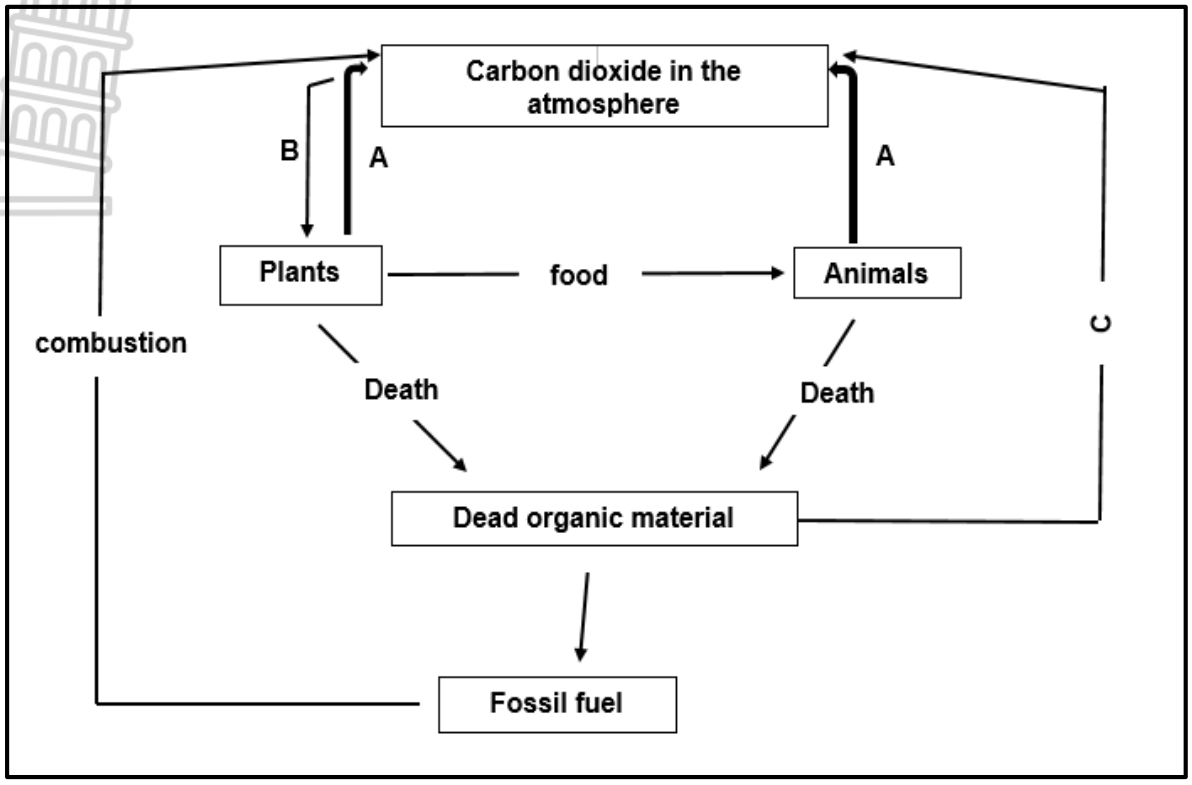
3.2 The diagram below shows the flow chart of a particular cycle.



3.2.1 Identify the type of cycle represented by the flow chart above. (1)

3.2.2 Identify processes labelled:

(a) **C** (1)

(b) **A** (1)

(c) **B** (1)

