Hillcrest High School

Grade 11

Life Science Exam

Paper 1

November 2014

Time: 2 ½ hours

Examiner: Mr Mahabeer

150 Marks

Instructions

1. Write your Life Science teachers name on all booklets.
2. Number the answers exactly as the questions are numbered.
3. Write neatly and legibly
4. Do all drawings in pencil and label them in ink.
5. Only draw diagrams and flow charts when requested to do so.

SECTION A

Question 1

Various possible options are provided as answers to the following questions. Choose the correct answer and write only the letter (A-D) next to the question number(1.1.1-1.1.10) in your answer book, for e.g. 1.1.11 C

1.1.1. Thirty trout were netted from a farm dam, marked with plastic tags and then released. Later a sample of fifty trout was caught. Fifteen of these had tags. The best estimate of the trout population would be

A- $\frac{15}{30} \times \frac{50}{1}$

B- $\frac{30}{15} \times \frac{50}{1}$

C- $\frac{50}{30} \times \frac{30}{1}$

D- $\frac{30}{50} \times \frac{15}{1}$

1.1.2. The substance that enters the mitochondrion at the beginning of Krebs cycle of cellular respiration is

A- Glucose

B- Ethanol

C- Lactic acid

D- Pyruvic acid

1.1.3. Which one of the following hormones could increase the glucose concentration of blood?

A- Thyroxin

B- Insulin

C- ADH

D- glucogon

1.1.4. the following are involved in the process of cellular respiration

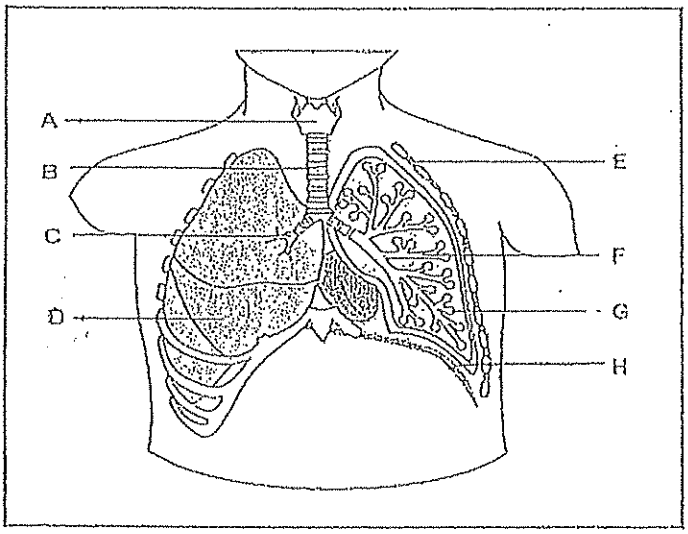
1. Energy
2. Carbohydrates
3. Carbon dioxide
4. Water
5. Oxygen

Which of the following equations correctly represent their involvement in the process of cellular respiration?

A- $2 + 3 = 1 + 4 + 5$
B- $2 + 4 = 1 + 3 + 5$
C- $1 + 2 = 3 + 4 + 5$
D- $2 + 5 = 1 + 3 + 4$

1. 1.5. During the dark phase of photosynthesis....
   A- ATP is formed
   B- Water is split
   C- Oxygen is released
   D- Energized hydrogen combines with carbon dioxide

Question 1.1.6 and 1.1.7 are based on the diagram below showing the human thorax



1.1.6. Which of the following are represented by A, D and H?
   A- Larynx, trachea, diaphragm
   B- Intercostal muscle, bronchus, larynx
   C- Larynx, lung, diaphragm
   D- Bronchiole, lung, alveolus

1.1.7. Which one of the following is a function of structure H?
   A- During inhalation it contracts and during exhalation it relaxes
   B- During inhalation it relaxes and during exhalation it contracts
   C- During inhalation it is arched and during exhalation it relaxes
   D- During inhalation it contracts and during exhalation it is flattened

1.1.8. Which one of the following substances does not pass from the blood into the sweat gland.

A- Nitrogenous waste
B- Water
C- Keratin
D- Sodium chloride

1.1.9. A localized aggregation of the same species

A- Population
B- Territoriality
C- Community
D- Natality

1.1.10. Which of the following statement about predation is CORRECT?

A- All carnivores are predators
B- The ratio of predators to prey fluctuates with time
C- Predation is interspecific competition
D- In a balanced habitat, there are more predators than prey

(Total20)

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 1.2.6) in the ANSWER BOOK.

