Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

FINAL EXAMINATION

13 NOVEMBER 2018

GREENBURY SECONDARY SCHOOL

GRADE 10
PAPER TWO

MARKS: 150

TIME: 2½ hour

N.B. This question paper consists of 15 pages including this page.

INSTRUCTIONS AND INFORMATION

Read the following instructions 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 instruction 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 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 answer and write only the letter (A-D) next to the question number in your answer book eg. 1.1.6 D.

1.1.1 What is the name of the huge land mass from which all the continents of the Earth arose?

A. Gondwana
B. Pangea
C. Laurasia
D. Galactica

1.1.2 Which of the following is the correct representation of the scientific name of an organism?

A. *Homo sapiens*
B. *Homo Sapiens*
C. *homo sapiens*
D. *homo sapiens*

1.1.3 Listed below are some features of a certain group of organisms :

i. cells are eukaryotic
ii. multicellular bodies
iii. no cell walls
iv. all are heterotrophs

Which of the above apply to the animal kingdom?

A. i, ii and iii only
B. i, ii and iv only
C. ii, iii and iv only
D. i, ii, iii and iv

1.1.4 A typical cardiac cycle involves …

A. Atrial systole followed by ventricular systole
B. Atrial diastole followed by ventricular systole
C. Ventricular systole followed by ventricular diastole
D. Ventricular diastole followed by atrial diastole

1.1.5 Which one of the following is a physiographic factor?

A. Altitude
B. pH of soil
C. Temperature
D. Soil organisms

5X2 = [10]

1.2 Give the correct biological TERM for each of the following descriptions. Write only the term next to the question number in your answer book.

1.2.1 A blood circuit that involves the blood leaving the heart and circulating to all parts of the body
1.2.2 A distinct geographical region with a characteristic climate, soil type and vegetation
1.2.3 The gas required by all living organisms for cellular respiration
1.2.4 Plant adapted to live in dry habitat
1.2.5 Scientists who study fossils
1.2.6 Movement of large masses of land over millions of years
1.2.7 Species found in one area and nowhere else in the world
1.2.8 That part of the earth where living organisms exist
1.2.9 The non-living component of an ecosystem
1.2.10 The death of all individuals of a species

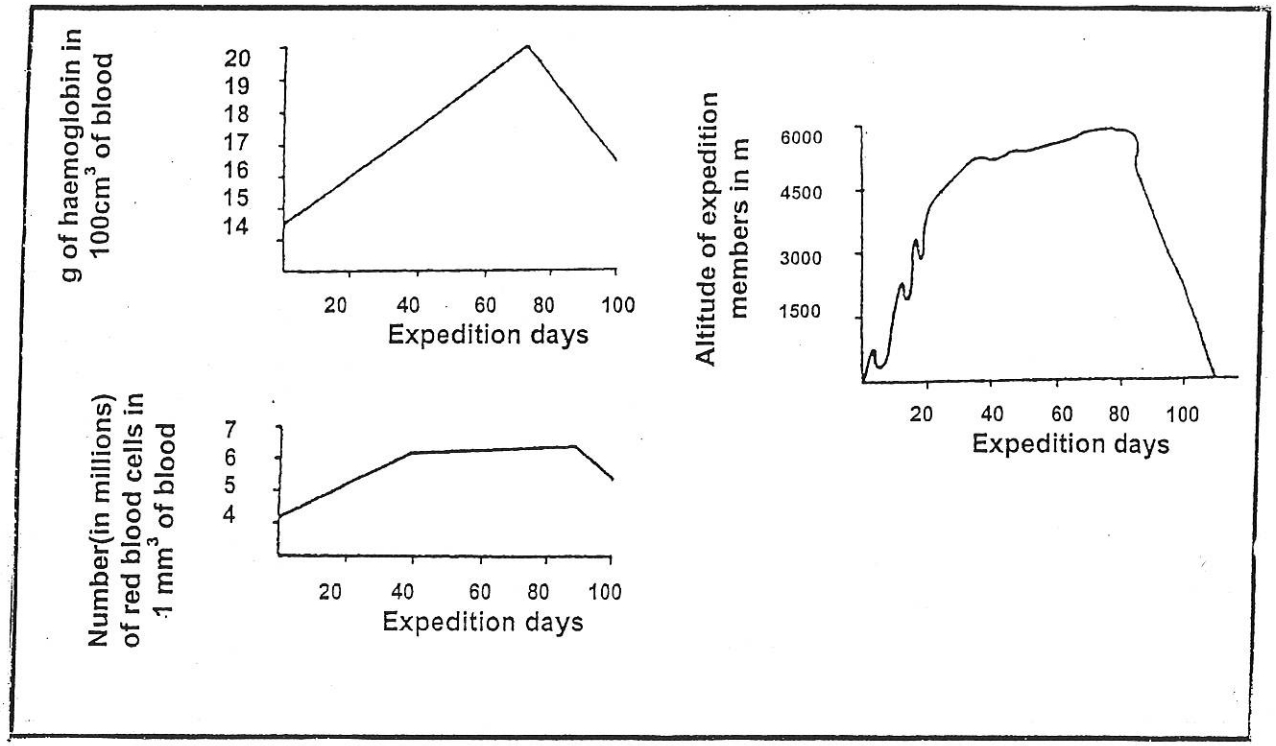
[10]