3.2.3 Explain how process A produces carbon dioxide. (2)

3.2.4 Briefly describe the type of cycle identified in QUESTION 3.2.1. (4)
(10)

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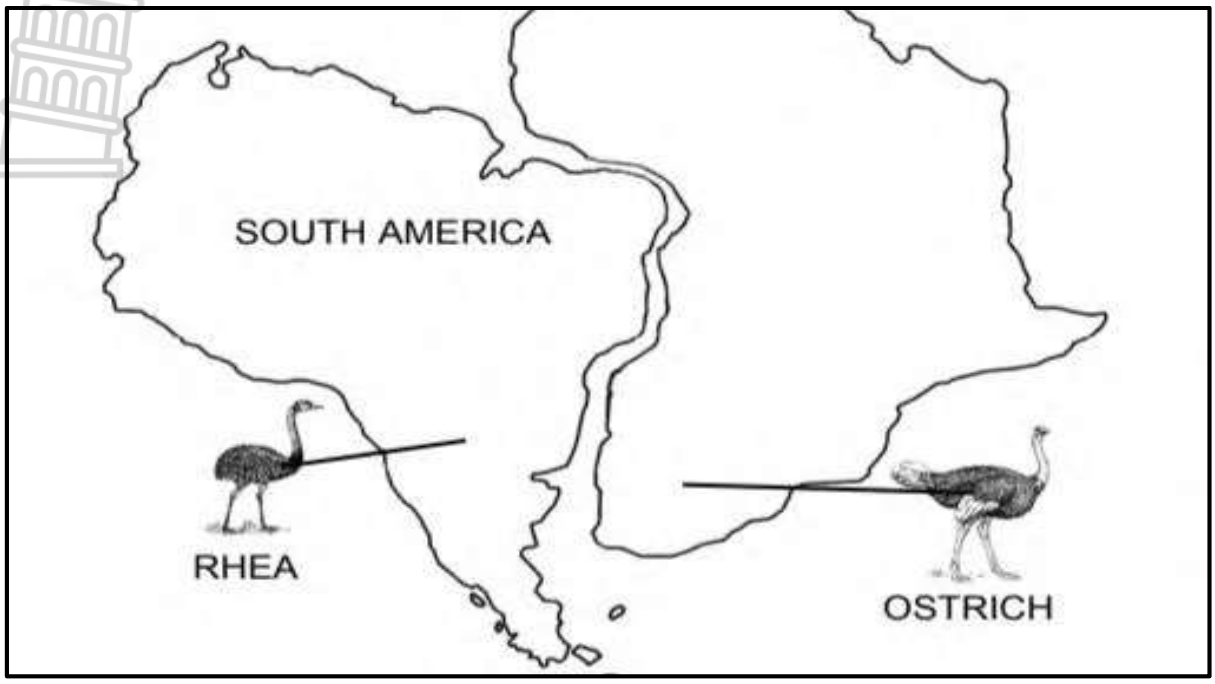
3.3 The diagram below shows how South America and Africa were once joined in the past.



3.3.1 Name the phenomenon that lead to the world to have separated continents. (1)

3.3.2 In which continent is Ostrich found? (1)

3.3.3 What is the unique characteristic that is common for Rhea and Ostrich? (1)

3.3.4 What do we call the study of the distribution of existing and extinct organism in different geographical areas? (1)

3.3.5 Mention the two major super continents that South America and Africa belonged to. (2)

3.3.6 Birds like the Rhea and Ostrich are different species, yet they share many similar characteristics. Explain how such similar birds ended up on continents separated by a vast ocean. (4)

(10)

