

HILLCREST HIGH SCHOOL

LIFE SCIENCES

GRADE 11

Life Science Exam Paper Two

Examiner: Mr Mahabeer

Moderators: Mrs L. Prior
Mrs R. Harmse

TIME: 2 $\frac{1}{2}$ hours

MARKS: 120

Instructions:

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 instructions of each question
6. Make 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 correct answer and write only the letter (A -D) next to the question number (1.1.1 – 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Disease causing agents are called...

- A. Antibodies
- B. Vaccines
- C. Antibiotics
- D. Pathogens

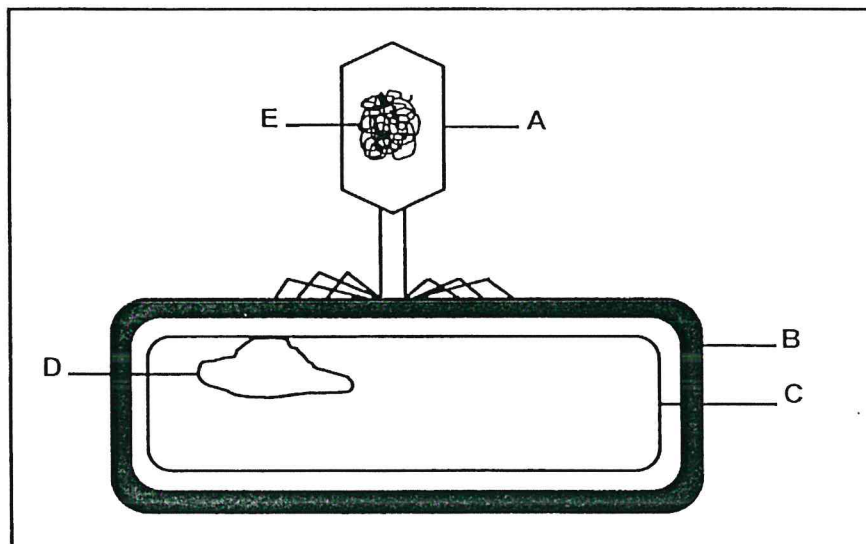
1.1.2 Sponges are a phylum of animals formally known as...

- A. *Cnidaria*
- B. *Porifera*
- C. *Platyhelminthes*
- D. *Arthropoda*.

1.1.3 Cephalisation is generally associated with all of the following except:

- A. Bilateral symmetry
- B. Concentration of sensory structures at the anterior end.
- C. A brain
- D. Sessile existence

1.1.4 Which structure in the diagram below represents viral RNA?



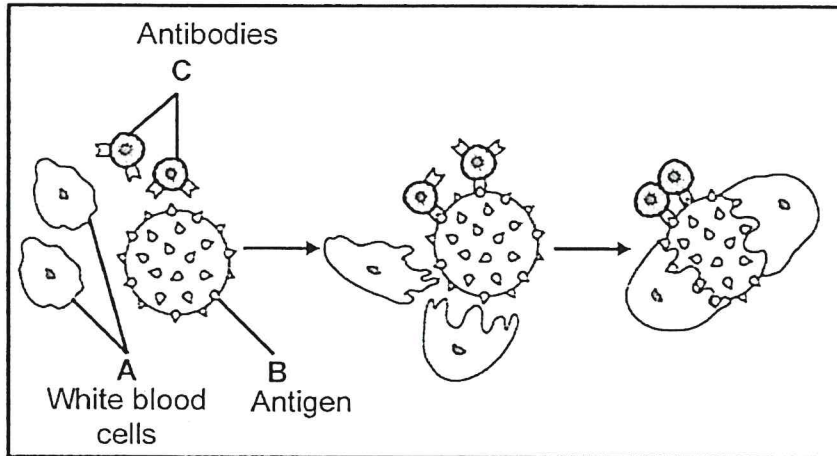
- A. Structure B
- B. Structure C
- C. Structure D
- D. Structure E

1.1.5 Mushrooms are a type of fungus. What characteristic of fungi makes them different from plants?

- A. Fungal cells are eukaryotic
- B. Fungi are multicellular
- C. Fungi are heterotrophic
- D. Fungi have cell walls

1.1.6 The diagram below illustrates activities taking place in a human body.

Based on the diagram, vaccinations usually stimulate the body to produce more of...