1.2.1. The movement of individuals into a community
1.2.2. The thin fibrous outer covering of the lung
1.2.3. The leaf like structure covering the opening of the trachea
1.2.4. Compound glands between the villi of the duodenum
1.2.5. The gas given off during the process of aerobic respiration.
1.2.6. The exact location within the chloroplast, in which the dark phase of photosynthesis occurs.

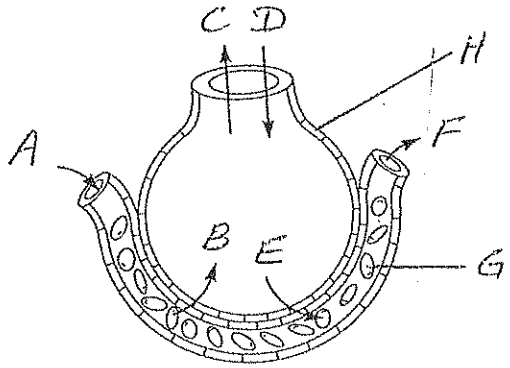
(Total 6)

1.3 . Indicate whether each of the statements in COLUMN I applies to **A ONLY, B ONLY, BOTH A AN D 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 1.3.10) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	C shaped cartilaginous rings	A- Trachea B- Oesophagus
1.3.2	Produced in the exocrine cells in the pancreas	A- Insulin B- Glucogon
1.3.3	Relationship between two different species where one benefits and the other is harmed	A- Mutualism B- Commensalism
1.3.4	Has excess amino acids	A- Hepatic portal vein B- Hepatic vein
1.3.5	Breathing muscle	A- Intercostal muscle B- Diaphragm muscle
1.3.6	The total head count of all individuals in a population.	A- Fertility rate B- Census

(Total 12)

1.4 The diagram below represents an alveolus and its blood capillary.



Indicate the letter on the diagram which represents each of the following. Write only the letter (A to G) next to the question number (1.4.1 to 1.4.5) in the answer book

1.4.1 Red blood corpuscle

1.4.2 Squamous epithelial cells of the alveolus

1.4.3 The direction in which most oxygen molecules will move between the alveolus and blood capillary

1.4.4 The area with the highest carbon dioxide concentration in the blood capillary

1.4.5 The area with the lowest oxygen concentration in the blood capillary

(Total 5)

a) Independent variable.
b) Dependent variable. (1)
(1)

2.2.3 Calculate the average time taken for the release of 20 bubbles for all colours. Show all working.
(2)

2.2.4 Express bubble production under violet, blue and green light as a ratio. (1)

2.2.5 Explain why the apparatus is left for 5 minutes under each colour of light before taking measurements.
(1)

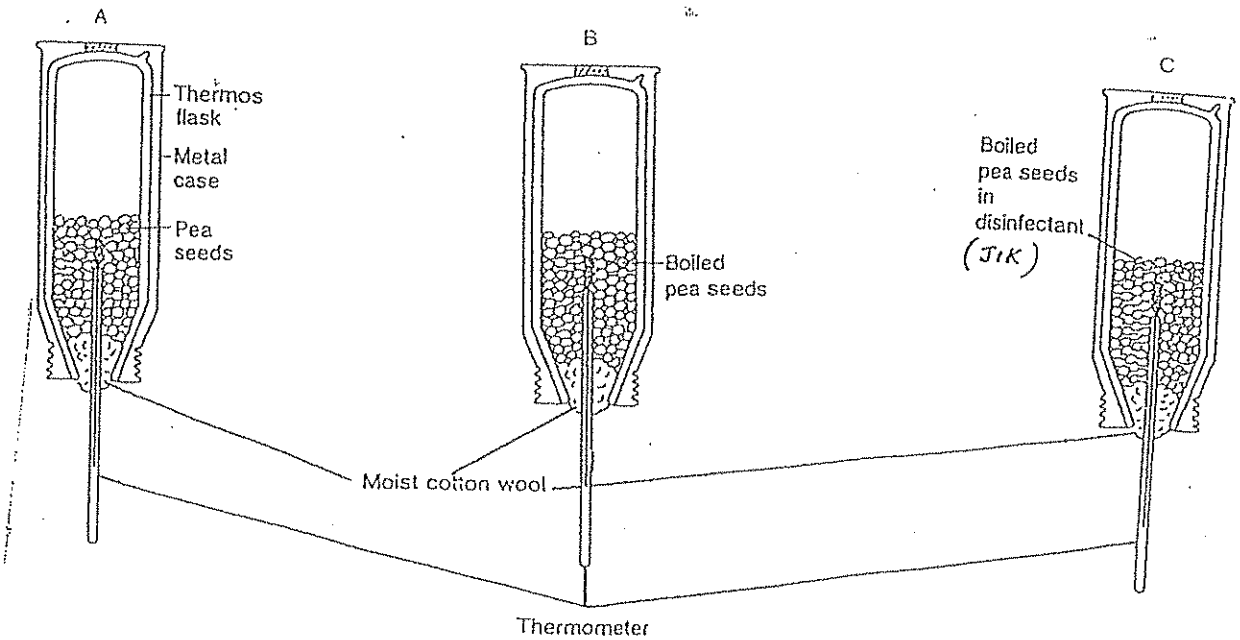
2.2.6 Without modifying the apparatus, how could the reliability of the results be increased?
(1)