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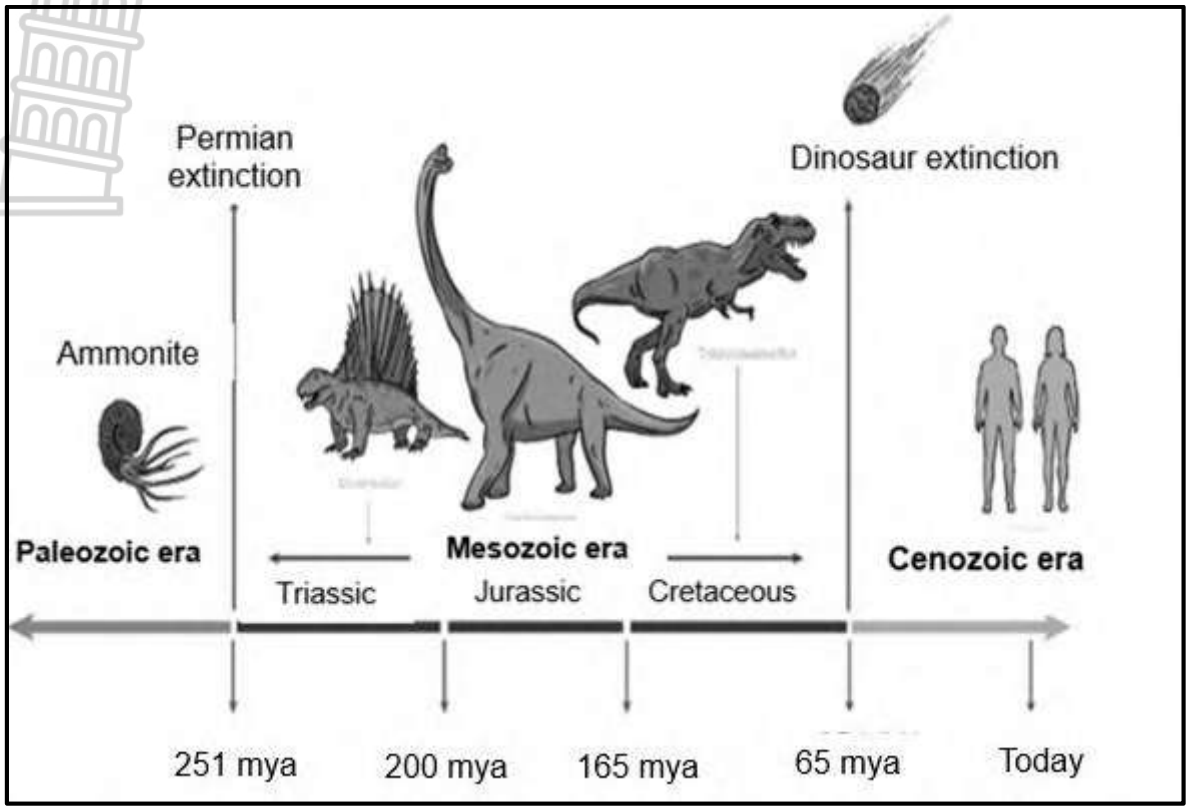
3.4 The diagram below shows geological events in millions of years ago (MYA).



3.4.1 Define *mass extinction*. (2)

3.4.2 When did the Dinosaur become extinct? (1)

3.4.3 In which Era did the Triassic, Jurrasic and Creataceous period belong? (1)

3.4.4 Explain how Dinosaurs might have became extinct. (3)

3.4.5 To which Era does the:

(a) Human beings live in (1)

(b) Sea animmone (ammonite) lived (1)

3.4.6 Which extinction took place toward the end of paleozoic era? (1)
(10)

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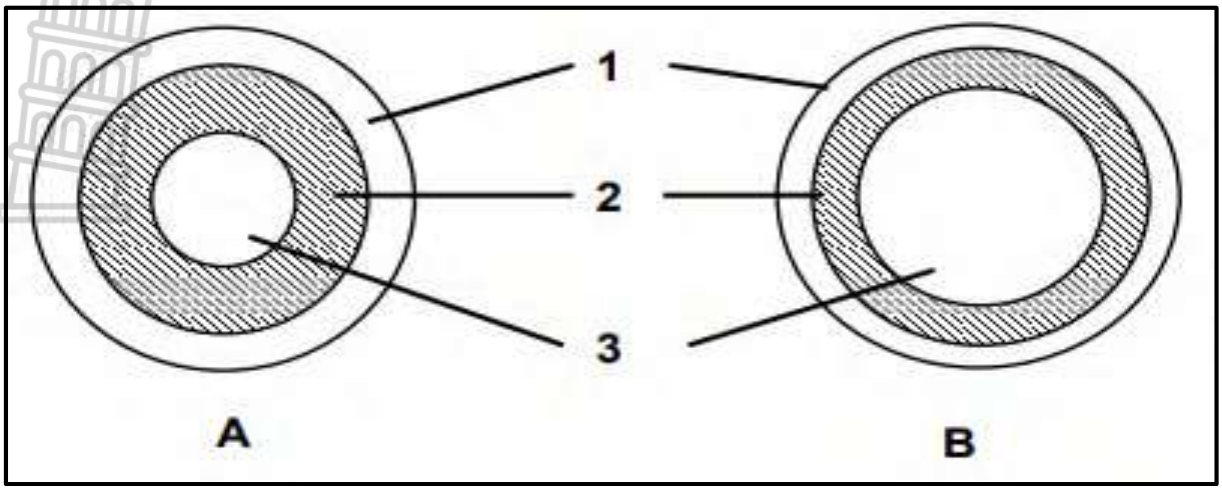
3.5 The diagram below shows a transverse section through two different blood vessels.



