GREENBURY SECONDARY SCHOOL

DEPARTMENT OF MATHEMATICS AND SCIENCES

FINAL EXAMINATION -2015

LIFE SCIENCE P2 – GRADE 10

EXAMINER : C. JUGDHAW **MAX MARKS : 150**

MODERATOR : K. GOVENDER /S. SINGH /T. RAMPURTHAB

TIME : 2.5 hrs

NAME OF LEARNER.....

.....

INSTRUCTIONS TO LEARNERS :

1. Answer all questions .
2. Write neatly and legibly
3. Draw diagrams in pencil and label in ink
4. This paper consists of .....13..... pages

.....

SECTION A

QUESTION ONE

1.1 In each of the following questions, four possible answers are given. Choose the most appropriate answer and then write **only the letter** corresponding to it, next to the question number.

1.1.1 Which of the following process is not involved in the water cycle.

A. fixation
B. condensation
C. evaporation
D. precipitation

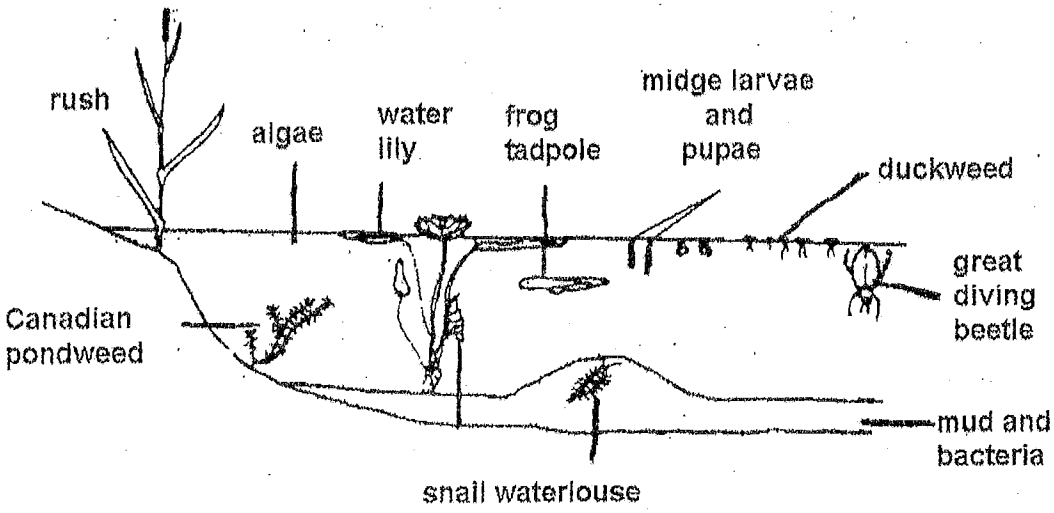
1.1.2 Which of the following is an abiotic component?

A. bacteria
B. animals
C. pear trees
D. water

1.1.3 A trophic level refers to :

A. a feeding level
B. form of symbiotic relationship
C. a heterotroph
D. energy transfer

1.1.4 The diagram represents a pond during the December month. Which two organisms is part of the first trophic level of this food chain.



A. Water louse and bacteria
B. Duckweed and bacteria
C. Water lily and algae
D. Pond weed and snail

1.1.5 Two of the chambers of the heart have relatively thin walls, one has thick walls and one has very thick walls. What is the relative thickness of the walls of each of the chambers.

	Thin walls	Thick walls	Very thick walls
A.	Left and right ventricles	Left atrium	Right atrium
B.	Left and right ventricles	Right atrium	Left atrium
C.	Left and Right atrium	Left ventricle	Right ventricle
D.	Left and Right atrium	Right ventricle	Left ventricle

1.1.6 The five Kingdom classification was suggested by :

A. Carolus Linnaeus
B. Robert Whittaker
C. Carl Woese
D. George Fox

1.1.7 A sample of soil has the following characteristics : large particles, large spaces, holds little water, feels gritty . This type of soil is :

A. clay
B. loam
C. sand
D. silt

1.1.8 Students conducted an investigation to determine if unknown liquids from an ecosystem were acid or bases. What was the independent variable in this investigation?

Unknown Liquids Data

Sample	Indicator	Colour change	Identification
Unknown 1	Litmus paper	Red	Acid
Unknown 2	Litmus paper	Pink	Acid
Unknown 3	Litmus paper	Pink	Acid
Unknown 4	Litmus paper	Blue	Acid

A. Sample
B. Indicator
C. Colour change
D. Identification

1.1.9 Which of the following statements about food pyramids is correct?

A. A pyramid of biomass indicates how much food in kilojoules is available on each trophic level.
B. A pyramid of numbers can consist of ten thousand lettuce, a hundred rabbits, ten owls and one snake.
C. A pyramid of energy shows that there is more energy on each successive trophic level.
D. A pyramid of energy shows the pyramid gets broader at the top.