1.3 Indicate whether each of the descriptions in COLUMN 1 applies to **A only**, **B only**, **both A and B** or **none** of the terms in COLUMN 2. Write **A only**, **B only**, **both A and B** or **none** next to the question number in your answer book. eg. 1.3.6 A only.

COLUMN 1	COLUMN 2
1.3.1 The father of modern taxonomy	A. Albert Einstein B. Carl Linnaeus
1.3.2 South Africa's national flower	A. King Protea B. Geophytes
1.3.3 Movement of water from atmosphere to ground	A. Precipitation B. Evaporation
1.3.4 A well-known fossil of the Cambrian period similar to crustaceans and arachnids.	A. Trilobites B. Horse-shoe crabs
1.3.5 Release CO_2 into the atmosphere	A. Decomposition B. Combustion

5X2 = [10]

1.4 The graphs below show the amount of haemoglobin and the number of red blood cells at different altitudes, for members of a Himalayan climbing expedition team.



1.4.1 In what unit was the amount of haemoglobin in the blood measured? [1]

1.4.2 How much of haemoglobin was present in the blood of the team members at the beginning of the expedition? [1]

1.4.3 How many red blood cells were present in $1mm^3$ of blood 38 days after the beginning of the expedition? [1]

1.4.4 What is the maximum amount of haemoglobin present in the blood during the expedition? [1]

1.4.5 How many days did the team spend above 4 500m? [2]

1.4.6 As the climbers spend more time at the higher altitudes, what happens to :

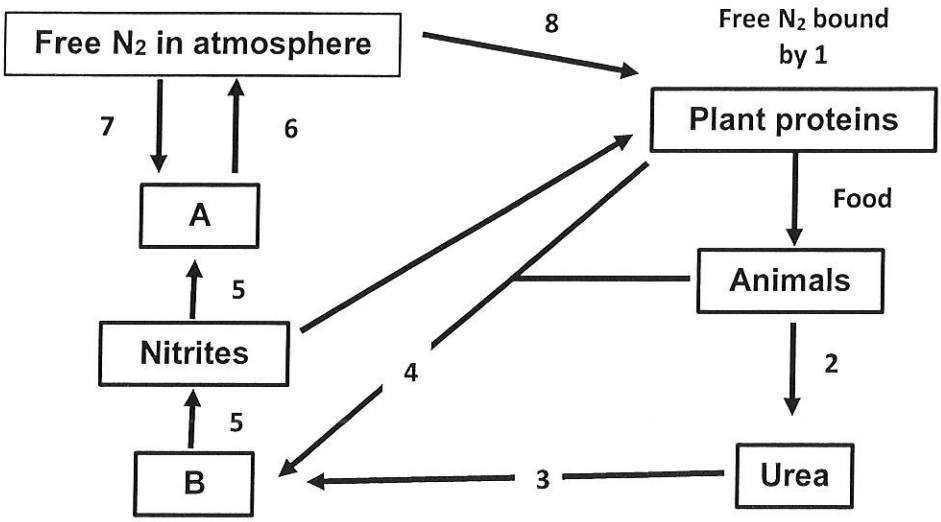
a) the number of red blood cells? [1]

b) the amount of haemoglobin in the blood? [1]

1.4.7 Explain your answers in QUESTION 1.4.6. [2]

[10]

1.5 Study the nutrient cycle below and answer the questions.



1.5.1 Name the nitrogen compound found at :

i) A

ii) B [2]

1.5.2 Name the process which will cause the changes at :

i) 5

ii) 6

iii) 8 [3]

1.5.3 Although there is free nitrogen in the atmosphere, it cannot be used by plants and animals in this form. It must be converted to a nitrate first.

