

PHOENIX NORTH LIFE SCIENCES CLUSTER

FINAL EXAMINATIONS 2019

GRADE 10

LIFE SCIENCES PAPER 2



DURATION: 2½ HOURS
MARKS: 150
EXAMINER: GROVE END SECONDARY
MODERATOR: GREENBURY SECONDARY

DATE OF EXAMINATION: 12 NOVEMBER 2019

NB: This question paper consists of 14 typed pages including this cover page and FOUR compulsory questions.

INSTRUCTIONS AND INFORMATION

READ THESE INSTRUCTIONS CAREFULLY BEFORE ANSWERING THE QUESTIONS.

1. Answer ALL the questions.
2. Number the answers correctly according to the numbering system used in this question paper.
3. Present your answers according to the instructions of each question.
4. Marks will be deducted for untidy, illegible work and poor spelling
5. Do ALL drawings in pencil and label them in blue or black ink.
6. Draw diagrams or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily be 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.

SECTION A**QUESTION 1**

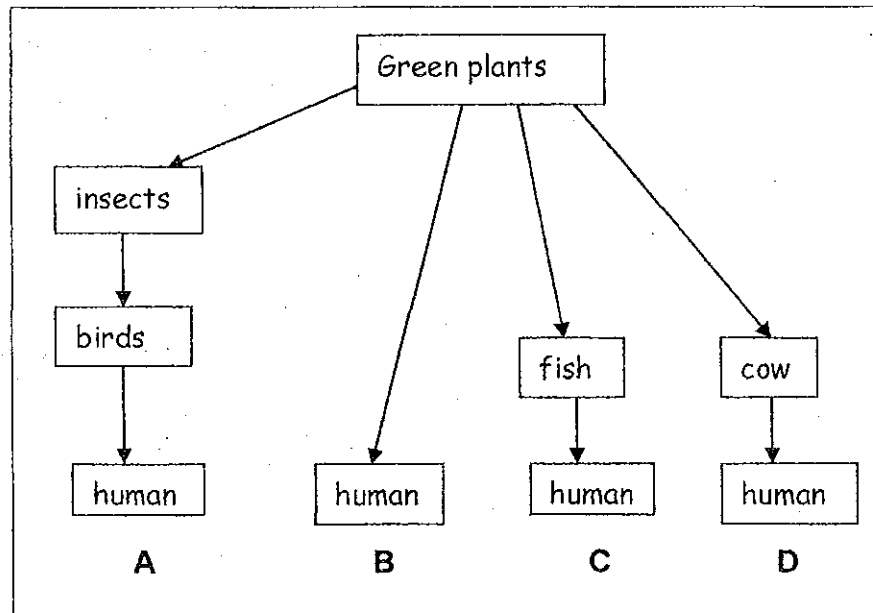
- 1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1. to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.
- 1.1.1 The abiotic factor needed by all plants and animals for respiration is...
- A carbon dioxide
 - B water vapour
 - C oxygen
 - D nitrogen
- 1.1.2 Which one of the following is NOT an abiotic factor?
- A decomposers
 - B water
 - C light
 - D soil
- 1.1.3 The narrowest blood vessel in the body is the...
- A Artery
 - B Lymph vessel
 - C Vein
 - D Capillary
- 1.1.4 The type of rock where fossils are mostly found is the...
- A igneous
 - B sedimentary
 - C metamorphic
 - D lava
- 1.1.5 A person who studies fossils is a/an...
- A archaeologist
 - B palaeontologist
 - C anthropologist
 - D radiologist

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1.1.6 There are no living members of trilobites and dinosaurs on the earth, therefore these are said to be...

- A Rare
- B Vulnerable
- C Extinct
- D Endangered

1.1.7 Which of the following pathways transfers the most energy to humans?

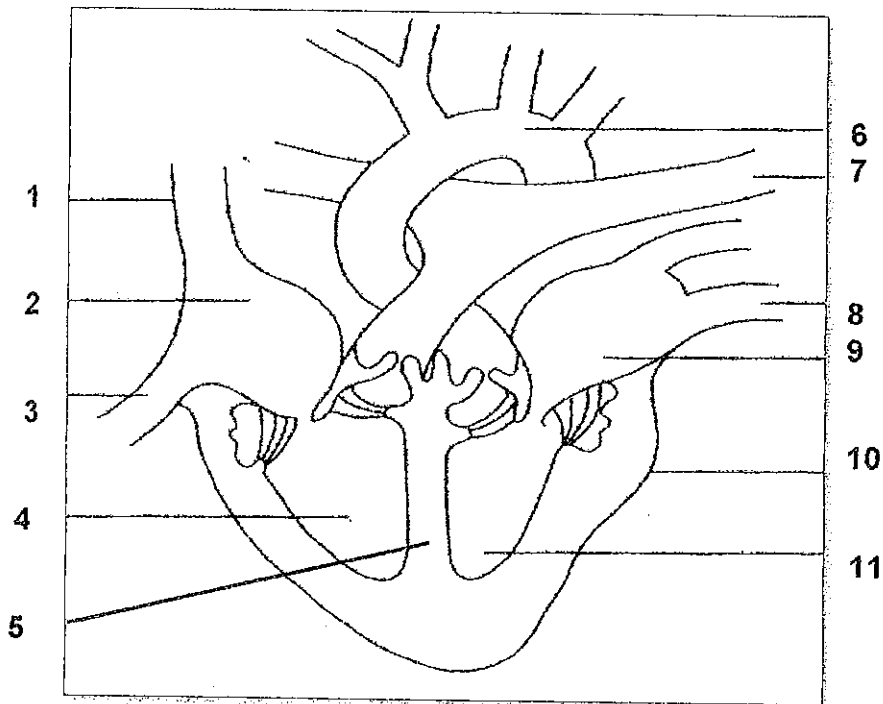


- A Pathway A
- B Pathway B
- C Pathway C
- D Pathway D

1.1.8 A jackal hunts, kills and eats a mouse, therefore the jackal is called a...

- A Producer
- B Prey
- C Predator
- D Scavenger

The diagram below shows the longitudinal section of the human heart. Refer to the diagram for Question 1.1.9 and Question 1.1.10