2.2.7 Using the results, explain how, when white light shines on the plant, the leaves appear to be green.
(2)

2.2.8 Draw a bar graph of the results shown in the table. (6)

(Total 16)

2.3 The diagram below represents the apparatus used in an investigation to show that germinating pea seeds respire and therefore give off heat. Three thermos flasks A,B and C were set up as shown in the figure below. The temperature of each flask was noted at the beginning of the investigation, and each day during a week in school, the results were recorded in the table below.



	TEMPERATURE IN 0 °C		
	FLASK A	FLASK B	FLASK C
Day 1	24	24	24
Day 2	26	24	24
Day 3	27	24	24
Day 4	28	25	24
Day 5	29	26	24

2.3.1 State a reason for the use of thermos flasks rather than ordinary glass bottles. (1)

2.3.2 Why were the boiled seeds in flask C placed in disinfectant (Jik)? (1)

2.3.3 State TWO reasons why the flasks were kept upside down? (2)

2.3.4 Explain what will happen if rubber bungs/stoppers were put in the necks of the flask instead of cotton wool. (2)

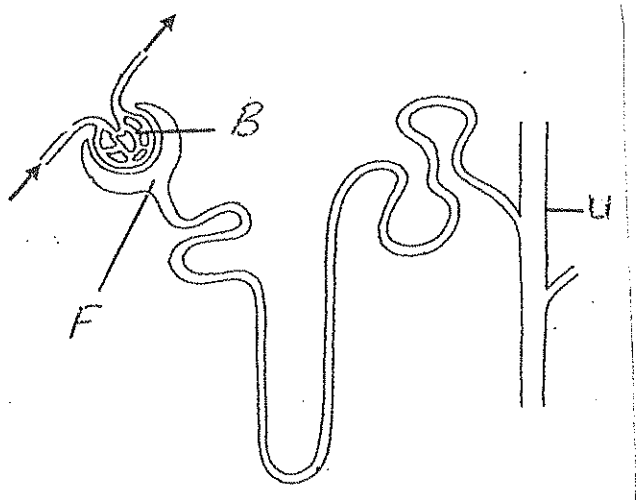
2.3.5 Flask B and C were intended to be controls for flask A. Which one was the true control? Provide an explanation for your answer. (2)

2.3.6 Draw and label the organelle in which energy release takes place. (5)

(Total 13)

Question 3:

3.1 The following diagram represents a nephron and part of its blood supply, the concentrations of some of the substances found in the blood (B), the filtrate (F) and urine (U) are given in the table below the diagram.



	BLOOD	FILTRATE	URINE
Substance	g/100 mℓ/hour	g/100 mℓ/hour	g/100 mℓ/hour
Urea	0,03	0,03	2,00
Glucose	0,10	0,10	0,00
Amino acids	0,50	0,50	0,00
Salt (NaCl)	0,72	0,72	1,50
Proteins	8,00	0,00	0,00
Creatinine	0,0010	0,0010	0,1000
Uric acid	0,0020	0,0020	0,0300
Ammonia	0,0001	0,0001	0,0500
Total flow per hour	14,00 ℓ	2,80 ℓ	0,05 ℓ

3.1.1 (i) Which of the substance present in the filtrate, was completely reabsorbed into the bloodstream? (1)

(ii) Why is it important for the body to reabsorb this substance? (1)

3.1.2 Name TWO substances that became the most concentrated in urine? (2)

3.1.3 (i) Which of the substances did not pass from B to F? (1)

