Hillcrest High School

Grade 11

Life Science Exam

Paper 1

November 2013

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.

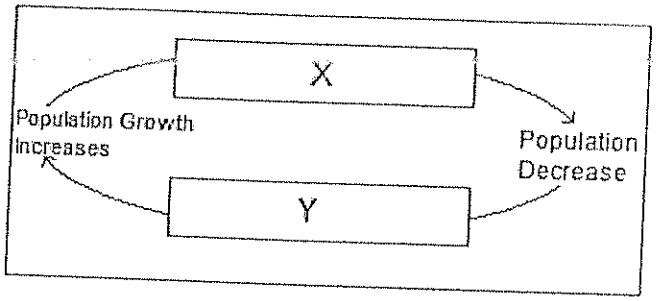
SECTION A

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 In the diagram below, which of these factors would be suitable to put into Y?

i. Mortality.
ii. Natality
iii. Immigration



A- (i) and (ii)
B- (i) and (iii)
C- (ii) and (iii)
D- (i), (ii) and (iii)

1.1.2 The lungs of a long-term smoker will have...

A- Constricted bronchioles.
B- Thinner walls.
C- A large surface area.
D- An increased capacity for gaseous exchange.

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

A- Amylase.
B- Insulin.
C- Starch.
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.

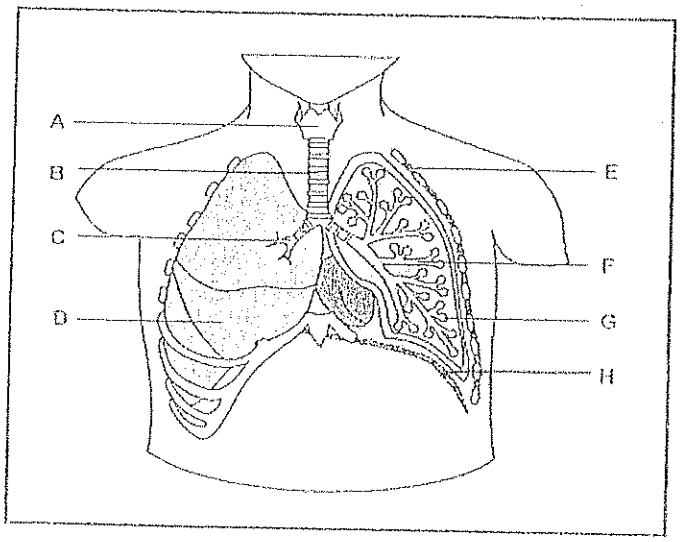
Which ONE of the following equations correctly represent their involvement in the process of cellular respiration?

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- Energised hydrogen combines with carbon dioxide.

Questions 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 G?

A- Larynx, trachea, diaphragm.
B- Intercostal muscle, bronchus, larynx.
C- Larynx, lung, alveolus.
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- Urea.
B- Water.
C- Keratin.
D- Sodium chloride.

1.1.9 A localised aggregation of the same species.

A- Population.
B- Territoriality.
C- Altraism.
D- Natality.

1.1.10 Which of the following statement about predation is CORRECT?

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

(Total 20)

Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1 -1.2.6) in your answer book.

1.2.1 The movement of individuals out of a community.

1.2.2 The thin fibrous outer covering of the kidney.

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 required for the process of aerobic respiration.

1.2.6 The exact location within the chloroplast, in which the dark phase of photosynthesis occurs.

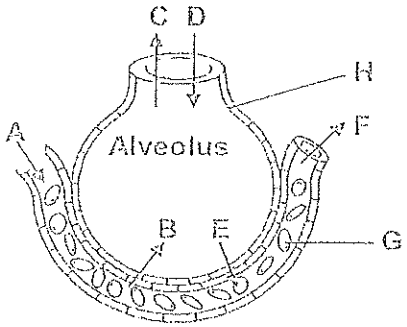
(Total 6)

1.3 For each of the following statements in column one, state whether it applies to A only, B only, both A and B, or neither A nor B. Write A only, B only, both A and B, or None next to the question number in your answer book.