1.1.9 The part that prevents the mixing of oxygenated and deoxygenated blood is...

- A 2
- B 4
- C 5
- D 10

1.1.10 The largest artery in the body leaves from this chamber...

- A 2
- B 4
- C 9
- D 11

(10x2)

(20)

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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 - 1.2.10) in the ANSWER BOOK.

1.2.1 The gas that makes up the highest percentage of the atmosphere

1.2.2 Organisms that do not have a true nucleus or cell organelles

1.2.3 The process of forming large sheets of ice on Earth

1.2.4 The double - walled sac which surrounds the heart

1.2.5 Several food chains linked to one another

1.2.6 Height above sea level

1.2.7 Animals that consume meat only

1.2.8 The remains of organisms that have been preserved in rocks

1.2.9 The sorting and grouping of things according to similarities and differences

1.2.10 Abiotic factors that include aspect, slope and altitude

(10 x 1) (10)

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 number (1.3.1 to 1.3.5) in the ANSWER BOOK.

COLUMN I	COLUMN II	
1.3.1 Species that do not occur naturally in a habitat	A	Alien
	B	Indigenous
1.3.2 Plants adapted to live in very dry conditions	A	Mesophytes
	B	Hydrophytes
1.3.3 The scientist who suggested the five-kingdom classification	A	Whittaker
	B	Darwin
1.3.4 The blood vessel that takes waste substances away from the heart muscle itself	A	Coronary artery
	B	Coronary vein
1.3.5 Transports oxygenated blood from the lungs to the heart	A	Pulmonary artery
	B	Pulmonary vein

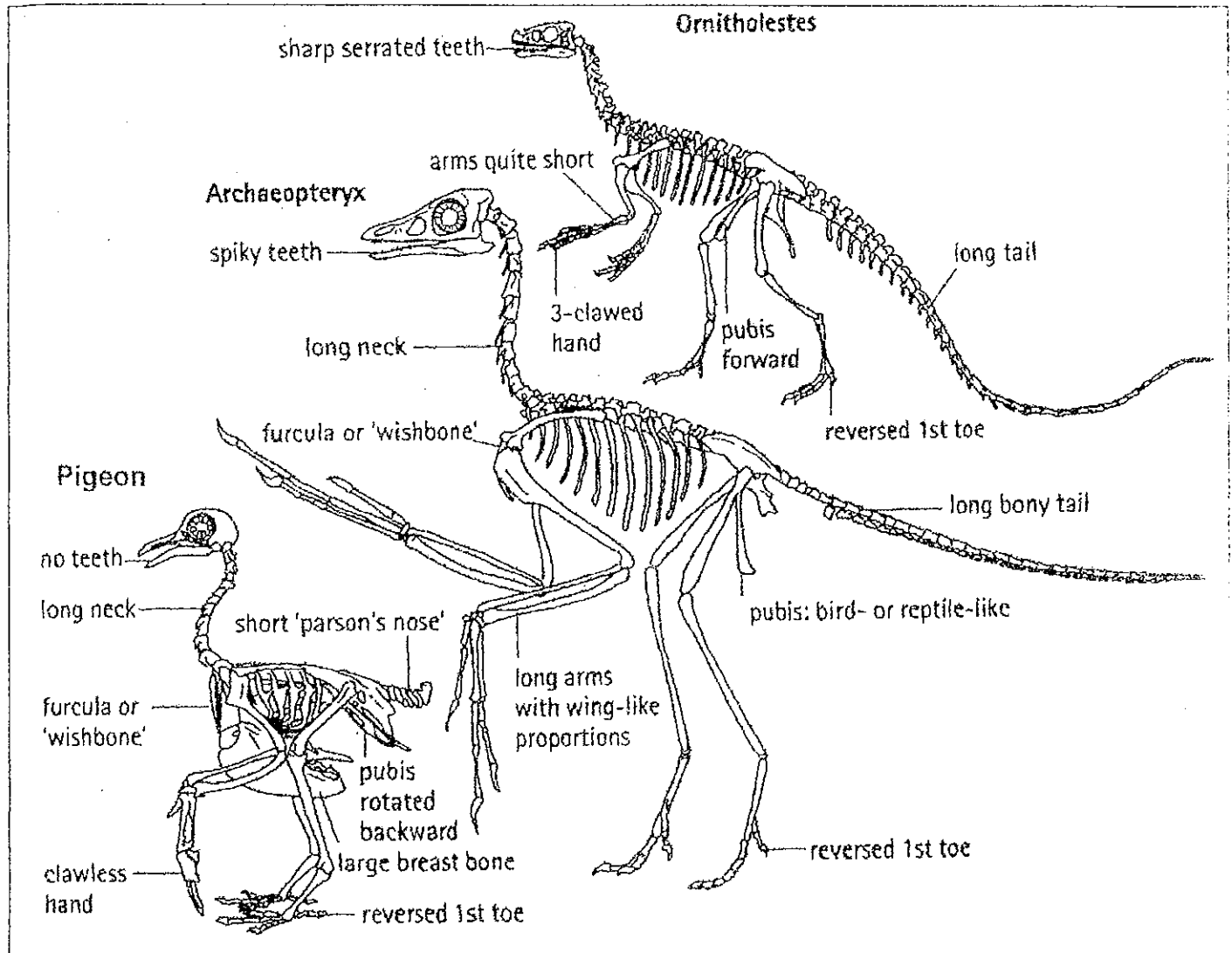
(5x 2)