1.1.10 Which of the following is not a fossil?

A. A dinosaur skull, 65 million years old
B. Oil formed from micro-organisms, 150 million years old.
C. Stone tool made by human ancestors, 2.6 million years old.
D. Trilobite remains , 580 million years old.

(10x2) 20

PTO 1.2..

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 – 1.2.8)

1.2.1 Organisms that are able to manufacture their own food .

1.2.2 A series of linked food chains with more than one consumer per trophic level .

1.2.3 Scientists who studies ancient life forms through fossils.

1.2.4 The level of acidity or alkalinity of substances in a solution.

1.2.5 Plants that are adapted to live in dry habitat.

1.2.6 The representation of a timescale that shows the history of life on earth.

1.2.7 The part of the heart that acts as a natural pacemaker.

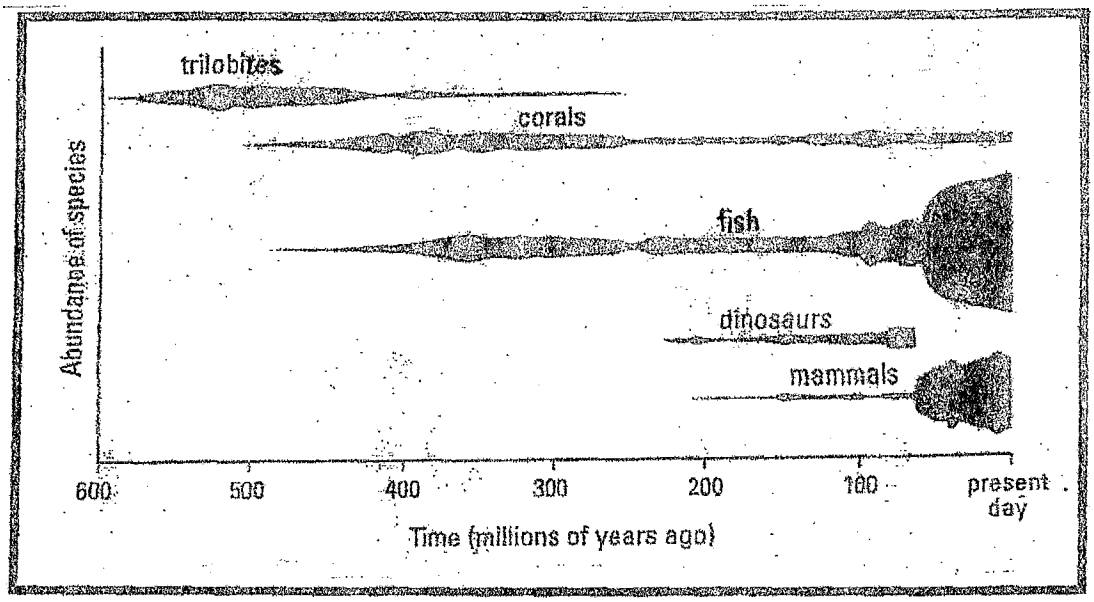
1.2.8 The science of classification of living organisms. (1x8) (8)

1.3 Match the description of **COLUMN A** with items in **COLUMN B.** Write only the letter of the correct answer next to the question number.

COLUMN A	COLUMN B
1.3.1 A group of closely related organisms that are able to interbreed and produce fertile offspring	A. Kingdom
1.3.2 Organisms having cells that do not have a true nucleus and that do not have membrane bound organelles.	B. Calcium carbonate.
1.3.3 The highest group of organisms in the taxonomic level	C. Archaeopteryx
1.3.4 The number and variety of species living in an ecosystem	D. Prokaryotes
1.3.5 A strange – looking fish , once thought to be extinct caught on the coast of East London.	E. Species
1.3.6 A link between dinosaurs and birds	F. Species diversity
1.3.7 A mineral found in fossils.	G. Coelacanth
1.3.8 The process of formation of large sheets of ice on Earth	H . glaciations

(8x1)(8)

1.4 The graph below shows the abundance in diversity of the different groups of animals present on the Earth during the last 600 million years. Answer the question set on it.