State TWO ways in which free nitrogen is converted to nitrates. [2]

1.5.4 Nitrogen is required by all organisms since it forms part of protein molecules. Name the monomers of protein. [1]

1.5.5 Explain why the Earth is not likely to run out of Nitrogen gas. [2]

[10]

TOTAL FOR SECTION A = [50]

SECTION B

QUESTION 2

2.1 Three soil samples taken from different regions, were analysed for air content, permeability to water and humus content. The results obtained are shown in the table below.

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

2.1.1 According to the results above, which soil sample (**A**, **B** and **C**) would be as follows :

a) Loam? [1]

b) Sand? [1]

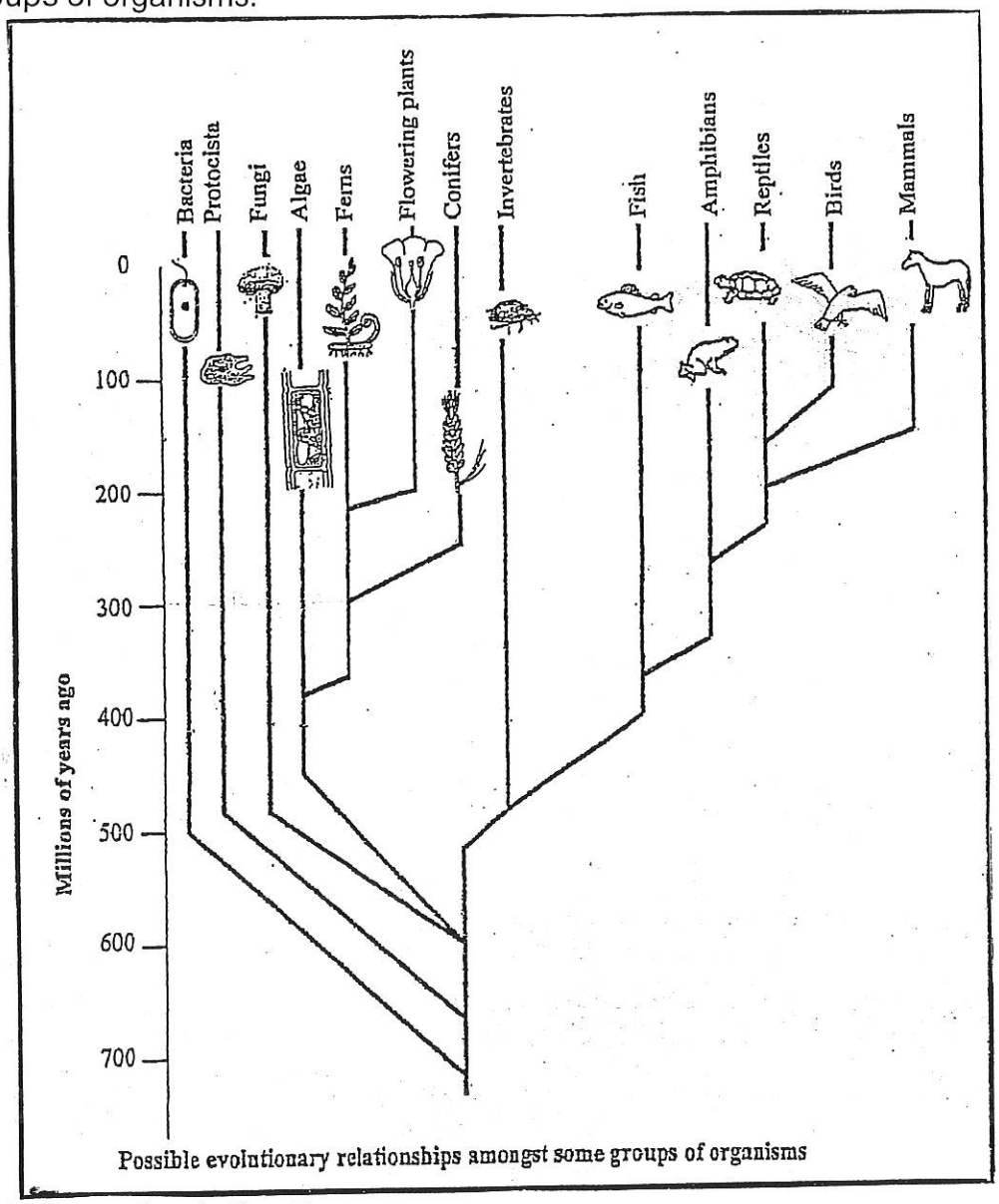
2.1.2 Explain the disadvantages for the plants growing in soil sample B with regard to permeability to water. [2]