- A. Structure A only.
- B. Structure B only.
- C. Structures A and C only.
- D. Structures A, B and C.

1.1.7 Which characteristic is shared by *Cnidarians* and *Platyhelminthes*?

- A. Dorsoventrally flattened bodies
- B. Radial symmetry
- C. A digestive system with a single opening
- D. A distinct head

1.1.8 Which row in the table below correctly pairs a human activity with its impact in the environment?

	<u>Human activity</u>	<u>Impact</u>
A	Decrease in the use of pesticides	Erosion of rock in soil
B	Increase in housing developments	Improvement in air quality
C	Increase in human population	Reduction in water usage
D	Decrease in recycling	Reduction in amount of available resources

QUESTIONS 1.1.9 AND 1.1.10 REFER TO THE GRAPH AND TABLE BELOW:

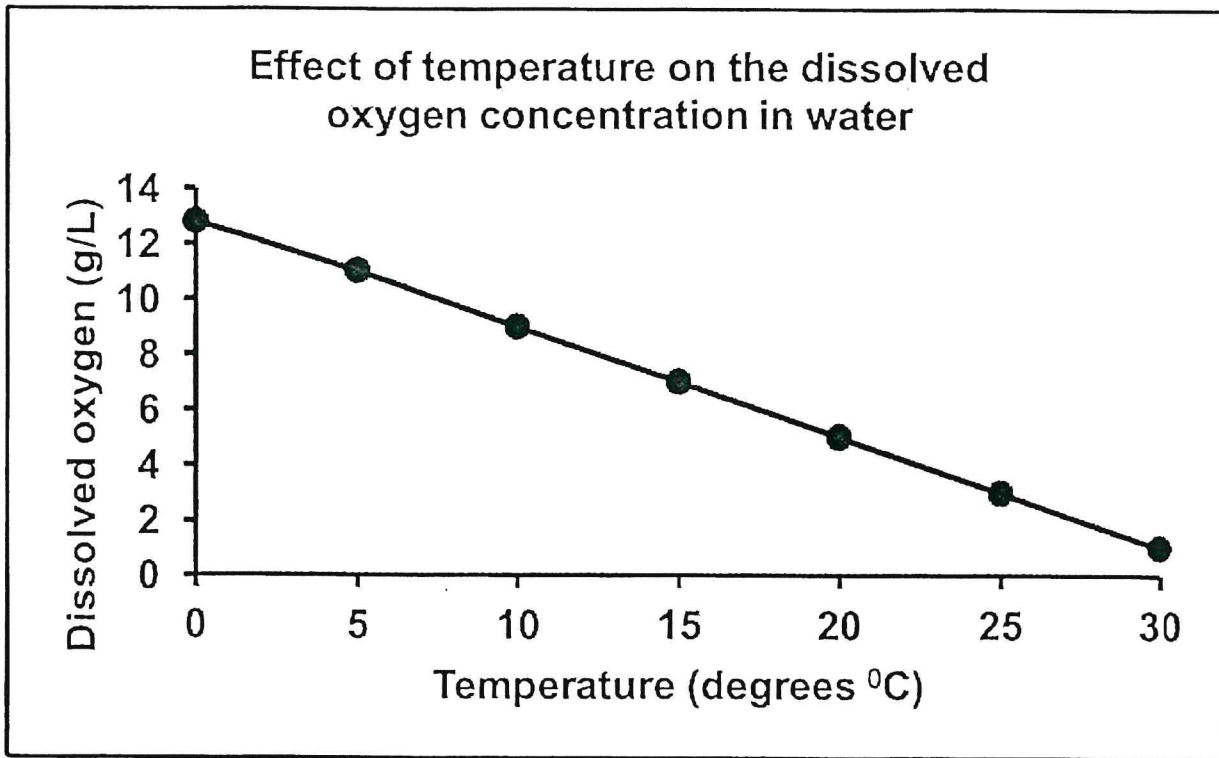


Table of oxygen requirements of different organisms in a river.