	COLUMN A	COLUMN B
1.3.1	Occurs in the liver.	A. Deamination. B. Hydrolyses.
1.3.2	Produced in the exocrine cells in the pancreas.	A. Insulin. B. Glucogon.
1.3.3	O_2 is the final acceptor of hydrogen atoms.	A. Krebs cycle. B. Oxidative phosphorylation.
1.3.4	Has excess amino acids.	A. Hepatic portal vein. B. Hepatic vein.
1.3.5	Breathing muscle.	A. Intercostal muscles. B. Diaphragm muscles.
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, for example 1.4.6 H.

1.4.1 Red blood corpuscle. (1)

1.4.2 Squamous epithelial cells of the alveolus. (1)

1.4.3 The direction in which most oxygen molecules will move between the alveolus and blood capillary. (1)

1.4.4 The area with the highest carbon dioxide concentration in the blood capillary. (1)

1.4.5 The area with the lowest oxygen concentration in the blood capillary. (1)

(Total 5)

1.5 Choose a term from the list below that matches each of the following examples of social behavior. Write only the letter (A to F) next to the question number (1.5.1 to 1.5.7) in the ANSWER BOOK, for example 1.5.8 G.

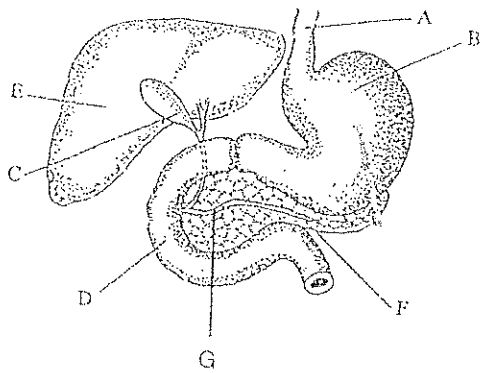
A- Resource partitioning.
B- Intraspecific competition.
C- Commensalism.
D- Mutualism.
E- Interspecific competition.
F- Parasitism.

1.5.1 Peacocks display the large, brightly-coloured feathers of their tails.
1.5.2 A hippo deposits a mixture of dung and urine on the edge of a graving area.
1.5.3 Vultures and crows feed on the same carcass.
1.5.4 A remora fish attached to a shark gets left overs when the shark feeds.
1.5.5 Bees visit flowers to get nectar whilst pollen attaches to their bodies.
1.5.6 Different animals feed on different types of vegetation like grass, shrubs and trees.
1.5.7 Mosquitoes bite and deposit the malaria-causing organism into the blood of a human.

(Total 7)

Question 2

2.1 The following drawing shows part of the human digestive system and associated organs. Study the diagram and answer the questions that follow.



2.1.1 Name the parts labeled A, B, C and F. (4)

2.1.2 Name the digestive juice produced in B. (1)

2.1.3 State two functions of the digestive juices in 2.1.2. (2)

2.1.4 Name the substance stored in C. (1)

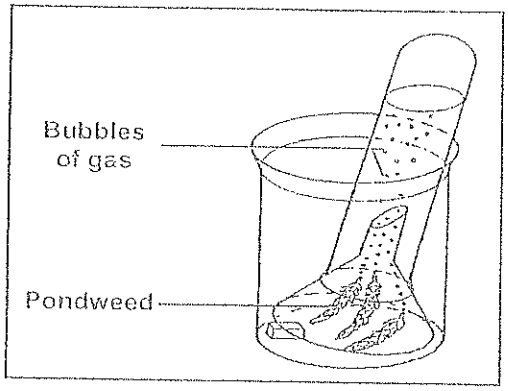
2.1.5 Why is the substance in 2.1.4 necessary for the digestion of lipids and fats? (1)

2.1.6 Explain why organ F is both an exocrine gland and an endocrine gland. (2)

(Total 11)

2.2 When light shines on pondweed, Elodea sp, bubbles of gas are released. The rate at which bubbles of gas are produced can be used to measure the rate of photosynthesis. An investigation was carried out to study the effect of different colours of light on the rate of photosynthesis in the pondweed.