3.5.1 Which diagram represents:

(a) Artery (1)

(b) Vein (1)

3.5.2 Explain your answer to QUESTION 3.5.1 (a) (2)

3.5.3 Which blood vessel (A or B) has valves? (1)

3.5.4 Provide the labels for the parts numbered:

(a) **3** (1)

(b) **2** (1)

(c) **1** (1)
(8)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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Department:
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PROVINCIAL ASSESSMENT

GRADE 10

LIFE SCIENCES P2

NOVEMBER 2024

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 10 pages.

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PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. If more information than marks allocated is given

Stop marking when maximum marks are reached and put a wav 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 part of it is required

Read all and credit relevant part.

4. If comparisons are asked for and descriptions are given

Accept if 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-recognized abbreviations

Accept if first defined in answer. If not defined, do not credit the unrecognized abbreviation but credit the rest of answer if correct.

10. Wrong numbering

If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.

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SECTION A

QUESTION 1

1.1

1.1.1 D✓✓
1.1.2 B✓✓
1.1.3 A✓✓
1.1.4 B✓✓
1.1.5 A✓✓
1.1.6 C✓✓
1.1.7 B✓✓
1.1.8 B✓✓ (8 X 2) **(16)**

1.2

1.2.1 Coronary artery✓
1.2.2 Pangaea ✓
1.2.3 Altitude ✓
1.2.4 Biosphere ✓
1.2.5 Aspect✓
1.2.6 Food web✓
1.2.7 Radiometric dating✓ (7 x 1) **(7)**

1.3

1.3.1 A only✓✓
1.3.2 A only✓✓
1.3.3 A only✓✓
1.3.4 Both A and B✓✓ (4 x 2) **(8)**

1.4

1.4.1

T✓

Prokaryotes	Eukaryotes
Organisms with cells with no true nuclei✓	Organisms with cells that have true nuclei✓
Their genetic material /DNA is not enclosed by a nuclear membrane and occurs free in the cytoplasm✓	Their genetic material /DNA is enclosed by a nuclear membrane and occurs free in the cytoplasm✓
No true organelles occur in the cytoplasm✓	True organelles occur in the cytoplasm✓
Monera are prokaryotes✓	Protista, Fungi, Plantae and Animalia are eukaryotes✓

(7)

T : 1 and (3 x 2): 6

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1.5

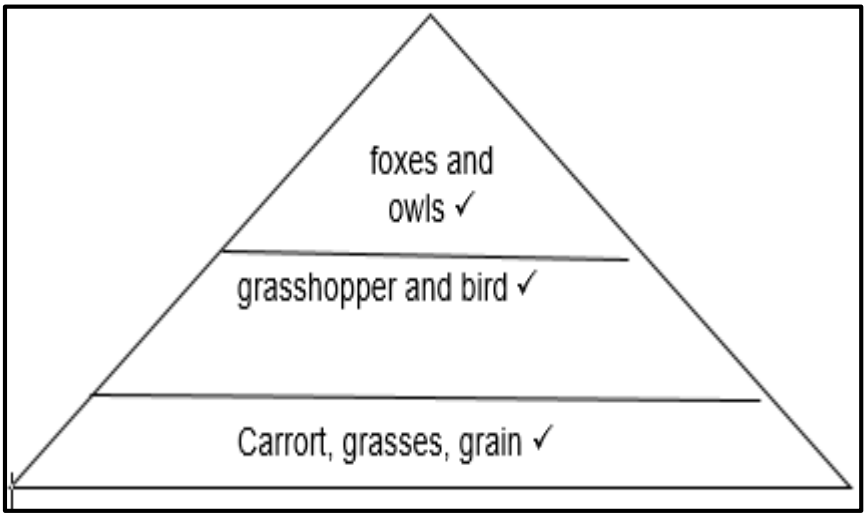
1.5.1 Food web ✓ (1)

1.5.2 An ecosystem is a particular area e.g. a pond, a forest etc. consisting of all different living organisms (biotic components) which interact with each other and their non-living environment (abiotic components). ✓✓ (2)

1.5.3 Rabbit, mice, grasshopper and bird will lack food✓ and die out✓ and as a result the foxes and owls ✓ Any 2 (2)

1.5.4

Correct diagram: ✓



(4)

1.5.5

- Carrots- rabbits-foxes✓
- Grasses-rabbits-foxes✓
- Grasses- grasshopper -birds✓
- Grains-mice-owls✓
- Grains – grasshopper- owls✓
- Grains-birds-foxes✓