1.4.1 (a) According to the graph ,which group of animals is the only one that existed on the earth 600 million years ago. (2)

(b) Calculate the number of years that these organisms lived on the earth. (2)

1.4.2 Name TWO groups of organisms that existed 350 million years ago. (2)

1.4.3 What happened to the mammals when the dinosaurs became extinct? (2)

1.4.4 Give TWO pieces of evidence from the graph that suggest that a mass extinction occurred about 250 million years ago . (2)

1.4.5 Which group of animals exhibited the greatest diversity....

(a) 150 million years ago ? (2)

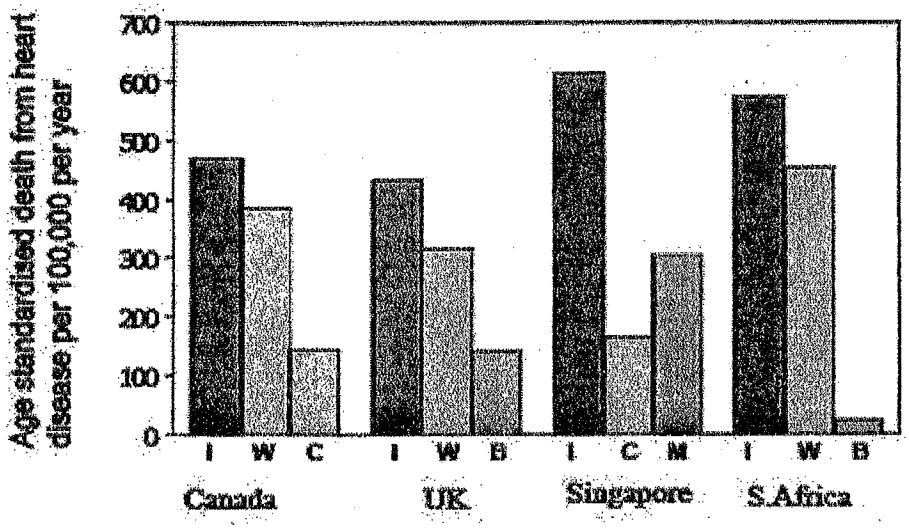
(b) today ? (2) **14**

SECTION A: TOTAL 50

QUESTION TWO

2.1 Study the graph below and answer the following questions.

Age-standardised death rates from heart disease among Indian men per 100,000 per year compared to other ethnic groups in Canada, UK, Singapore and South Africa.



(I= Indians, B=blacks, W=whites, C=Chinese, M= Malays)

[Source: Enas, © *British Journal of Diabetes & Vascular Disease*]

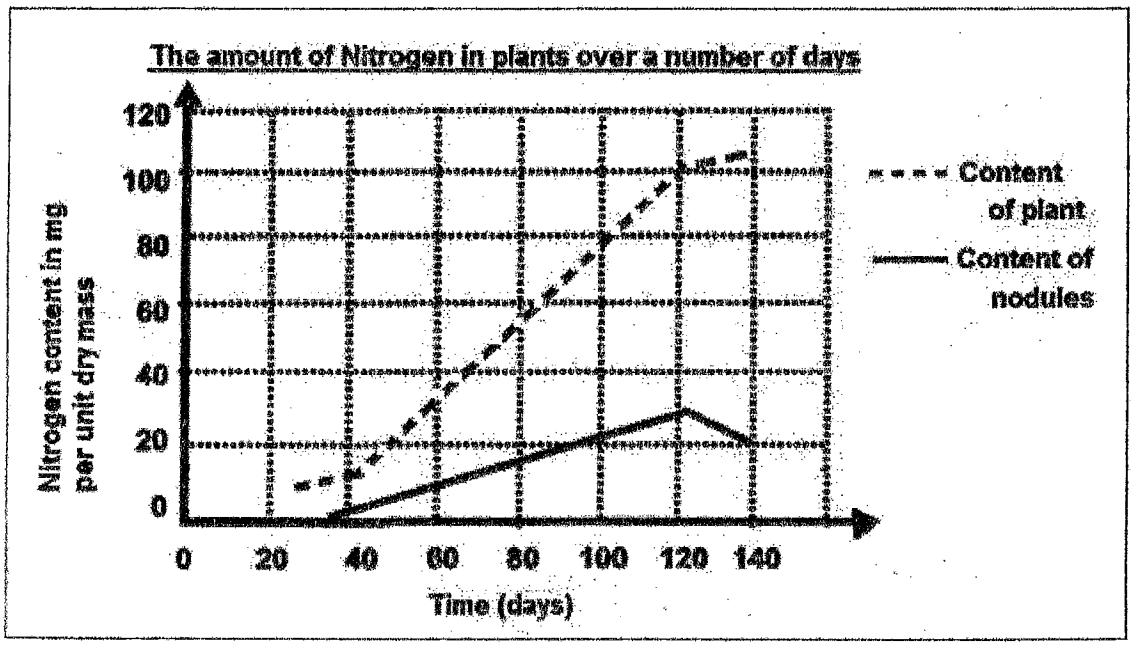
2.1.1 According to survey , which population group shows:

(i) the highest incidence of death from heart disease ?
(ii) the lowest incidence of death from heart disease? (2)

2.1.2 Mention any TWO possible risk factors which contribute to heart diseases. (2)

2.1.3 What is the main cause of a heart attack. (2)[6]

2.2 A large number of soya bean seeds (a leguminous plant) were dipped in a suspension of nitrogen- fixing bacteria and then grown in sand lacking nitrogen- containing compounds. Batches of plants were removed at intervals and the nitrogen content of the nodules and the rest of the plant were determined separately . The results are shown in the graph below .



2.2.1 What is the amount of nitrogen in *mg per unit dry mass* in the bean plant, including the nodules on day 120? (2)

2.2. 2 Suggest an explanation for the increase in the nitrogen content of the soya bean plant. (3)

2.2.3 Explain how the nitrogen content of the plant can add to the nitrogen content of the air. (3) (8)

2.3 Read the article and answer the questions that follow.

'Extinct' damselfly makes a come back.
A species of damselfly, thought to be extinct, has made a dramatic comeback after the removal of alien trees under the Working for Water programme. The Ceres stream damselfly, *Metacnemis angusta*, had not been spotted since 1920 .

The removal of invasive alien plants in wetland systems has resulted in almost instant recovery of endemic species, including the Ceres stream damselfly. Once the invaders are removed , adequate sunlight can penetrate the system, and streamside bushes recover.

[Source: *African Wildlife* Vol. 59 No.1 2005- originally www.iol.co.za]

2.3.1 Define the words :

a) extinct (1)

b) endemic. (1)

2.3.2 How did people intervene in the community in Ceres to promote conservation. (1)

2.3.3 How would this intervention in question 2.3.2 be an advantage to this wetland? (1) 4

2.4 Complete the following questions on Ecotourism.

2.4.1 Explain what is ecotourism? (2)

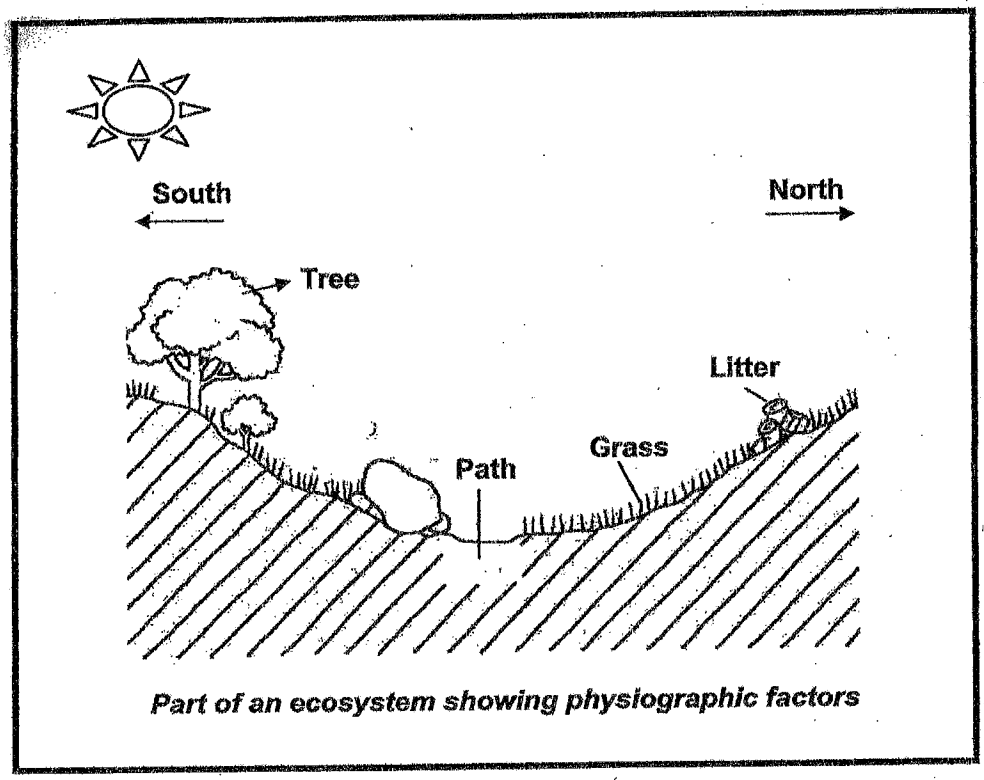
2.4.2 List TWO:

a) benefits of ecotourism. (2)
b) negative impacts of ecotourism (2)