Animal	Striped Bass	Shad	Yellow perch	Clams	Blue Crab	Spot fish	Worms
Minimum oxygen requirements (mg/L)	6	5	5	4	3	2	1

1.1.9 Thermal pollution causes the level of dissolved oxygen in water to...

- A. Decrease.
- B. Increase and then decrease.
- C. Remain unchanged.
- D. Increase.

1.1.10 Due to the release of water from a factory, the temperature of water in a stream is 30°C.

Two organisms that are likely to be found living in the stream are...

- A. Striped bass and blue crab.
- B. Worms and clams.
- C. Worms and spot fish.
- D. Yellow perch and spot fish.

[10X2=20]

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 Measurement of the total amount of carbon dioxide emissions of an individual per year.
- 1.2.2 The death of all numbers of a particular species.
- 1.2.3 The average number of children born in one generation per female of child bearing age.
- 1.2.4 The total count of all individuals in a population.
- 1.2.5 The permanent movement of organisms out of a specific area.
- 1.2.6 The male part of the flower
- 1.2.7 Animals that remain attached to the substrate for their entire life cycle
- 1.2.8 The tissue layer which gives rise to the outer covering of the animal
- 1.2.9 Type of symmetry in which an animal can be cut in any vertical plane through its central axis to give two mirror images
- 1.2.10 Shedding of the exoskeleton in arthropods to allow growth

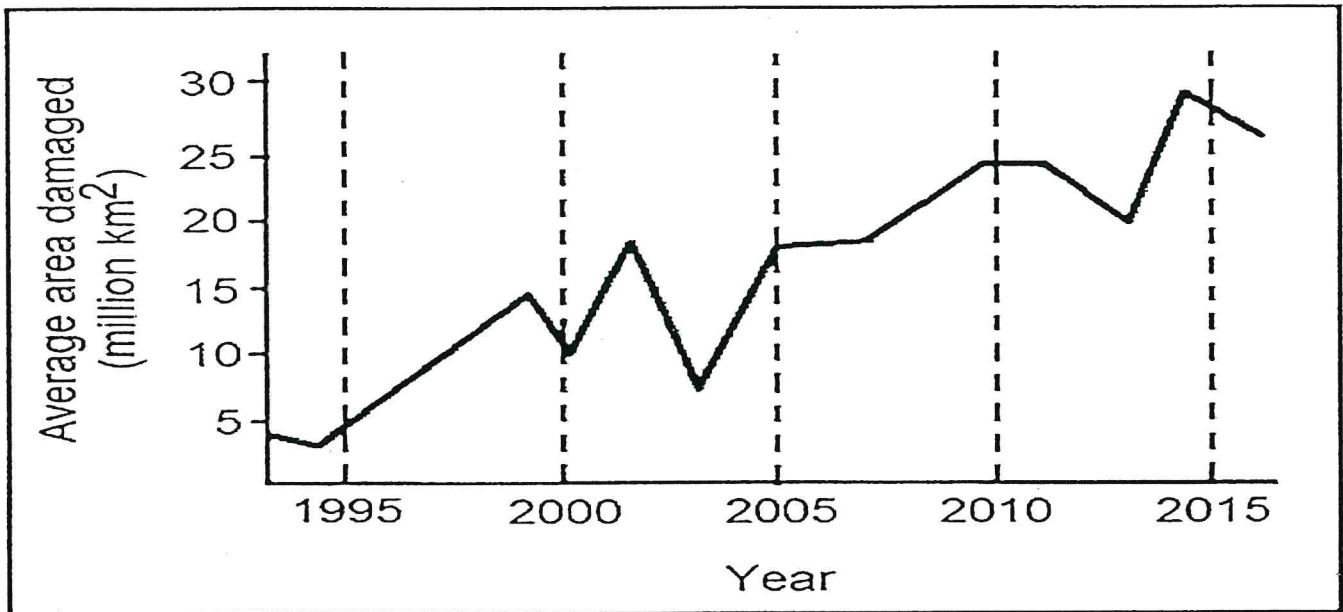
[10x1=10]