2.1.3 Name TWO factors relating to the composition of soil sample B that resulted in its low permeability to water. [2]

2.1.4 State TWO advantages of a higher percentage of humus for the soil. [2]

[8]

2.2 Study the diagram showing possible evolutionary relationships amongst some groups of organisms.



Possible evolutionary relationships amongst some groups of organisms

2.2.1 According to the diagram :

a) How many million years ago did conifers evolve? [1]

b) Which were the first organisms that lived on earth? [1]

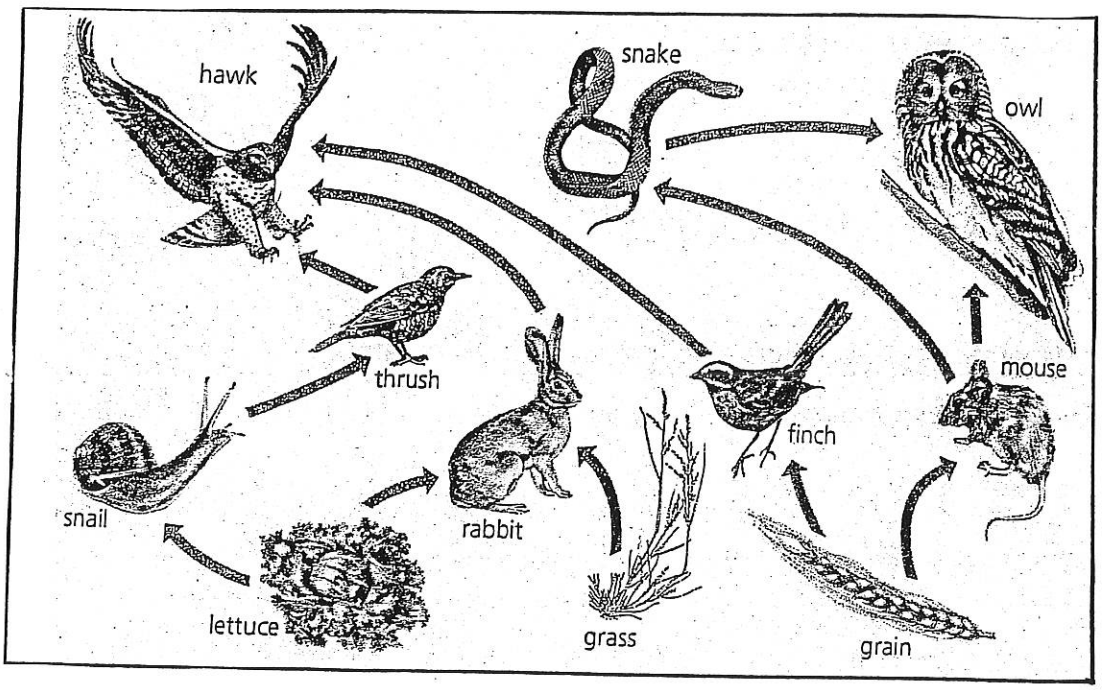
c) From which group of organisms did reptiles evolve? [1]

d) Which is the most recent group of animals to evolve? [1]

e) Give ONE reason why mammals are more closely related to birds than with amphibians. [1]

[5]