2.4.3 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)

2.4 .5 Name TWO recognised biodiversity "hotspots' in South Africa. (2) (10)

2.5 Study the diagram below which shows physiographic factors of part of an ecosystem in South Africa and answer the questions that follow :



Part of an ecosystem showing physiographic factors

2.5.1 List TWO physiographic factors and briefly state what is meant by each. (4)

2.5.2 Which side of the ecosystem will be the coldest (north-facing or south- facing)? Give a reason for your answer. (3)

2.5.3 In a table show ONE difference each between the north and south side of the mountain, with reference to :

(a) Water content , and

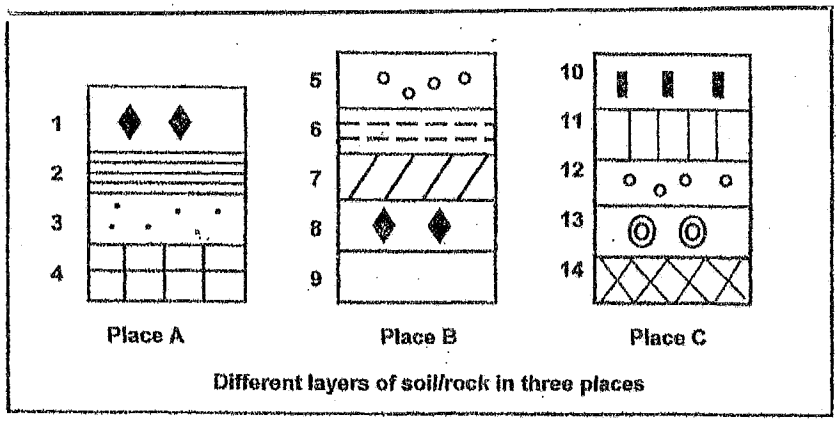
(b) Vegetation (5) (12)

TOTAL 40

QUESTION THREE

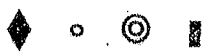
3.1 Some fossils are typical of a particular period of the earth's history. Fossil organisms have lived only in that period and it is then possible to tell the age of the rock in which they are found. Such fossils are called index fossils. A typical index fossil is the trilobite that lived in the oceans during the Paleozoic era. At the end of this era they became extinct. If rock contains trilobites , we can conclude that the rock was formed during that era.

Three different rock strata from three places(A,B,C) are illustrated below.



Different layers of soil/rock in three places

The symbols below are used to indicate the four different index fossils found in the different strata in places A, B and C.



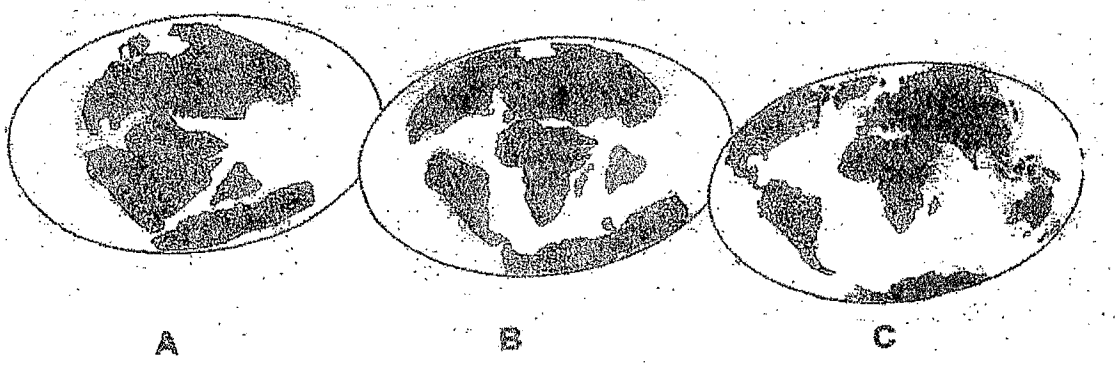
3.1.1 Explain why layers 1 and 8 are of the same geological age. (2)