1.3 Indicate whether each of the statements in COLUMN A applies to **A only**, **B only**, **both A and B** or **None** of the items in COLUMN B. Write **A only**, **B only**, **both A and B** or **None** next to the question number (1.3.1 – 1.3.5) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Reduces greenhouse gases in the atmosphere	A. Landfill sites B. Deforestation
1.3.2 Decreases biodiversity	A. Alien plant invasion B. Urbanisation
1.3.3 Triploblastic animals with a blind gut	A. Platyhelminthes B. Annelida
1.3.4 Simple sampling	A. Indirect technique B. Direct technique
1.3.5 A relationship between two organisms that live together for the benefit of one	A. Commensalism B. Mutualism

[5x1=5]

1.4 Chlorofluorocarbons (CFCs) unfortunately have caused considerable damage to the ozone layer, resulting in the formation of big holes. The graph below shows the extent of the damage in the Antarctic ozone layer.



1.4.1 During which year was the "hole" in the Antarctic area the:

- a) Smallest? (1)
- b) Largest? (1)

1.4.2 What was the area of the 'hole' (millions km²) in the years:

- a) 2000 (1)
- b) 2005 (1)

1.4.3 Suggest ONE solutions to ozone depletion. (1)

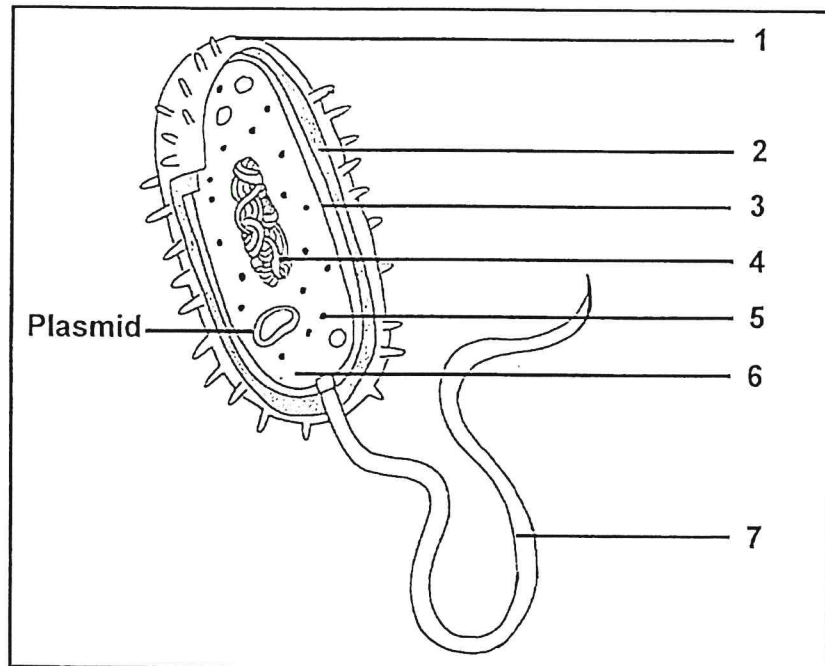
[5]

TOTAL SECTION A: 40 MARKS

SECTION B

Question 2

2.1 The diagram below is that of a bacterial cell.



2.1.1 Identify parts labelled 5 and 7. (2)

2.1.2 State the function of the part 4. (1)

2.1.3 Provide the letter of the part that performs the following functions.

a) Prevents desiccation of the organism. (1)

b) Allows the movement of the organism. (1)

[5]

2.2 A mycorrhiza is a mutualistic relationship between fungal hyphae and the roots of true plants. The hyphae increase the absorptive surface of the plant's root by aiding in the absorption of water, phosphorus and other mineral ions from the soil to the roots of plants. The plant is photosynthetic and provides the fungus with carbohydrates.