(10)

Please turn over

- 1.4. *Archaeopteryx* is an early prehistoric bird dating from about 150 million years ago. A total of eight fossils of *Archaeopteryx* have been found in Germany. It lived during the Jurassic period when many dinosaurs lived. *Archaeopteryx* seemed to be part bird and part dinosaur.

Study the following diagram and answer the questions that follow.



- 1.4.1. List THREE similarities only shared between *Ornitholestes* (dinosaurs) and *Archaeopteryx*. (3)
- 1.4.2. Tabulate TWO differences between a pigeon and the *Archaeopteryx*. (2)
- 1.4.3. "*Archaeopteryx* seemed to be part bird and part dinosaur."
Explain the significance of this. (1)

TOTAL SECTION A: (6)

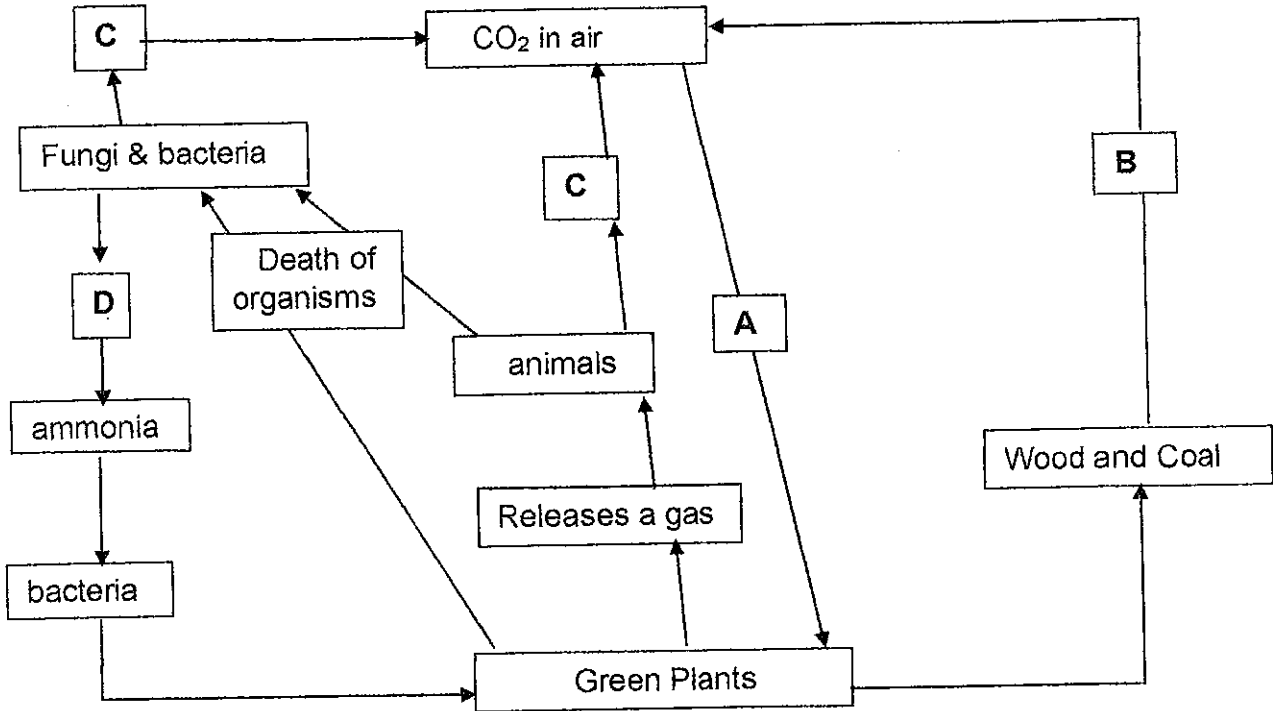
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SECTION B

QUESTION 2

2.1 The flow diagram below shows parts of two important nutrient cycles in the environment.



2.1.1 Name the two cycles. (2)

2.1.2 Name the process represented by...

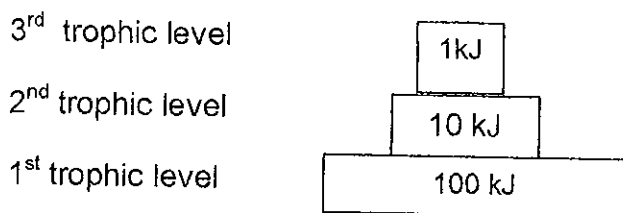
- (a) **A**
- (b) **B**
- (c) **C**
- (d) **D**

(4)

2.1.3 State TWO effects of deforestation on the environment. (2)

(8)

- 2.2 A food pyramid is shown below for a simple food chain involving a rabbit, a fox and grass. The pyramid shows how much energy (in kilojoules) is passed on at each trophic level.