3.1.2 Indicate TWO layers, other than layers 1 and 8, that have the same geological age. (2)

3.1.3 Name this method of determining the age of the rock. (2)

3.1.4 Explain what is meant by the "missing link". (2) (8)

3.2 Study the diagrams below and then answer the questions that follow.



A B C

3.2.1 What process is illustrated in this series of diagrams? (1)

3.2.2 Name the super-continent that is splitting up in diagram A. (1)

3.2.3 Define Biogeography. (1)

3.2.4 Explain how Biography provides evidence for the process mentioned in question 3.2.1. (2)

3.2.5 Name TWO other processes or phenomena that may have caused or contributed to mass extinctions. (2)(7)

3.3

To date fossils , Scientists rely on principles of radioactive decay of certain radioactive isotopes within fossils. An isotope is a different form of an element eg. Carbon 14 is an isotope of the element carbon, also called carbon -12. Over time these radioactive isotopes change their chemical structure , or decay and form other elements. This happens at predictable rates, which makes radiometric dating a more accurate and reliable indicator of age. The amount of substance that remain after a specific time is noted.

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

3.3.1 Calculate the value of : (a) X (2)
(b) Z (2)

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

3.3.3 Give TWO reasons why there are gaps in the fossil records. (2) (8)

3.4 Organisms are named according to a binomial naming system. The scientific name for humans is *Homo sapiens.*

3.4.1 What part of the name is :

(i) the genus

(ii) the species (2)

3.4.2 The plant *Mentha longifolia* is called spearmint or wild mint in English, *kruisement* in Afrikaans and *kwena* in Sotho.
Explain how using the plant's scientific name would help a botanist who comes from China and does not know any of the languages mentioned above. (2)

3.5. The relationship between two species of mites, Species A and Species B was investigated in a laboratory experiment. One of the species is a herbivore and the other is a carnivore that feeds on the other species of mites. The herbivorous mites were placed in a container with plenty of food. A few days later, some carnivorous mites were added to the container. The number of mites of each species was estimated every week for eight weeks. The results of the experiment are given in the following table.

Time (weeks)	**Population of Species A**	**Population of species B**
1	210	100
2	920	340
3	1400	1 250
4	750	1 900
5	300	950
6	170	750
7	250	360
8	580	130

3.5.1 Draw a line graph of these results. Plot two lines on the same set of axes. (10)

3.5.2 Of the TWO species, which do you think is the :

(i) predator

(ii) prey (2)

3.5.3 Predict what might happen to the number of Species A if Species B were to suddenly disappear. (1) (13)

(40)

TOTAL SECTION B: 80

SECTION C

QUESTION FOUR

4.1 Write an essay describing the Cardiac cycle in detail and discuss the mechanism involved by the brain in controlling the heartbeat and heart rate .

Content: 17
Synthesis : 3

TOTAL SECTION C : 20

FINAL MARKS : 150

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SECTION A

1.1.1.	A ✓✓	1.1.6	B ✓✓		
1.1.2	D ✓✓	1.1.7	C ✓✓		
1.1.3	A ✓✓	1.1.8	A ✓✓		
1.1.4.	C ✓✓	1.1.9	B ✓✓		
1.1.5.	D ✓✓	1.1.10	C ✓✓	(10x2)	20

1.2.1.	PRODUCERS ✓	1.2.5	Xerophyte. ✓
1.2.2	FOOD WEB ✓	1.2.6	Geological timescale ✓
1.2.3	PALEONTOLOGIST ✓	1.27.	Sino-artrial node ✓
1.2.4.	pH ✓	1.28	taxonomy ✓ (8x1)

1.3.1.	E ✓	1.35	G ✓		
1.3.2	D ✓	1.36	C ✓		
1.3.3	A ✓	1.37	B ✓		
1.3.4	F ✓	1.38	H ✓	(8x1)	8

1.4.1. (a) TRILOBITES ✓✓

(b) 600 − 250 = 350 ✓✓

1.4.2 TRILOBITES ✓ ; CORALS ✓ , FISH (2)

1.4.3. THEY DIVERSIFIED ✓✓ / INCREASED IN VARIETY /
– INCREASED IN NUMBERS / MANY MORE SPECIES EVOLVED

1.4.4. TRILOBITES BECAME EXTINCT / DECREASED IN NUMBER ✓
– THE FISH ALMOST DISAPPEARED ✓ but then recovered /
coral extinct ✓

1.4.5.(a) fish ✓✓

(b) fish ✓✓

TOTAL 50

Question 2

2.1.1(i) Indians ✓

2.1.1 (ii) African / Black people

2.1.2. Heredity ✓ / age ✓ / gender / smoking / high cholesterol / lack of exercise / Poor lifestyle any 2

2.1.3. Blockage of the coronary arteries ✓ (2)

2.2.1 130 ✓ (128 - 130) mg / per cent dry mass.