Scientists conducted an experiment to determine the effect of mycorrhizal associations on plant growth. The experiment was conducted as follows:

- Two groups of plants were grown.
- One group was planted in soil that had been sterilised.
- The other group was planted in the same type of soil but the soil had not been sterilised.
- All other factors remained the same between the two groups.
- The plants were allowed to grow for 8 weeks.
- Each week, the height (in centimetres) of each plant was measured.

The table below shows the growth of the plants over the 8-week period.

Week	Height of plants grown in sterilised soil (cm)	Height of plants grown in non-sterilised soil (cm)
1	0,8	2,0
2	1,5	5,5
3	2,0	8,7
4	2,3	10,0
5	2,4	12,0
6	3,8	16,2
7	5,0	19,1
8	6,0	25,0

2.2.1 Define *mutualism*. (1)

2.2.2 Describe the mutualistic relationship between the fungus and the plants. (2)

2.2.3 Identify the:

a) Independent variable (1)

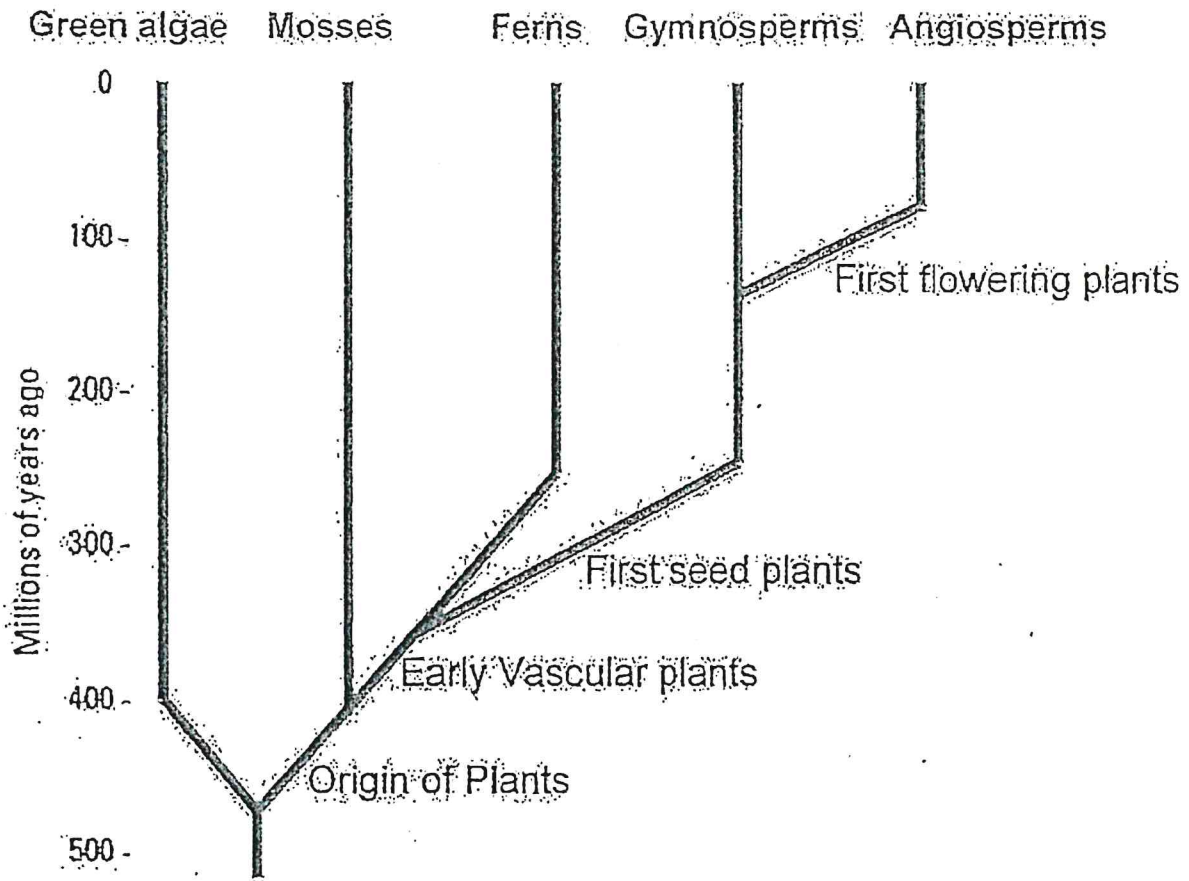
b) Dependent variable (1)