- 2.2.1 Which of the organisms will occupy the...
- first trophic level? (1)
 - second trophic level? (1)
 - third trophic level? (1)

- 2.2.2 Calculate the percentage of energy that is transferred from the first trophic level to the third trophic levels. Show ALL working. (2)

- 2.2.3 List TWO reasons for a loss of energy from trophic level 2 to trophic level 3 (2)

- 2.2.4 It had been found that there was a high percentage of "DDT" in the tissues of tertiary consumers in a river ecosystem. Account for this high percentage of DDT in the tissues of these consumers.

[Hint: DDT is an insecticide that is non-biodegradable] (2)

- 2.3 Three soil samples, taken from different regions, were analysed for air content, permeability to water and humus content. The results are as follows:

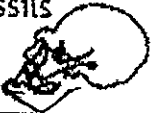
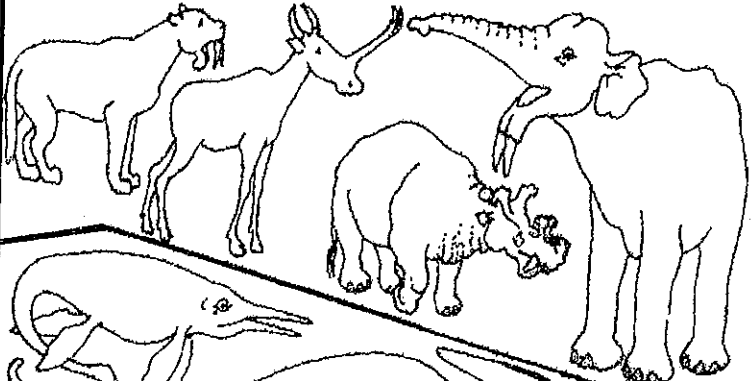
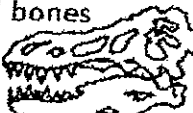
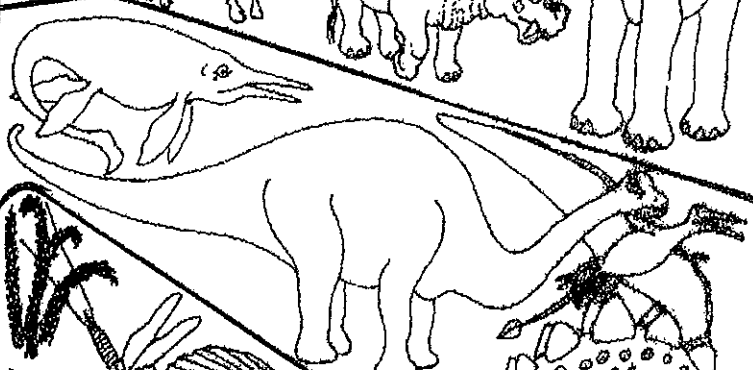


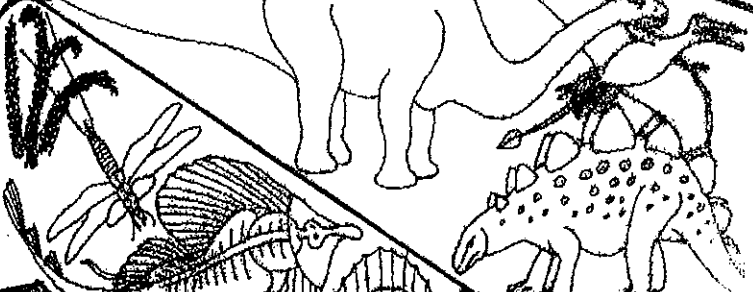


SOIL SAMPLE	A	B	C
Air content (%)	30	10	60
Permeability to water (ml of water passing through 100g of soil per minute)	20	5	70
Humus content (%)	25	10	5

- 2.3.1 From the table above, identify which soil type is ...
- loam (1)
 - clay (1)
 - sand (1)

- 2.3.2 Use the results in the table to explain the disadvantage of soil sample C for growing plants. (2)

- 2.3.3 State TWO characteristics of the soil in the sample B that resulted in its low permeability to water. (2)
- 2.3.4 Discuss the advantage of having humus in the soil. (3)
(10)
- 2.4 Thando wanted to determine whether ferns prefer to grow in the shade or in direct sunlight. She planted TEN young fern plants of the same species on both sides of the school's buildings. The south side of the buildings had shade while the north side was sunny. She also watered the plants regularly with the same amount of water each time.
- 2.4.1 Write a suitable hypothesis for the Thando's investigation. (2)
- 2.4.2 State the independent variable of this investigation. (1)
- 2.4.3 List TWO factors, other than the number of young fern plants, that Thando must have kept constant in her investigation. (2)
- 2.4.4 State ONE way how Thando can increase the reliability of her results. (1)
(6)

2.5 Study the geological time scale below and answer the questions that follow.

End of Period	PERIOD	Examples of Fossils	
2,8 mya	Tertiary	mammal fossils 	
65 mya	Cretaceous	dinosaur bones 	
144 mya	Jurassic		
213 mya	Triassic		
248 mya	Permian	ammonites s 	
286 mya	Carboniferous	fossil fern ? 	
360 mya	Devonian		
408 mya	Silurian	trilobites s 	
430 mya	Ordovician		
505 mya	Cambrian		