2.2.2. - Some of these nitrogen fixing bacteria may live inside the roots of soya beans.
- they would absorb free nitrogen ✓ from the air in the soil and convert it into nitrates ✓
- the soya bean plant would then use the nitrates to make other nitrogen compound ✓
- this increasing the nitrogen level inside the plant ✓ (3)

2.2.3. When the plant die ✓
- nitrifying compound will convert the nitrogen compound in them to nitrates ✓
- nitrates nitrogen will be converted to free nitrogen ✓
- by denitrifying bacteria ✓ (3)

2.3.1.(a) extinct – species that no longer exist ✓ (1)
(b) endemic – organisms which are only found in a restricted area / part of a country ✓ (1)

2.3.2 Alien trees were removed from the area ✓ (1)

2.3.3. Water will be conserved / saved. ✓ (1)
– Indigenous plants will flourish

2.4.1. It is a form of tourism ✓ where people understand the natural area without affecting the environment. ✓
– People visit the area for the sake of its beauty.

2.4.2(a) – Create job opportunities ✓ (2)
– business opportunities ✓
– enjoyment of natural beauty by visitors
– bring money for conservation programmes

b) – Exploitation of local people ✓ (2)
– negative impact on the environment.

2.4.3. – do not pick fruit and plants
– do not touch wild animals / feed (2)
– danger to environment – fires – litter

2.4.4 – Cape Floristic Region ✓
– Succulent Karoo ✓ any 2
– Maputaland – Pondoland.

2.5.1. Aspect ✓ - portion of an area in relation to the sun ✓

Slope - ✓ the incline of the soil which influences run off of water ✓ / inclination of the la

- altitude ✓ height above sea level.

(2×2)

2.5.2. South ✓

- it is shaded ✓ / no direct sunlight ✓

(3)

2.5.3.

North	South
- less water / dry ✓	- more water / wet
- less plant	- greater abundance of plant

table ✓

(2×2+1) 5.

Question 3

3.1.1. They have the same ✓ index fossil ✓

3.1.2. 5 ✓ and 12 ✓

3.1.3. Relative dating ✓ (1)

3.1.4. It is a fossil yet to be found. ✓ (6)

3.2.1. Continental drift ✓

3.2.2. Pangea ✓

3.2.3. Study of distribution of organisms on earth ✓

3.2.4. Similar species were found on the different continents ✓ (1)

3.2.5. asteroids ✓ / volcanoes / disease (2)