2.3 The following is a diagram of a "food web".



2.3.1 Explain what is a "producer". [2]

2.3.2 What do the arrows represent? [1]

2.3.3 From the above food web, single out one food chain with four trophic levels. Write out this food chain. [2]

2.3.4 Give the name of one organism that is found in the trophic level containing the most amount of energy. [1]

2.3.5 Give the name of TWO secondary carnivores. [2]

2.3.6 Explain why a food web is more beneficial for an ecosystem than a single food chain. [2]

[10]

2.4 The following table shows the number of organisms in each trophic level around a baobab tree.

Trophic Level	Number of organisms
Baobab tree	1
Caterpillars	220 000
Birds	30
Snakes	3

2.4.1 Draw a pyramid of numbers to represent this habitat. [5]

2.4.2 Suggest TWO reasons why there is a large difference between the numbers of primary and secondary consumers. [2]

[7]

2.5 Complete the following questions on Ecotourism.

2.5.1 Explain what is ecotourism? [2]

2.5.2 List TWO :

a) benefits of ecotourism [2]

b) negative impact of ecotourism [2]

2.5.3 You are the manager of an ecotourism site.
Mention TWO rules or principles that you would set, to guide your tourist, at your site. [2]

2.5.4 Name TWO recognised biodiversity "hotspots" in South Africa that you studied. [2]

[10]

QUESTION 3

3.1 A group of grade 10 learners carried out an investigation to determine the heart rate of 3 different people at a 5-minute interval.

The results are recorded in the table below.

Time (5 minute intervals)		0	5	10	15	20	25
Beats per minute	Person A	78	78	76	76	78	78
	Person B	68	68	68	72	78	84
	Person C	115	115	117	117	116	118

3.1.1 State 2 planning steps that the learners will consider when carrying out this investigation. [2]

3.1.2 List TWO variables that the learners should keep constant in order to ensure validity of the results. [2]

3.1.3 Which person is involved in physical activity during the entire 25 minutes? [1]

Give ONE reason for your answer. [1]

3.1.4 Which person is sleeping and appears to be entering an unpleasant dream? [1]

Explain why. [2]

3.1.5 On a single system of axis, plot line graphs using the information from the table for Persons **A** & **B**. Label the graphs clearly. [6]

[15]

3.2 Tabulate TWO structural differences between arteries and veins. **[5]**

3.3 Study the fossil in Diagram **A** and organism in Diagram **B**.

DIAGRAM A

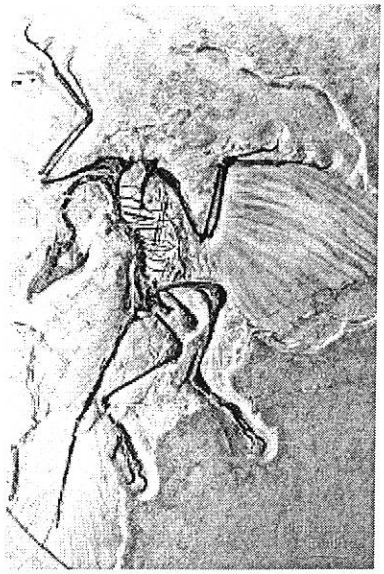
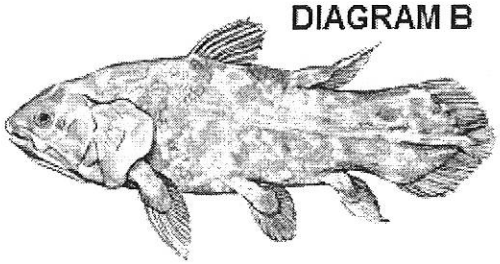


DIAGRAM B



3.3.1 Name the organism in diagram …

a) **A**

b) **B** [2]

3.3.2 Explain TWO reasons why scientists concluded that this prehistoric bird represented by Diagram **A**, is a transitional fossil. [4]

3.3.3 Describe how the hard parts of this organism became fossilized. [4]

3.3.4 Explain why organism **B** is called a 'living fossil'. [2]

[12]

3.4 Study the table below that shows the decay of carbon-14 over time and then answer the questions that follow.

DECAY OF CARBON-14								
Years from the present	0	5 730	11 460	17 190	22 920	**X**	34 380	40 110
Number of half-lives elapsed	0	1	2	3	4	5	6	7
Percentage of original carbon-14 remaining	100	50	25	12,5	6,25	**Z**	1,56	0,78