Any 3 (3)

TOTAL QUESTION 1: 50

TOTAL SECTION A: 50

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SECTION B
QUESTION 2

2.1

2.1.1 A- Aorta ✓
B- Bicuspid valve ✓
C- Left ventricle ✓ (3)

2.1.2 (a) F✓- Right atrium ✓ (2)
(b) E✓- Tricuspid valve ✓ (2)

2.1.3 Part c pumps blood over a long distances/to all parts of the body✓ - whereas part D pumps blood over a short distances/to the lungs only✓ (2)

2.1.4 The heart pumps the blood firstly to the lungs, and the to the rest of the body✓ through blood vessels ✓ (2)

2.1.5 **During general diastole**
- the heart relaxes✓/ventricles and atria relax
- Deoxygenated blood enters the right atrium from the inferior and superior vena cava✓
- and oxygenated blood enters the left atrium from the pulmonary vein✓
- The tricuspid and bicuspid valves are open✓
- so blood also moves into the ventricles✓ (5)

(16)

2.2

2.2.1 Carl Linnaeus ✓ Binomial system ✓ (2)

2.2.2 Kingdom- Plantae ✓
Order – Corniferales ✓
Family – Pinaceae ✓ (3)

2.2.3 *Pinus ponderosa* ✓✓ **(correctly written Genus first letter in caps and species first letter small)** (2)

2.2.4 Monera✓
Protist✓
Fungi ✓
Plantae✓
Animalia✓ (5)

(12)

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2.3

2.3.1 Plant and animal species that are found in one region and nowhere else in the world✓ (1)

2.3.2 Fynbos ✓ (1)

2.3.3 There were several projects ✓aiming at encouraging responsible travel to natural areas in order to conserve the environment✓ (2)

2.3.4 $\frac{70}{100}$ ✓ x 9000 ✓= 6 300 ✓species (3)

2.3.5 Vegetation: of this biome, which is mostly small bushes✓ grows in nutrient poor soil✓
Climate: they also survive the long dry summer ✓ conditions, as well as frequent fires✓ Any 3 (3)
(10)

2.4

2.4.1 Relative dating✓ (1)

2.4.2 (a) **A**–28650✓✓ (2)
(b) **B**–2,5✓✓ (2)

2.4.3 After 60 million years✓ there is no more carbon-14 remaining✓ in the fossil (2)

2.4.4 **Radiometric dating**
● This type of dating uses different instruments to measure the radioactive elements ✓e.g. uranium, carbon etc. in fossils or rocks.
● The more the radioactive element in a fossil has decayed✓, the older the fossil. ✓
● For fossils older than 50 000 years the age of the rocks in which the fossils are embedded is determined. ✓
● Carbon 14 dating is used to measure the age of fossils that are younger than 50 000 years. ✓ (5)
[50]

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QUESTION 3

3.1

3.1.1 - Ask permission✓from the owner of the farm
- Deciding on the venue✓
- Deciding on the duration ✓
- Deciding how to vary the temperature in the greenhouses✓
- Deciding how to vary the light in the greenhouses ✓
- Deciding on the species of tomato plant✓
- Deciding on the measuring techniques✓
- Deciding on the measuring apparatus ✓
- Deciding on recording method✓

(MARK FIRST TWO ONLY) Any 2 (2)

3.1.2 (a) Temperature/Light ✓ (credit if only 1 is given) (1)
(b) Yield of potatos ✓ (1)

3.1.3 - Set up more plants in each greenhouse✓
- Repeat the investigation ✓ (2)