2.2.4 Describe ONE way in which the scientists ensured that the results of this investigation are valid. (1)

2.2.5 Use the data in the table above to draw two line graphs. Both sets of data must be drawn on one set of axes (5)

[11]

2.3 Study the phylogenetic tree showing possible relationships amongst the different plant groups.



2.3.1 According to the phylogenetic tree:

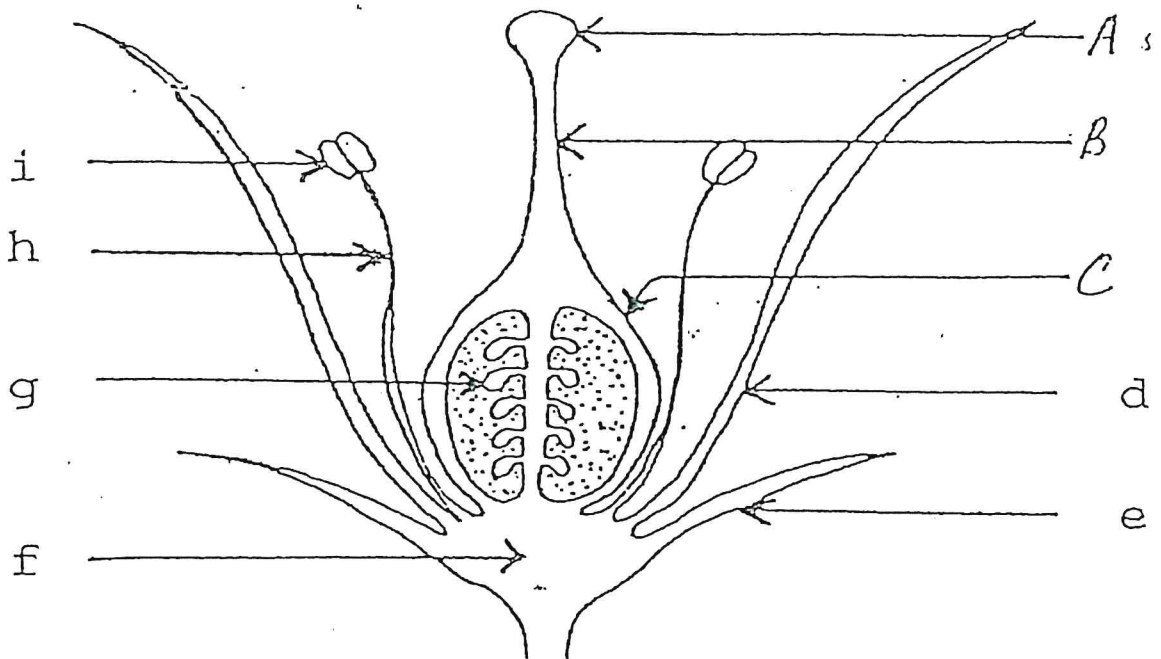
- How long ago did the mosses first appear? (1)
- How long after the mosses did the first ferns appear? (1)
- Which was the most recent plant group to appear on earth? (1)
- What characteristic do ferns, gymnosperms and angiosperms have in common? (1)

2.3.2 Name TWO plant groups represented that produce seeds. (2)

2.3.3 List TWO characteristic of seeds that make seed-bearing plants more successful over seedless plants. (2)

[8]