3.4.1 Name TWO types of methods used to determine the age of fossils. [2]

3.4.2 Calculate the value of :

a) **X** [1]

b) **Z** [1]

3.4.3 Explain why it would NOT be possible to date a fossil which existed 80 000 years ago using the decay of carbon-14. [2]

3.4.4 Give TWO reasons why there are gaps in the fossil records. [2]

[8]

[40]

TOTAL FOR SECTION B = [80]

SECTION C

ESSAY QUESTION

Discuss the possible causes of the 5 mass extinctions that have taken place in the past and describe three activities of human that may be considered as causes for the 6th mass extinction currently taking place on Earth.

Content : [17]

Synthesis : [3]

[20]

TOTAL FOR SECTION C = [20]

GRAND TOTAL = [150]

PHOENIX NORTH CLUSTER
LIFE SCIENCE P2
GRADE 10

MEMORANDUM

SECTION A

QUESTION 1

1.1.1	B ✔ ✔	1.2.1	Systemic ✔
1.1.2	A ✔ ✔	1.2.2	Biome ✔
1.1.3	D ✔ ✔	1.2.3	Oxygen ✔
1.1.4	A ✔ ✔	1.2.4	Xerophytes ✔
1.1.5	A ✔ ✔ **5X2=[10]**	1.2.5	Palaeontologist ✔
		1.2.6	Continental drift ✔
1.3.1	B only ✔ ✔	1.2.7	Endemic ✔
1.3.2	A only ✔ ✔	1.2.8	Biosphere ✔
1.3.3	A only ✔ ✔	1.2.9	Abiotic ✔
1.3.4	A only ✔ ✔	1.2.10	Extinct ✔ **[10]**
1.3.5	Both ✔ ✔ **[10]**		

1.4.1 g/100 cm^3 ✔ [1]

1.4.2 14,5g ✔ in 100 cm^3 blood [1]

1.4.3 6 million ✔ [1]

1.4.4 20g ✔ in 100 cm^3 blood [1]

1.4.5 60 ✔ ✔ days [2]

1.4.6 a) Increases ✔ [1]
b) Increase ✔ [1]

1.4.7 -At higher altitudes the air is thinner ✔ / oxygen is rare
-to accommodate for this lack, ✔ more red blood cells are produced
OR
-haemoglobin in the red blood cells carry ✔ oxygen
-therefore, there will be more haemoglobin to carry more oxygen
[Any 1X2] [2]

[10]

1.5.1 i) nitrate ✔ ii) ammonia ✔ [2]

1.5.2 i) nitrification ✔ ii) denitrification ✔ iii) nitrogen fixation ✔ [3]

1.5.3 -lightning ✔
-nitrogen fixing bacteria ✔ [2]
[Mark first <u>two</u> only]

1.5.4 Amino acids ✔ [1]

1.5.5 Nitrogen is recycled from the atmosphere through plant bodies ✔ as protein and then returned back to the atmosphere by bacteria. ✔ [2]

[10]

SECTION B

QUESTION 2

2.1.1 a) A ✔ [1]
b) C ✔ [1]

2.1.2 Soil becomes waterlogged; ✔ roots of the plants can rot ✔ [2]

2.1.3 -Fine ✔ soil particles that are
-closely ✔ packed [2]

2.1.4 -Improves the aeration ✔ of the soil
-Increases the water-retaining ✔ ability of the soil
-Improves the mineral ✔ content of the soil [Any 2] [2]

[8]

2.2.1 a) 300 ✔ mya [1]
b) Bacteria ✔ [1]
c) Amphibians ✔ [1]
d) Birds ✔ [1]
e) Mammals share a more recent common ancestor ✔ with birds than with amphibians. [1]

[5]