- The pondweed was exposed to one colour of light and left for 5 minutes before measurements were taken.
- The time taken for the release of 20 bubbles was recorded.
- The procedure was repeated using light of a different colour of equal intensity.
- The apparatus was set up as shown in the diagram.



The results are shown in the table below.

COLOUR OF LIGHT	TIME TAKEN TO RELEASE 20 BUBBLES (SECONDS)
Violet	80
Blue	40
Green	160
Yellow	140
Red	70

2.2.1 Which colour light is the best for photosynthesis? (1)

2.2.2 State the :

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

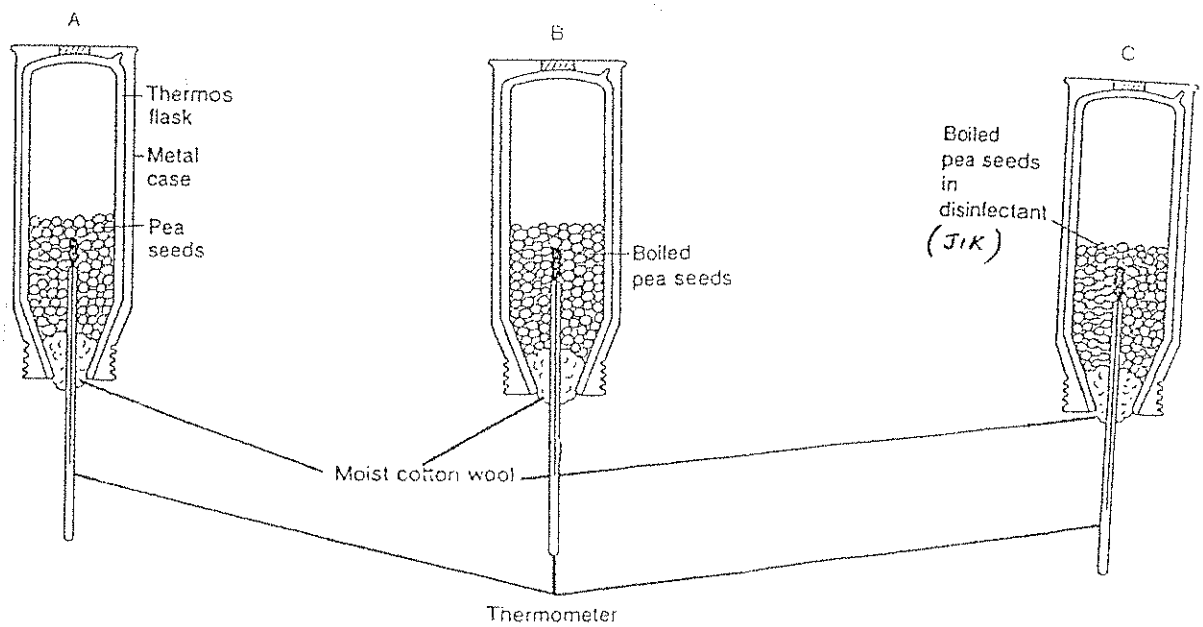
2.2.6 Without modifying the apparatus, how could the reliability of the results be increased? (1)

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)

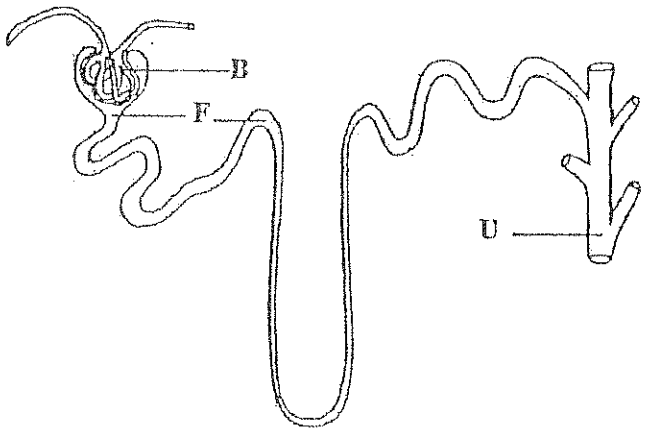
2.3.5 Flask B and C were intended to be controls for flask A. Which one was the true control? Provide an explanation for your answer. (2)

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.