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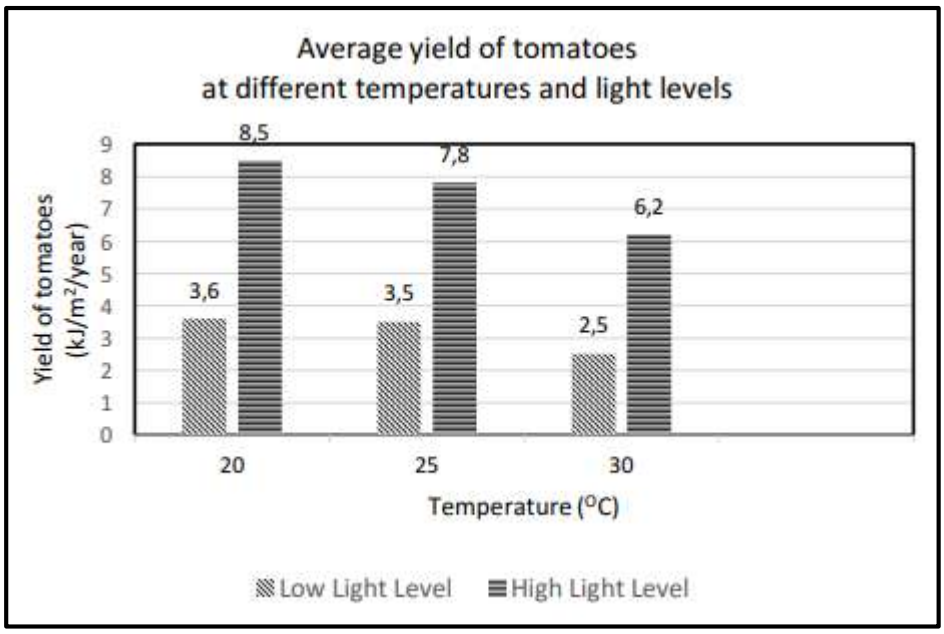
3.1.4



Correct type of graph **(T)**	1
Caption **(C)**	1
Correct labels for X-axis and Y-axis including correct units **(L)**	1
Correct scale for X-axis (correct width and spacing of bars) and Y-axis **(S)**	1
Plotting of bars **(P)**	1: 1-5 bars plotted correctly 2: All 6 bars plotted correctly

(6)
(12)

3.2

3.2.1 Carbon cycle ✓ (1)

3.2.2 (a) **C** - Decomposition ✓ (1)
(b) **A** - Cellular respiration✓ (1)
(c) **B** - Photosynthesis ✓ (1)

3.2.3 Cellular respiration – organic compounds in plants and animals are broken down✓ in the presence of oxygen✓ and energy, water and carbon dioxide are released. (2)

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3.2.4 ●Carbon occurs in the form of carbon dioxide✓ (CO2) in the atmosphere✓/some is dissolved in water.
●Green plants use carbon dioxide during photosynthesis ✓to produce organic compounds✓/carbohydrates.
●The carbon which forms part of organic compounds in plants is transferred to animals when they eat plant material✓
●Sometimes dead plant and animal remains do not decompose but are fossilised to form fossil fuels✓ (coal and oil). Any 4 (4)

(10)

3.3

3.3.1 Continental drift✓ (1)

3.3.2 Africa✓ (1)

3.3.3 Both flightless✓ / they are flightless birds (1)

3.3.4 Biogeography ✓ (1)

3.3.5 Laurasia ✓ and Gondwanaland ✓ (2)

3.3.6 Both have developed from a common ancestor✓ that lived in the on the same continent✓Gondwanaland then they both became separated ✓ when South America and Africa broke apart due to continental drift✓ (4)

(10)

3.4

3.4.1 Extinction that occurs when many species disappear✓over the same period of time. ✓ (2)

3.4.2 65 MYA✓ **(units must be there)** (1)

3.4.3 Mesozoic✓ Era (1)

3.4.4 The common theory is that the giant meteor hit the earth✓ (as seen in the diagram), filling the atmosphere with deadly gas✓, vapourised rock and dust✓. Other factors like asteroid ✓and volcanic eruptions ✓may be considered Any 3 (3)

3.4.5 (a) Cenozoic ✓ (1)
(b) Paleozoic ✓ (1)

3.4.6 Permeian extinction ✓ (1)

(10)

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3.5

3.5.1	(a) Diagram A✓	(1)
	(b) Diagram B✓	(1)
3.5.2	- It has thick muscular wall✓to withstand the pressure exerted by the pumping action of the heart✓ - The lumen is smaller in diameter✓to facilitate faster movement of blood✓/Creates higher pressure Any (2 x 1)	(2)
3.5.3	Diagram B✓	(1)
3.5.4	(a) Lumen ✓	(1)
	(b) Muscle ✓layer	(1)
	(c)connective✓ tissue	(1)
		(8)
		[50]

TOTAL SECTION B:	**100**
GRAND TOTAL:	**150**

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