2.5.1 In which period would you find fossils of human species? (1)

2.5.2 From the beginning of which period were fern and reptile fossils found? (2)

2.5.3 For how long did the trilobites live on earth?
Show all working. (2)

[NB: Cambrian period originated 570 mya]

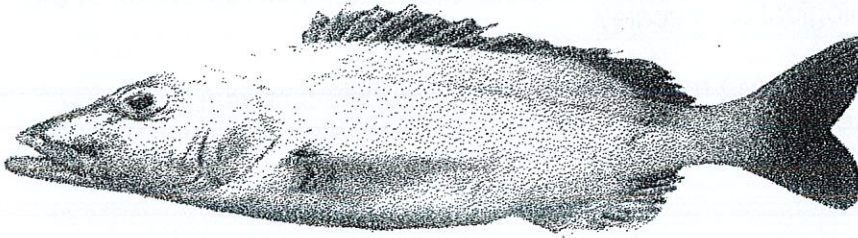
2.5.4 Around 250 million years ago most marine invertebrates, like the ammonites, became extinct as the world's continents were all joined to form one huge land mass.

(a) Which period did this event take place in? (1)

(b) Name the huge single landmass that was formed at this time? (1)

QUESTION 3

3.1 Read the following information and answer the questions.



The picture above shows *Petrus rupestris*, commonly known as the red steenbrass. This fish is the largest member of the seabream family (Sparidae) and is endemic to South Africa.

Adapted from Daily news May 2014

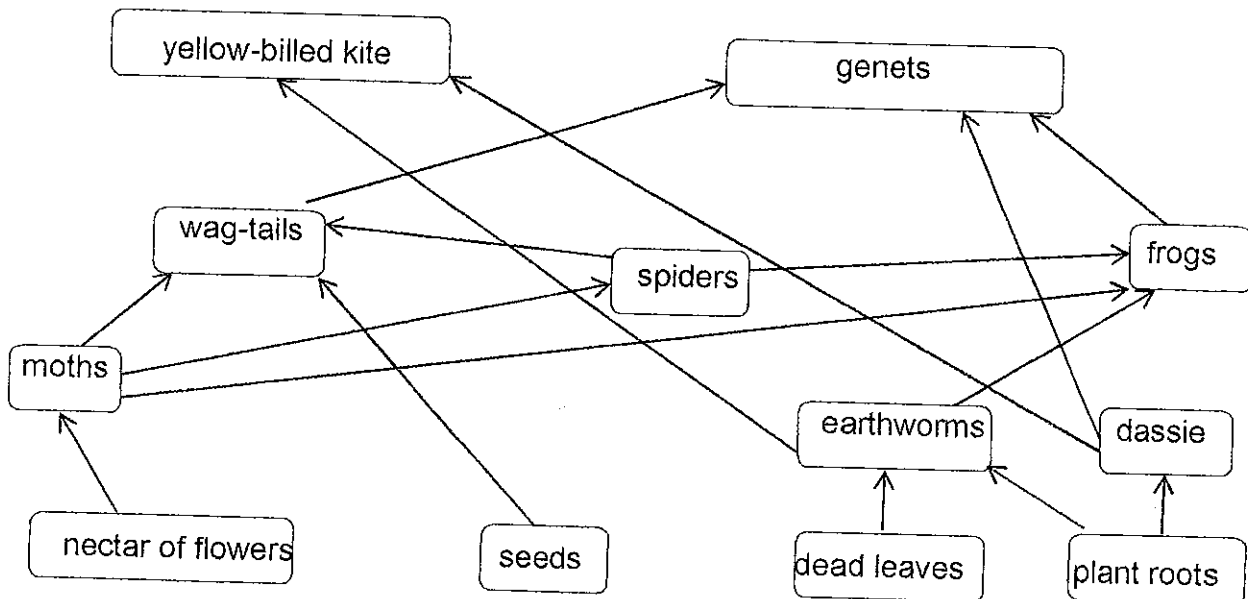
- 3.1.1. Provide each of the following for the "red steenbrass":
- (a) genus name (1)
 - (b) species name (1)
- 3.1.2. Name the scientist who developed the type of naming system used in the passage above. (1)
- 3.1.3. What is the specific name given to this type of naming system? (1)
- 3.1.4. Suggest TWO ways in which the government can assist in protecting this fish species from becoming endangered. (2)

3.2 The table below shows the number of families that existed in the different time periods.

Number of Years Ago (mya)	Number of Families
550	70
450	410
400	410
365	350
320	400
210	270
70	600
5	720

- 3.2.1 Draw a line graph that represents the data. (6)
- 3.2.2 How many times was there a decrease in the number of families in the graph? (1)
- 3.2.3 What do these drops in the number of families represent, in the geological time scale? (1)
- 3.2.4 Explain TWO reasons scientists suggest as causes for many species of organisms to die out in relatively short periods of time in the history of life on Earth. (4)
- (12)**