	Structure B	Structure F	Structure U
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"

Figure 1

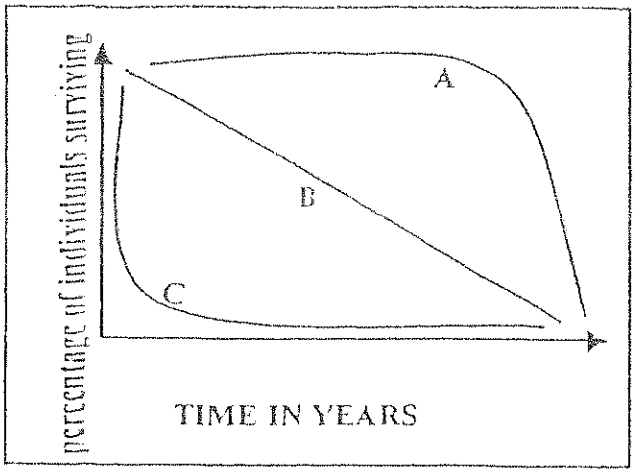
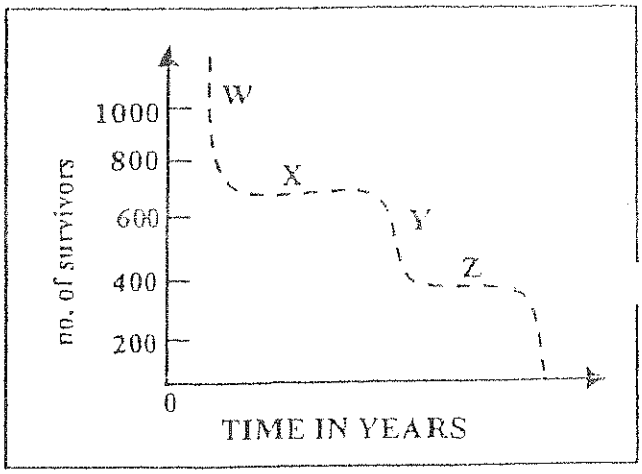


Figure 11



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)