2.4 The drawing represents a flower of an angiosperm



2.4.1 Give ONE reason why the flower of this plant is classified as an angiosperm. (1)

2.4.2 Give the labels for A, B and C (3)

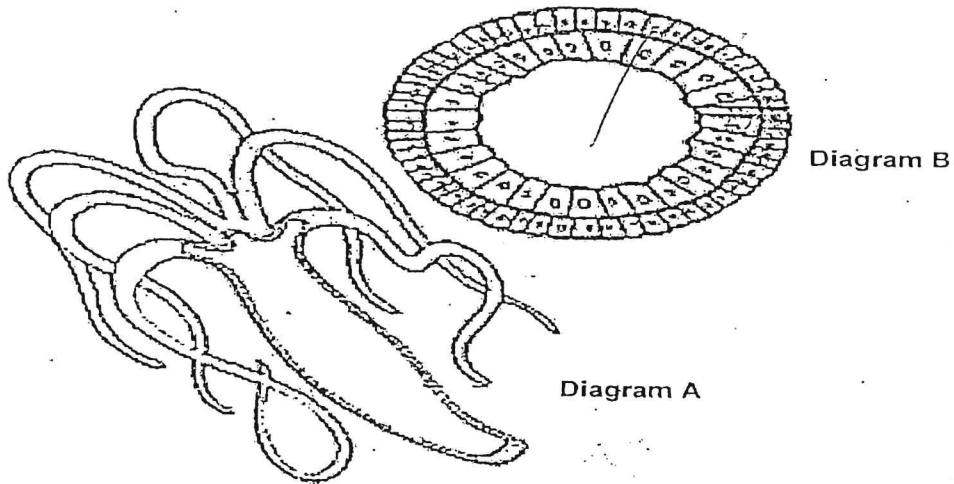
2.4.3 Which letter refers to the whorl that is important for insect pollination? (1)

2.4.4 a) Is this the flower likely to be self-pollinated or cross-pollinated? (1)

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

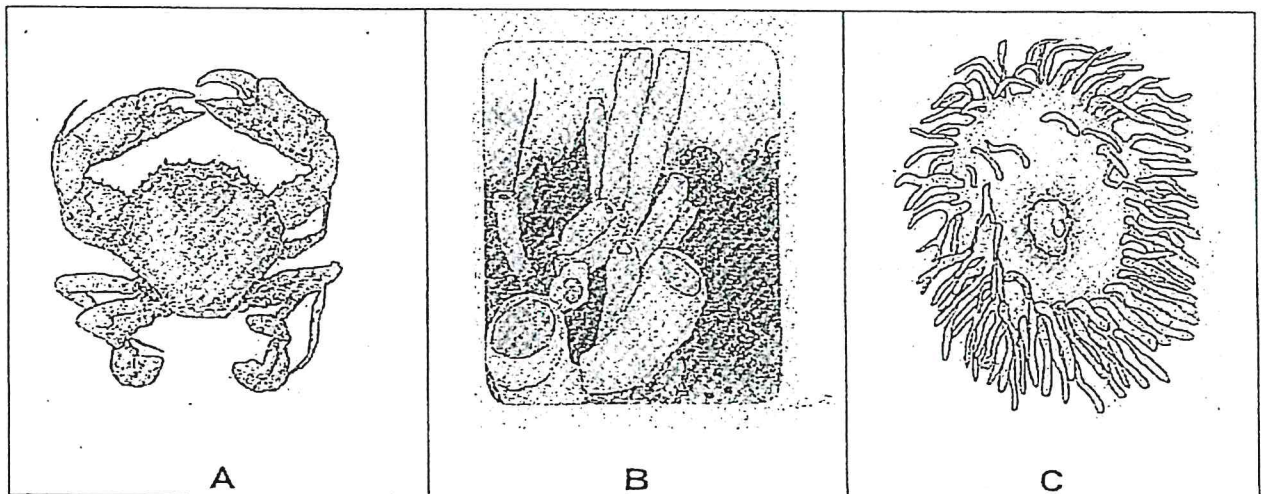
[7]

2.5 Diagram A shows a complete animal while Diagram B shows a cross section through the body of the same animal.



- 2.5.1 Identify the phylum to which the organism belongs. (1)
- 2.5.2 What type of gut does the organism have? (1)
- 2.5.3 Explain ONE disadvantage of the type of gut named in Question 2.5.2. (1)
- 2.5.4 Explain ONE importance of the development of a coelom. (1)
- [4]**