(ii) Give a reason for your answer. (1)

3.1.4 State one way in which the information in the table would differ if it referred to a patient suffering from diabetes mellitus before treatment (2)

3.1.5 (i) How many grams of urea would be excreted per day if these flow rates were to remain constant? Show all calculations. (2)

(ii) What percentage of the blood flowing through B is filtered into F? (2)

(Total 12)

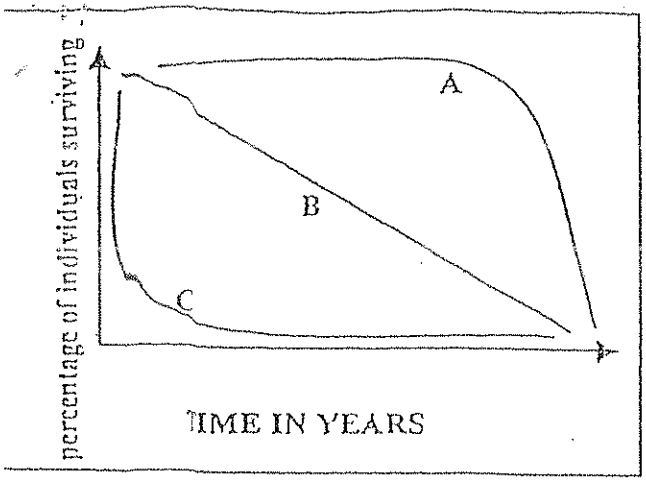
3.2 Study the following passage and the graphs below the passage and answer the questions based on the passage and the graphs:-

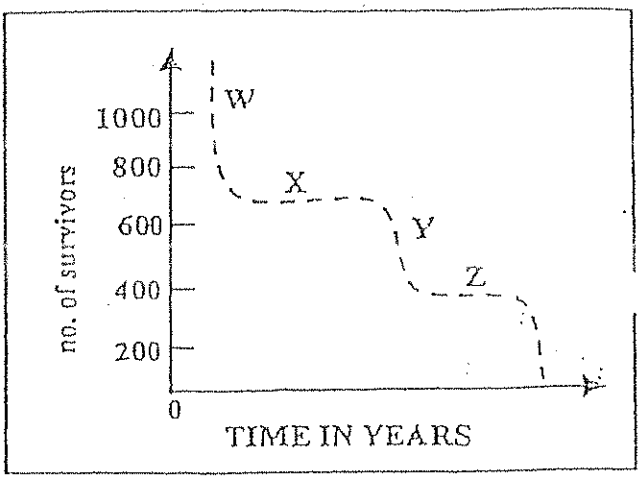
Durban residents were told that they had nothing to fear from the so-called invasion of the moth larvae, or to use the every-day term "army worm", found on white walls around lights. The worms are harmless to people, they lay their eggs on long grass at night at temperatures greater than 24°C, hatch within three days and cause most damage to young succulent grasses and crops before people actually notice them.

Homeowners were recommended to use synthetic pyrethroid, which is environment-friendly and non-toxic to warm-blooded animals, to kill the worms. This army worm is not indigenous to this province but is prevalent in Tanzania, Kenya, Zambia and Zimbabwe. It migrates down from central Africa when "climatic conditions are appropriate".

There is a similar worm called the "lesser army worm" which occurs in this province, but it is not nearly as damaging to crops.

Abridged article from The Natal Mercury, Tuesday 8 April 2003 entitled "Fear not the Worms, says experts"





3.2.1 Which of graphs A, B or C on Figure 1 applies to the moth larvae? Quote a line from the passage to substantiate your answer. (2)

3.2.2 Name TWO density independent factors that allowed for the increase in the growth of the moth larvae. (2)

3.2.3 Suggest a reason for each of the following:-

(i) "the army worms lay their eggs on long grass"

(ii) "the use of a synthetic pyrethroid"

(iii) "the worms migrate down from central Africa". (3)