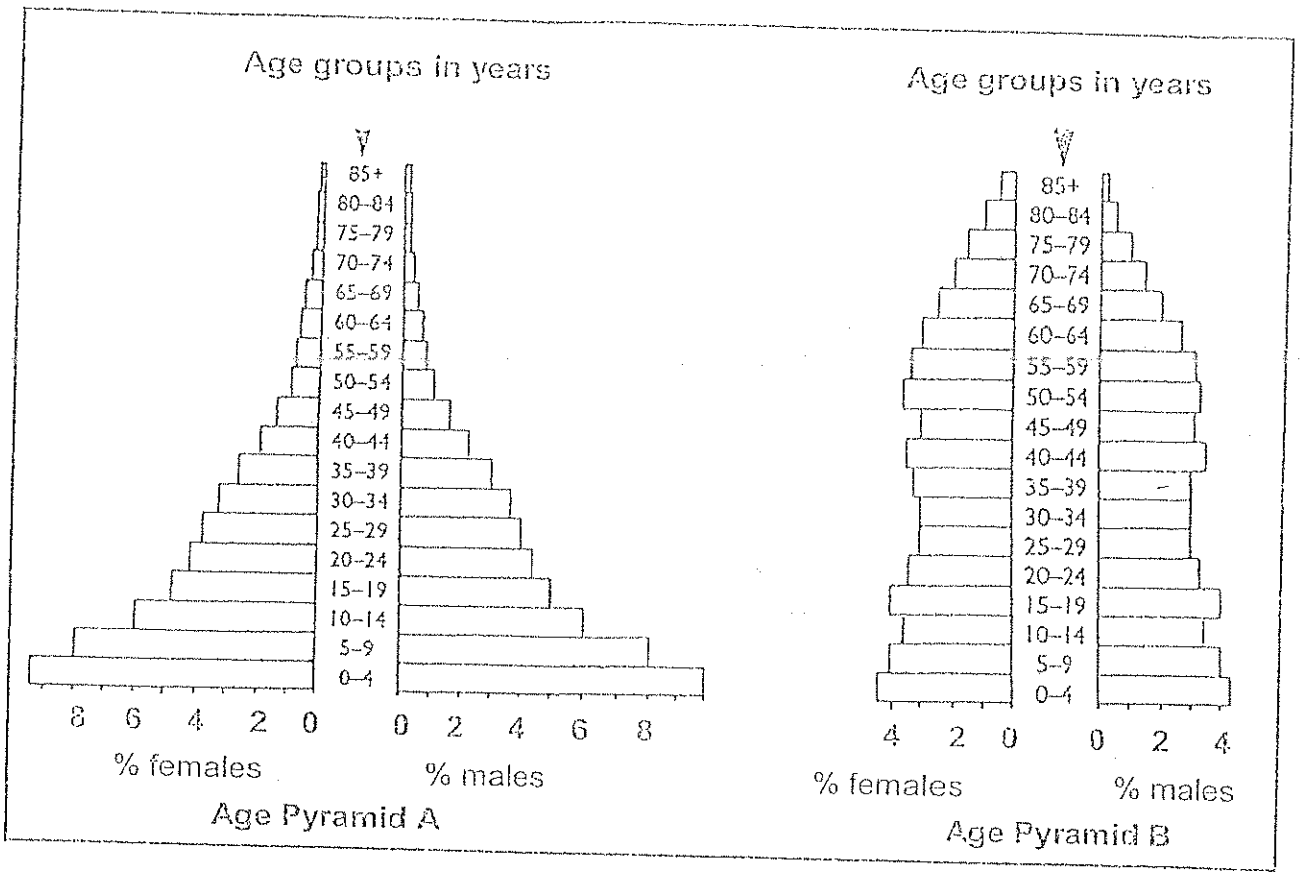
3.2.4 A leading Kwa-Zulu entomologist (a person that studies insects) decided to work out the number of worms that occurred in Kwa-Mashu. The total area in Kwa-Mashu where the worms occurred was 2000m^2. He chose five 10m^2 plots and found 120, 100, 150, 130 and 100 worms in each plot respectively.

(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.



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)

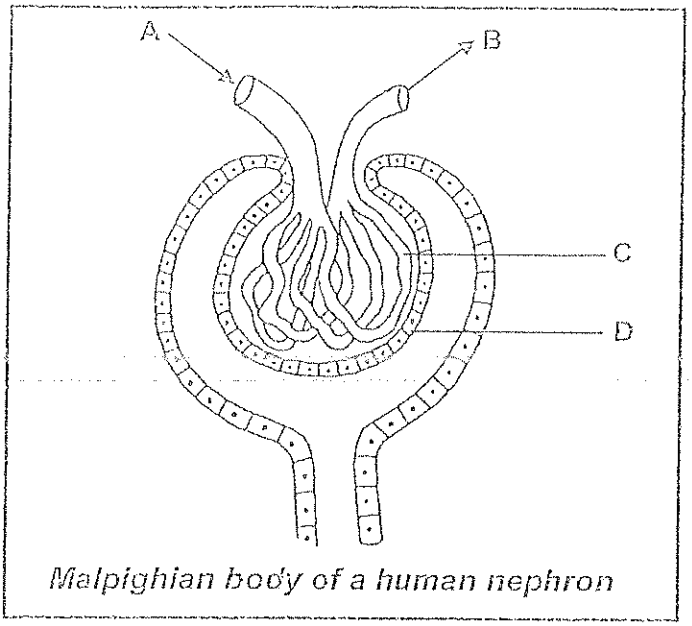
3.3.4 Which group (male or female) has the larger percentage reaching old age in pyramid B? (1)

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

Humans need a constant supply of oxygen because they respire aerobically.

Describe how the air PASSAGES and the LUNGS are structurally suited for efficient intake of oxygen

Content: (17)

Synthesis: (3)

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

GRAND TOTAL: 150