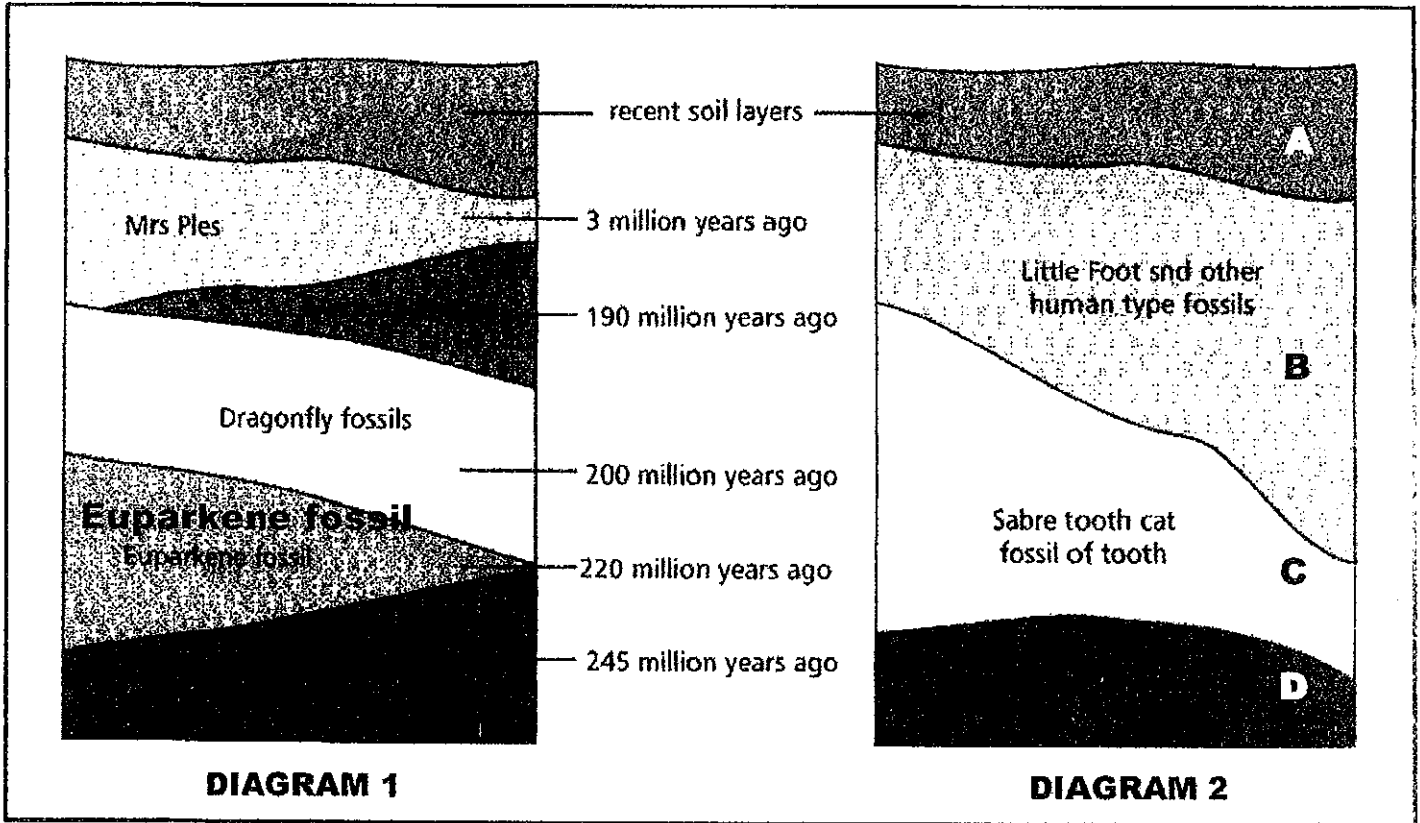
3.3 Study the food web in a forest habitat and answer the questions.



- 3.3.1 Identify TWO sources of nutrition the animals in this food web obtained from plants (2)
- 3.3.2 Name TWO herbivores from the food web. (2)
- 3.3.3 Wag-tails are versatile feeders. What is the advantage of this to the survival of these birds? (2)
- 3.3.4. Illustrate ONE food chain consisting of at least FOUR organisms and must include earthworms. (2)
- 3.3.5. Explain what effect the disappearance of all the frogs will have on this food web. (2)
- (10)**

3.4. The two diagrams below show layers of rock found in different parts of South Africa. The first, (Diagram 1) is an area that has had the rocks in it dated by both relative and absolute dating methods.

Use the information in the two diagrams and answer the questions.



3.4.1 Refer to **Diagram 1** and answer the questions that follow.

- (i) How old is the oldest layer of rocks? (1)
- (ii) Identify the youngest layer of rocks. (1)
- (iii) Fossils are found in three time periods. State the range of time span during which these fossils were formed. (2)
- (iv) Name the youngest fossil. (1)

3.4.2 Determine the age of the sabre tooth cat fossil in **Diagram 2**? (2)

3.4.3 Name TWO methods scientists use to determine the age of fossils. (2)

3.4.4 (a) What is fossil tourism (1)

(b) Mention TWO benefits of fossil tourism. (2)

(12)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

4.1 Write an essay describing the events taking place during one cardiac cycle

AND explain how the heart is structurally suited to perform its function.