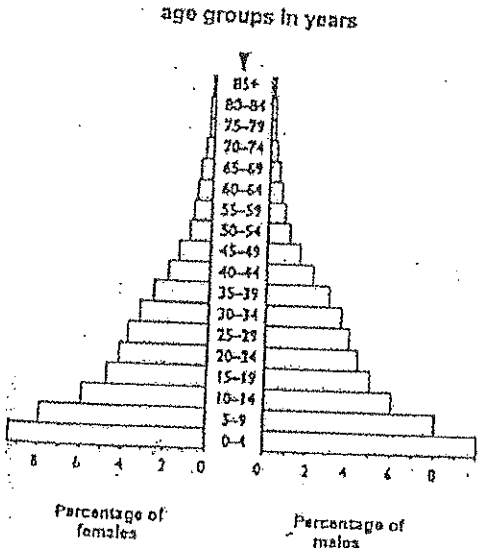
3.2.4 A leading Kwa-Zulu entomologist (a person that studies insects) decided to work out the number of worms that occurred in Kwa-Mashu. The total area in Kwa-Mashu where the worms occurred was 2000m^2. He chose five 10m^2 plots and found 120, 100, 150, 130 and 100 worms in each plot respectively.

(i) Using the quadrat method, estimate the total number of worms in the Kwa-Mashu area. Show all calculations. (5)

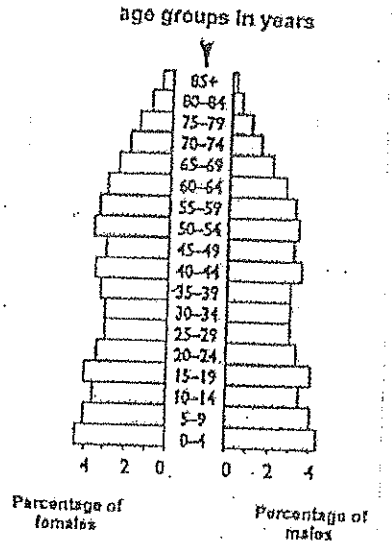
(ii) Describe two ways how entomologist could improve the reliability of these results. (2)

(Total 14)

3.3 The diagram below represents the age distribution of the human population of a developed country and a developing country in one year at a certain time.



Age Pyramid A



Age Pyramid B

3.3.1 What percentage of the female population is aged between 5 and 9 years in pyramid A? (1)

3.3.2 Which age group makes up exactly 5% of the male population in pyramid A? (1)

3.3.3 What percentage of the female population are aged 65 to 69 years in pyramid B? (1)

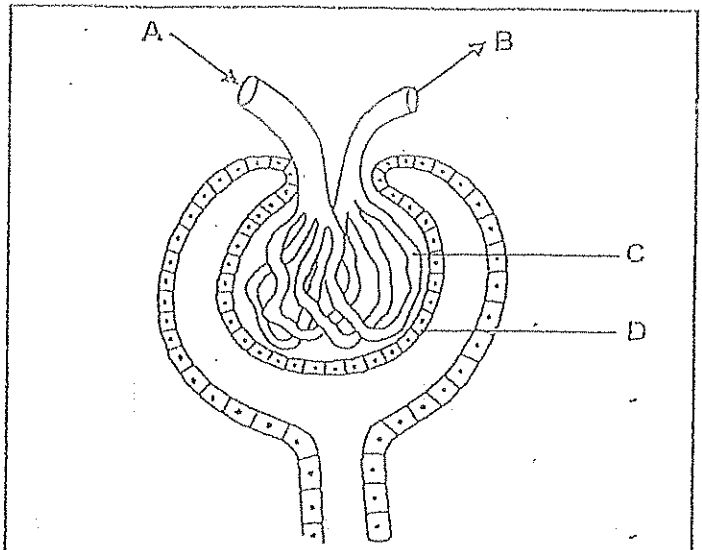
3.3.4 Which group (male or female) has the larger percentage reaching old age in pyramid B? (1)

3.3.5 Which pyramid represents the population distribution of a developed country. (1)

3.3.6 Give TWO reasons for your answer in Question 3.3.5 (2)

(Total 7)

3.4 Study the diagram below and answer the questions that follow.



Malpighian body of a human nephron

3.4.1	In which region of the kidney would you find this structure?	(1)
3.4.2	Name the process in urine formation that occurs in this structure.	(1)
3.4.3	Identify part C.	(1)
3.4.4	Describe TWO structural adaptations of part C for the process in Question 3.2.2 above.	(2)
3.4.5	Part A is wider than part B. What is the importance of this?	(2)

(Total 7)

QUESTION 4

Everyliving cell requires food, oxygen and water for its survival.

In an essay describe the path and changes that occur to a slice of bread from the time it is eaten until the digested food first reaches the liver

Content: (17)

Synthesis: (3)

NOTE: NO marks will be awarded for answers in the form of flow charts or diagrams.

GRAND TOTAL: 150