3.3.1. X : 28 650 ✓ ya

Z : 3,125 ✓ 90 ✓

3.3.2. There is no more carbon remaining ✓

3.3.3. - Not all organisms became fossilised ✓

- Some fossils might not have been formed ✓

- many fossils destroyed by natural disasters / man made disasters (3) 8

3.4.1 a) Genus : Homo ✓

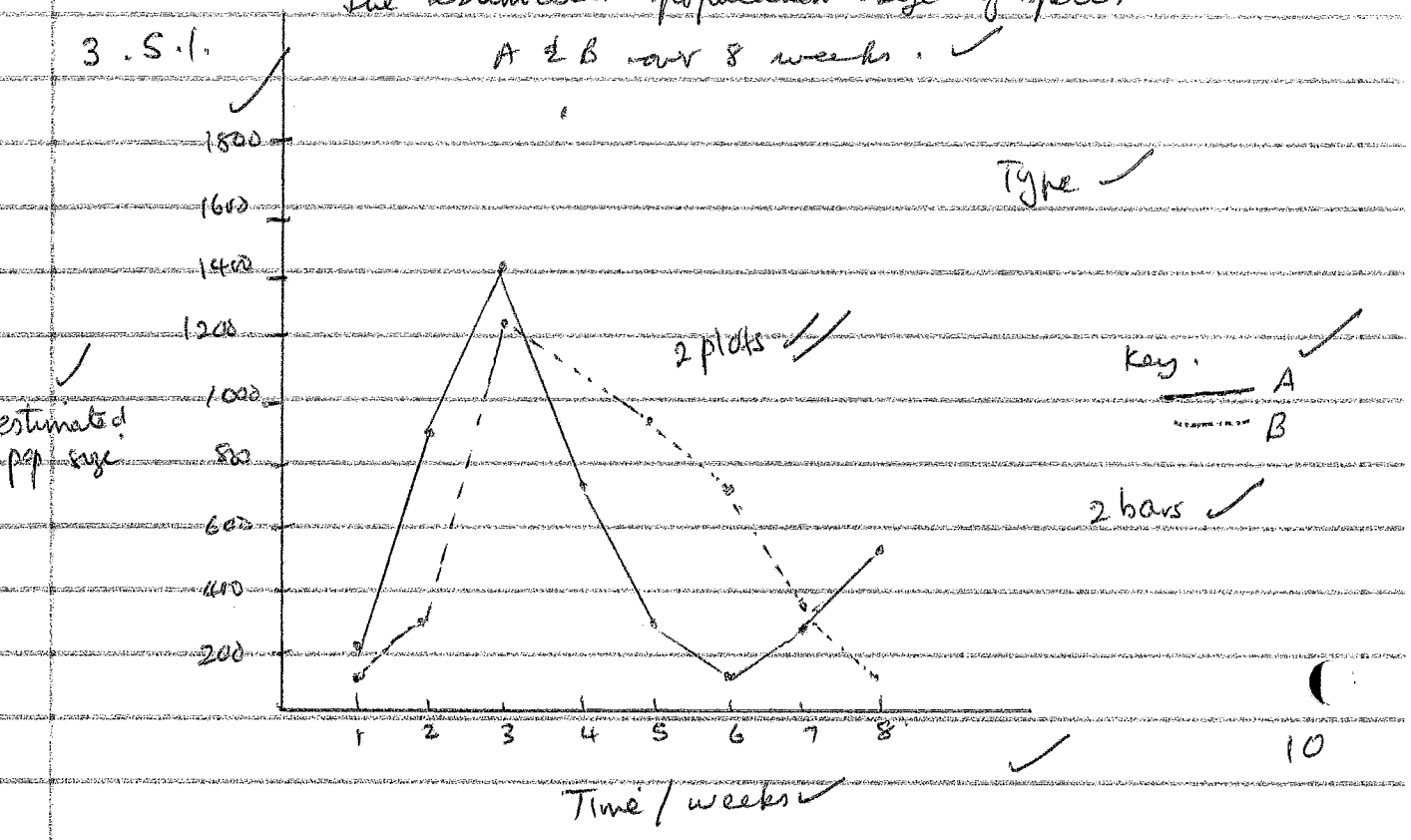
b) Species : sapiens ✓

3.4.2 - Common names vary from place to place ✓

- Latin names avoid confusion and the name does not change from place to place ✓ (2)

4

3.5.1. The estimated population size of species A & B over 8 weeks. ✓



3.5.2. (a) B. //

(b) A =

3.5.3. The species A numbers will increase because there will be no predators to kill them.

ESSAY

1 ATRIAL SYSTOLE * (comp fact)

— TWO ATRIA CONTRACT AT THE SAME TIME ✓

- TRICUSPID AND BICUSPID VALVE OPEN ✓

- BLOOD FLOWS INTO VENTRICLE ✓

- 0,1 sec. ✓ (1comp + any 3) = 4.

2. VENTRICULAR SYSTOLE * (comp)

- TWO VENTRICLES CONTRACT ✓

- TRICUSPID AND BICUSPID VALVE CLOSE ✓

— VALVE IN THE PULMONARY ARTERY AND AORTA OPEN ✓

- DEOXYGENATED BLOOD FROM RIGHT VENTRICLE FORCED UP PULMONARY ARTERY TO LUNG ✓

— OXYGENATED BLOOD FROM LEFT VENTRICLE FORCED UP AORTA TO ALL PARTS OF BODY ✓

— 0,3 sec.

(1comp + 3) = 4.

3 ATRIAL AND VENTRICULAR DIASTOLE * (comp)

- MUSCLE OF ATRIA AND VENTRICLE RELAX ✓

- SEMI LUNAR VALVE CLOSE ✓ - prevent backflow of blood ✓

- deoxygenated blood FILL RIGHT ATRIUM ✓

- O_2 FILL LEFT ATRIUM ✓

- CYCLE START AGAIN 0,4 SEC ✓ (1 comp + 3) 4

HEART BEAT CONTROLED BY BRAIN.

-IF BRAIN (MEDULLA OBLONGATA) FAIL TO SEND IMPULSE TO THE HEART ✓

- MUSCLES OF HEART WILL NOT CONTRACT ✓ HEART WILL NOT BEAT.

- DURING PHYSICAL ACTIVITIES HEART RATE INCREASE ✓

- MORE O_2 GETS TO THE CELLS ✓ MORE CO_2 LEAVE BLOOD ✓

- HIGH CO_2 CAUSE INCREASE IN HEART RATE ✓ 5

1743.