Content (17)

Synthesis (3)

(20)

TOTAL SECTION C: 20

GRAND TOTAL: 100

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MARKING MEMORANDUM
LIFE SCIENCES - GRADE 10 - P2
NOVEMBER EXAMINATIONS - 2019

SECTION A

QUESTION 1

1.1.1 C✓✓	1.2.1 nitrogen ✓
1.1.2 A✓✓	1.2.2 prokaryotic/ prokaryote✓
1.1.3 D✓✓	1.2.3 ice age/ glaciation✓
1.1.4 B✓✓	1.2.4 pericardium✓
1.1.5 B✓✓	1.2.5 food web✓
1.1.6 C✓✓	1.2.6 altitude✓
1.1.7 B✓✓	1.2.7 carnivores✓
1.1.8 C✓✓	1.2.8 fossils✓
1.1.9 A✓✓C✓✓	1.2.9 classification✓
1.1.10 D✓✓ (2 X 10) (20)	1.2.10 physiographic✓ (10 x 1) (10)

- 1.3.1 A only✓✓
- 1.3.2 None✓✓
- 1.3.3 A only✓✓
- 1.3.4 B only✓✓
- 1.3.5 B only✓✓ (5 X 2) (10)

- 1.4.1 - Long tail✓
 - Clawed hands✓
 - Spiky /sharp/ serrated teeth✓
 (mark first 3 only) (3)

1.4.2 ✓-table

Pigeon	Archaeopteryx	
1. Short parson's nose	Long tail	✓✓
2. No teeth	Spiky teeth	✓✓
3. Pubis rotated backwards	Pubis: bird-like or reptile-like	✓✓
4. A large breast bone	No breast bone	✓✓

Any 2 x2 (mark first 2 differences only) (5)

- 1.4.3 - This is a transitional fossil ✓
 - Is evidence for evolution✓ / or
 Showing intermediate forms of a species (2)
 (10)

TOTAL SECTION A: 50

Please turn over

- 2.3.1 a) soil sample A ✓
b) soil sample B ✓
c) soil sample C ✓

(1)
(1)
(1)

- 2.3.2 Soil water retention is low/ high water permeability ✓
Because of large air spaces ✓/or

Humus content is too low ✓
Therefore less nutrients in soil ✓

(any 1x2) (2)

- 2.3.3 Tiny particles/ grains/ compact ✓
Very little air spaces ✓

(2)

- 2.3.4 - Humus is the organic component ✓ of soil/ dead organic matter
- formed by decomposition of dead ✓ leaves/ plant and animal matter
- improving the mineral content of the soil. ✓

(3)
(10)

- 2.4.1 Ferns prefer to grow in shade ✓ ✓ OR
Ferns prefer to grow in sunlight ✓ ✓ OR
Fern growth is unaffected by change in light intensity ✓ ✓

(2)

- 2.4.2 Light (intensity) ✓

(1)

- 2.4.3 - same amount of water used to water the plant ✓
- same time of day for watering the plant ✓
- same species of fern ✓

(2)

(mark first 2 only)

- 2.4.4 increase the sample size ✓ /increase the number of plants planted ✓

(1)
(6)

- 2.5.1 Tertiary ✓

(1)

- 2.5.2 Devonian ✓

(2)

- 2.5.3 570 mya - 408 mya = 162 ✓ mya ✓

(2)

- 2.5.4 (a) Permian ✓

(1)

- (b) Pangea ✓

(1)

(7)

TOTAL : 40

SECTION B

QUESTION 2

- 2.1.1 - the carbon cycle ✓
- the nitrogen cycle ✓

(mark first 2 only) (2)

- 2.1.2 a) photosynthesis ✓
b) combustion ✓
c) respiration ✓
d) ammonification ✓ / *decomposition*

(1)
(1)
(1)
(1)

- 2.1.3 - Deforestation will result in barren and exposed land ✓ / desertification ✓
- resulting in soil erosion ✓
- and food sources removed ✓
- CO₂ build up in the atmosphere ✓
- increase in global warming ✓
- Reduces biodiversity ✓
- Habitat destruction ✓
- Affects carbon cycle ✓
- Affects oxygen cycle ✓
- Affects water cycle ✓

(mark first 2 only) (any 2) (2)

(8)

- 2.2.1 a) Grass ✓
b) Rabbit ✓
c) Fox ✓

(1)
(1)
(1)

$$2.2.2 \frac{1}{100} \times \frac{100}{1} = 1 \% \checkmark$$

(2)

- 2.2.3 Energy is lost through:

- Respiration ✓ / movement ✓ / growth ✓ / maintenance ✓ /
reproduction ✓ / faeces ✓ / urination ✓ / metabolic wastes ✓

(mark first 2 only) (2)

- 2.2.4 - it accumulates ✓ in the organisms body at each trophic level ✓

(2)

(9)

QUESTION 3

3.1.1 a) *Petrus* ✓ (mark wrong if spelling is incorrect)
 b) *rupestris* ✓

3.1.2 Carolus Linnaeus ✓

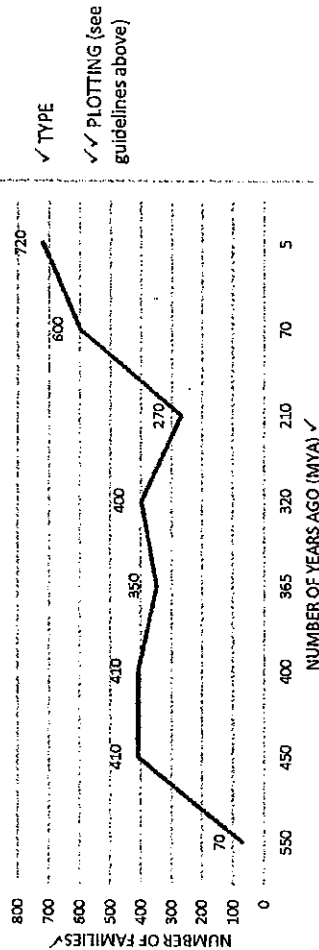
3.1.3 Binomial nomenclature ✓ / two name system ✓ (1)