2.3.1 Organisms / plants that make food ✔ using suns energy ✔ / photosynthesis. [2]

2.3.2 Energy flow from one organism ✔ to the other. [1]

2.3.3 Grain → Mouse → Snake → Bird ✔✔
or
Lettuce → Snail → Thrush → Hawk ✔✔ [2]

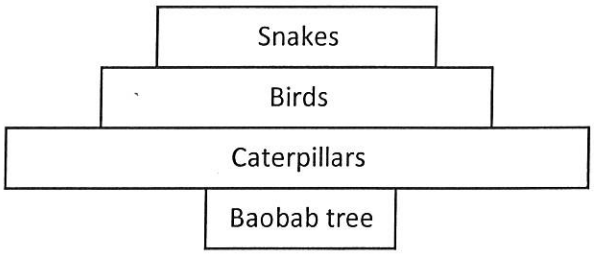
2.3.4 Grass ✔ / lettuce / grain [1]

2.3.5 Hawk ✔ and Owl ✔ [2]

2.3.6 -Alternate food sources ✔ ensure that when one source decreases.
-Ecosystems can still sustain ✔ itself over time.
-Reflects a stable ✔ ecosystem / balance ecosystem. [Any 2] [2]

[10]

2.4.1 .



- ✔ Caption
- ✔ Pyramid drawn according to / represent numbers
- ✔✔✔ All 4 organisms correctly placed.
- ✔✔ 2 organisms correctly placed.

PYRAMID OF NUMBERS [5]

2.4.2 -Primary consumer / caterpillars are small ✔ as compared to birds.
-Change of season ✔ may result in large numbers of caterpillars. [2]
(mark first two only)
[7]

2.5.1 It is a form of tourism where people enjoy the natural beauty ✔ of the area and the activities ✔ they can do there. [2]

2.5.2 a) Create job opportunities ✔ / income to community
-business opportunity ✔
-enjoyment of natural beauty ✔ by visitors
-bring money for conservation ✔ programmes [Any 2] [2]

b) -Exploitation ✔ of local people
-Negative impact on environment. ✔ [2]

2.5.3 -Do not pick ✔ fruits and plants
-Do not touch wild animals
-Do not feed animals
-No fires
-No litter [Any 2] [2]

2.5.4 Cape Floristic region
Succulent Karoo
Maputaland, Pondoland [Any 2] [2]

[10]

[40]

QUESTION 3

3.1.1 -Decide on the number of people ✔ to investigate.
-Decide on a date ✔ /time/place to carry out investigation.
-Collect all apparatus ✔ / instruments.
-Decide on how to record ✔ data collected.
-Decide on the duration ✔ of the investigation.
[Mark first two only] [Any 2] [2]

3.1.2 Learners must be of -same age group ✔
-same gender ✔
-must be carried out at same ✔ time
-same person ✔ recording results

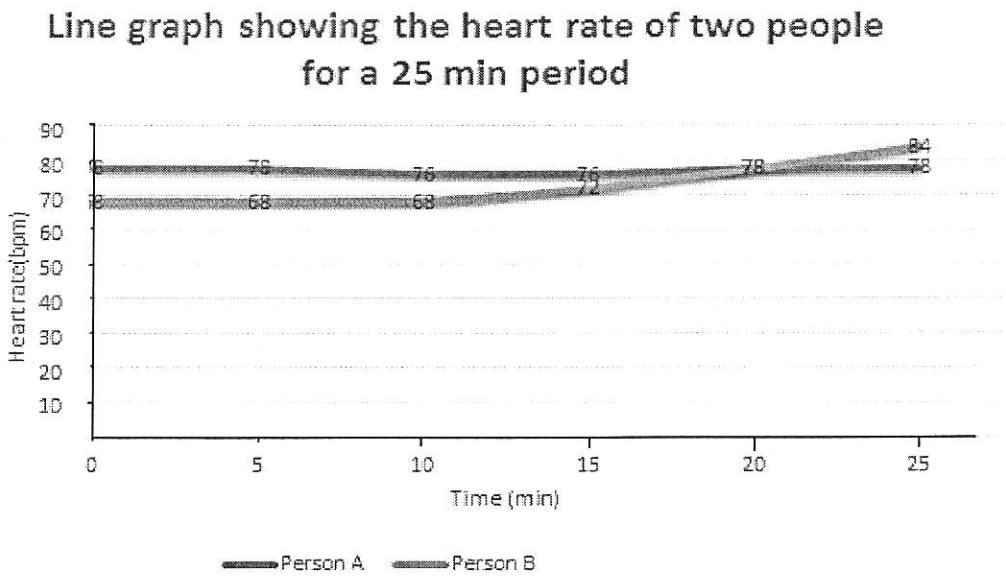
[Mark first two only] [Any 2] [2]

3.1.3 C ✔ [1]
Heart rate of very high ✔ [1]

3.1.4 B ✔ [1]
In the first 10 minutes, the heart beat was constantly low ✔ / 68 beats per minute. Thereafter, it starts to increase as the person enters the unpleasant dream. ✔ [2]

3.1.5 Caption ✔
Double line graph ✔
X; Y axis – label ✔
X; Y axis – scale ✔
Label each line ✔ ✔ [6]

graph



[15]

3.2

Arteries	Veins
- Smaller lumen ✓ - Thick muscular wall ✓ - Valves absent ✓	- Large lumen ✓ - Thin muscular wall ✓ - Has valves ✓

[1+4] =**[5]**

any (2x2)

3.3.1 a) Archaeopteryx ✔
b) Coelacanth fish ✔ [2]

3.3.2 -A skull with teeth and Jaws ✔ - more similar to dinosaurs ✔
or
-Has 3 claws on the end of the bones of each wing ✔ more similar to dinosaurs ✔ [1X2]
and
-Has feathers ✔ more similar to birds. ✔
or
-Has 3 forward pointing toes and one backward and pointing ✔ toe more similar to birds. ✔ [1X2]

3.3.3 -The organisms had died next to the flood ✔ plain / near water.
-Sediments ✔ piled up over the organism reducing O_2 flow.
-Soft part decaying. ✔
-Overtime mineral seeped ✔ into the bones ✔ replacing the organic ✔ part
[Any 4] [4]

3.3.4 -It was thought to be extinct ✔ a long time ago but recently found
-Organism has not ✔ changed over a long ✔ period of time. [Any 1X2] [2]

[12]

3.4.1 Radiometric Dating ✔
Relative Dating ✔ [2]

3.4.2 X = 28 650 ✔ years [1]
Y – 3,125% [1]

3.4.3 After 40 000 years ✔ there is no more carbon-14 remaining ✔ in the fossil. [2]

3.4.4 Not all organisms that die become ✔ fossilized.
Some fossils might not be found yet. ✔
Many fossils are destroyed by human activities ✔ / natural disasters.
[Mark first two only] [Any 2] [2]

[8]

QUESTION 4

Causes of 5 mass extinctions.

Volcanic Eruptions

- Throw tons of debris ✔ / ash / dust into the atmosphere
- Blocking out the sun ✔ / darkening the skies for long periods of time
- Plant die, ✔ herbivores die and carnivores ✔ die
- Toxic gases released, ✔ trap heat from atmosphere
- Cause acid rain ✔
- Cause global warming, ✔ and climate ✔ change
- Depleting oxygen in ✔ waters
- Organisms unable to adapt ✔ to extreme conditions.
- Blocking out sunlight for too long causes global temperatures to drop ✔
- Earth experienced ice ✔ age and glaciation ✔
- Decreasing sea levels ✔

Asteroid / Meteorite impact

- Also causes fire ✔
- Earthquakes ✔

[11]

Sixth Extinction

- Overpopulation ✔ of humans
- Using up the land ✔ / resources

- Habitat destructions ✔ / Farming / Agriculture / Housing / Urbanisation / Use of fertilizers
- Endemic species have nowhere to live ✔

- Pollution ✔
- Makes resources unusable ✔ for biotic components

- Unsustainable hunting ✔ practices / Overfishing / Exploitation
- Destroying food chains ✔ / ecosystems

[Any 3X2] [6]

Synthesis [3]

ASSESSING THE PRESENTATION OF THE ESSAY.

RELEVANCE	LOGIOCAL SEQUENCE	COMPREHENSIVE
All information is relevant to the question.	Ideas arranged in a logical cause and effect sequence.	Answered all aspects required by the essay in sufficient detail.
All the information provided is relevant to : - Causes of 5 mass extinction in the past. - Cause of sixth mass extinction. There is no irrelevant information.	All the information regarding : - 5 mass extinction causes, and - cause of sixth mass extinction, - is arranged in a logical manner.	- Causes of 5 mass extinctions - 7/11. - Human activities contributing to the sixth mass extinction – 4/6.

[20]