3.1.4 - Introduce bag limit ✓ / limit the number of fish caught ✓
 - Ban fishing during breeding times/ ban catch of undersized fish ✓
 - Implement fines ✓ / Imprisonment ✓
 - Monitor coastline/ fishing ✓ (mark first 2 only) (2) (6)

3.2.1 Criteria for marking the graph:

CRITERIA	MARK/S
Title of graph:	✓
Type of graph	✓
X-axis: Heading ; scale; unit	✓
Y-axis: Heading ; scale; unit	✓
All 8 points plotted correctly	✓
2 - 7 points plotted correctly	✓

LINE GRAPH SHOWING THE NUMBER OF FAMILIES THAT EXISTED IN THE DIFFERENT TIME PERIODS ON THE EARTH



3.2.2 2 ✓ (1)

3.2.3 Mass extinction ✓ (Do NOT accept extinction) (1)

3.2.4 - Drop in sea level ✓ as a result of glaciation ✓ / global cooling ✓
 - rise in sea levels ✓ as glaciers melted due to global warming ✓
 - volcanic activity ✓ / leading to drop in oxygen levels ✓ / global warming ✓
 - meteorite impact ✓ / leading to low oxygen levels / global warming ✓

(mark first 2 explained only) any (2x2) (4) (12)

3.3.1 nectar of flowers ✓ / seeds ✓ / dead leaves ✓ / plant roots ✓ (2)

3.3.2 moths ✓ / earthworms ✓ / dassie ✓ (2)

3.3.3 They are omnivores ✓
 feeding on a variety of plants and animals ✓
 so that if there is a shortage of the one type of food, they can feed on something else ✓ (any 2) (2)

3.3.4 dead leaves → earthworms → frogs → genets ✓ ✓
 Plant roots → earthworms → frogs → genets ✓ ✓ (2)

3.3.5 -Earthworm numbers increase ✓ causing a drop in availability of plant roots ✓ and dead leaves ✓
 OR
 -Moth numbers increase ✓ causing wag-tail numbers to increase as they have more food ✓
 OR
 -Spider numbers increase ✓ since they have just one instead of two predators ✓ (any 1 explained x 2) (2) (10)

3.4.1 (i) 245 million years old (with unit) ✓
 (ii) recent soil layers ✓
 (iii) they are between 3 million and 220 million years ago ✓
 (iv) Mrs Ples ✓ (1) (1) (2) (1) (2) (2) (1)

3.4.2 200 ✓ million years old ✓ (2)

3.4.3 relative dating ✓ / absolute dating ✓ / radiometric dating ✓ (any 2) (2)

3.4.4 (a) A type of tourism where people visit an area to view fossils. (1)

(b)
 - provides employment ✓
 - brings revenue into a country ✓
 - fossil sites provide important research facilities for paleontologists ,etc ✓
 - people are educated about history of life ✓ (mark first 2 only) (any 2) (2) (12) [40]

TOTAL SECTION B: 80

SECTION C
QUESTION 4

CARDIAC CYCLE

1. **Atrial Systole** *✓
 - Muscles of both the atria contract. ✓
 - The tricuspid and bicuspid valves are open to allow blood to flow from the atria into the two ventricles. ✓
 - Duration: 0.1 seconds. ✓
2. **Ventricular Systole** *✓
 - Muscles of both the ventricles contract. ✓
 - Both tricuspid and bicuspid valves close (the lub sound). ✓
 - Semi-lunar valves of the pulmonary artery and aorta open. ✓
 - Deoxygenated blood from the right ventricle is forced up the pulmonary artery and moves to the lungs. ✓
 - Oxygenated blood from the left ventricle is forced up the aorta and moves to all parts of the body. ✓
 - Duration: 0.3 seconds. ✓
3. **Atrial & Ventricular Diastole** * / **General Diastole** *✓
 - Muscles of the atria and ventricles relax. ✓
 - Semi – lunar valves in aorta and pulmonary artery close to prevent any back flow of blood (the dub sound). ✓
 - Deoxygenated blood from the vena cavae fills the right atrium; oxygenated blood from the pulmonary veins fills the left atrium. ✓
 - The cycle then starts again. ✓
 - Duration: 0.4 seconds. ✓

* 3 compulsory + 8

(11)

STRUCTURAL ADAPATATIONS OF THE HEART

- Valves ✓
- To prevent backflow ✓
- Septum ✓
- To separate right and left sides ✓ of the heart
- To prevent oxygenated blood from mixing with the deoxygenated blood ✓
- Walls of chambers are muscular ✓
- To be able to contract and relax ✓

(6)

Synthesis:

Criterion:	Relevance (R)	Logical Sequence (L)	Comprehensive (C)
Generally:	All information provided is relevant to the topic.	Ideas are arranged in a logical sequence.	All aspects required by the essay have been sufficiently addressed.
In this essay Q4	Only cardiac cycle and adaptation are described	Each aspect atrial systole, ventricular systole, atrial and ventricular diastole and adaptations are described in a logical sequence.	Minimum marks: - Cardiac cycle 8/11 - Adaptations 3/6
Mark:	1	1	1

GRAND TOTAL : 150