2.6 Study the diagram which represents three aquatic animals and answer the questions that follow.

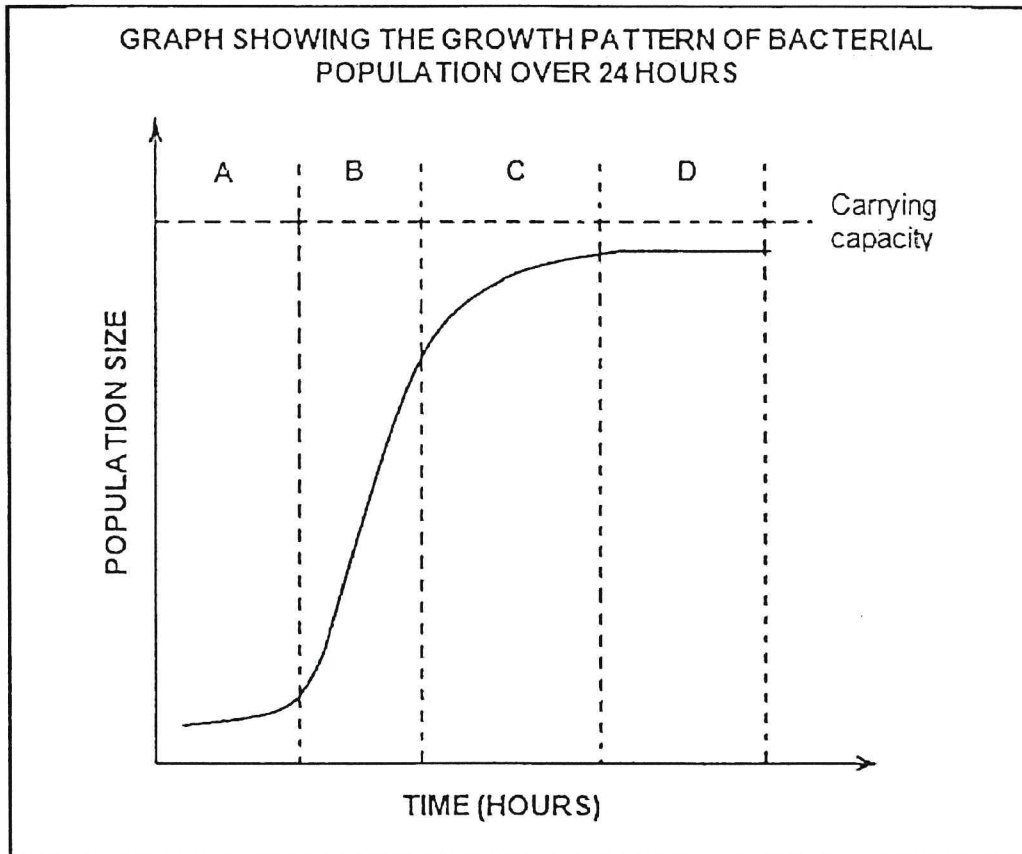


- 2.6.1 What kind of symmetry does each of the animals possess? (3)
- 2.6.2 Explain the advantage of the type of symmetry in A (2)
- [5]**

TOTAL QUESTION 2: 40 MARKS

Question 3

3.1 The graph below shows the growth pattern of a bacterial population in a petri dish over 24 hours.



3.1.1 Identify the growth pattern illustrated in the above graph. (1)

3.1.2 Name the phases A, B and D (3)

3.1.3 During which phase:

- a) Does natality equal mortality? (1)
- b) Is population growth the fastest? (1)
- c) Does natality exceed mortality to the greatest extent? (1)
- d) Does environmental resistance come into effect? (1)

3.1.4 Which phase is not shown in this diagram? (1)

3.1.5 Define carrying capacity. (1)

[10]

3.2 A group of students wanted to determine the population size of two species of butterflies. Their results are indicated in the table below.

	October 2004	November 2004	
	Number marked and released in first sample	Number in recaptured / second sample	Number marked in recapture / second sample
Species A	20	300	10
Species B	25	75	05

3.2.1 Define the term population. (2)

3.2.2 Estimate the number of butterflies of species A in the area by using the formula:

$$P = \frac{F \times S}{M}$$

F = Number caught in the first sample

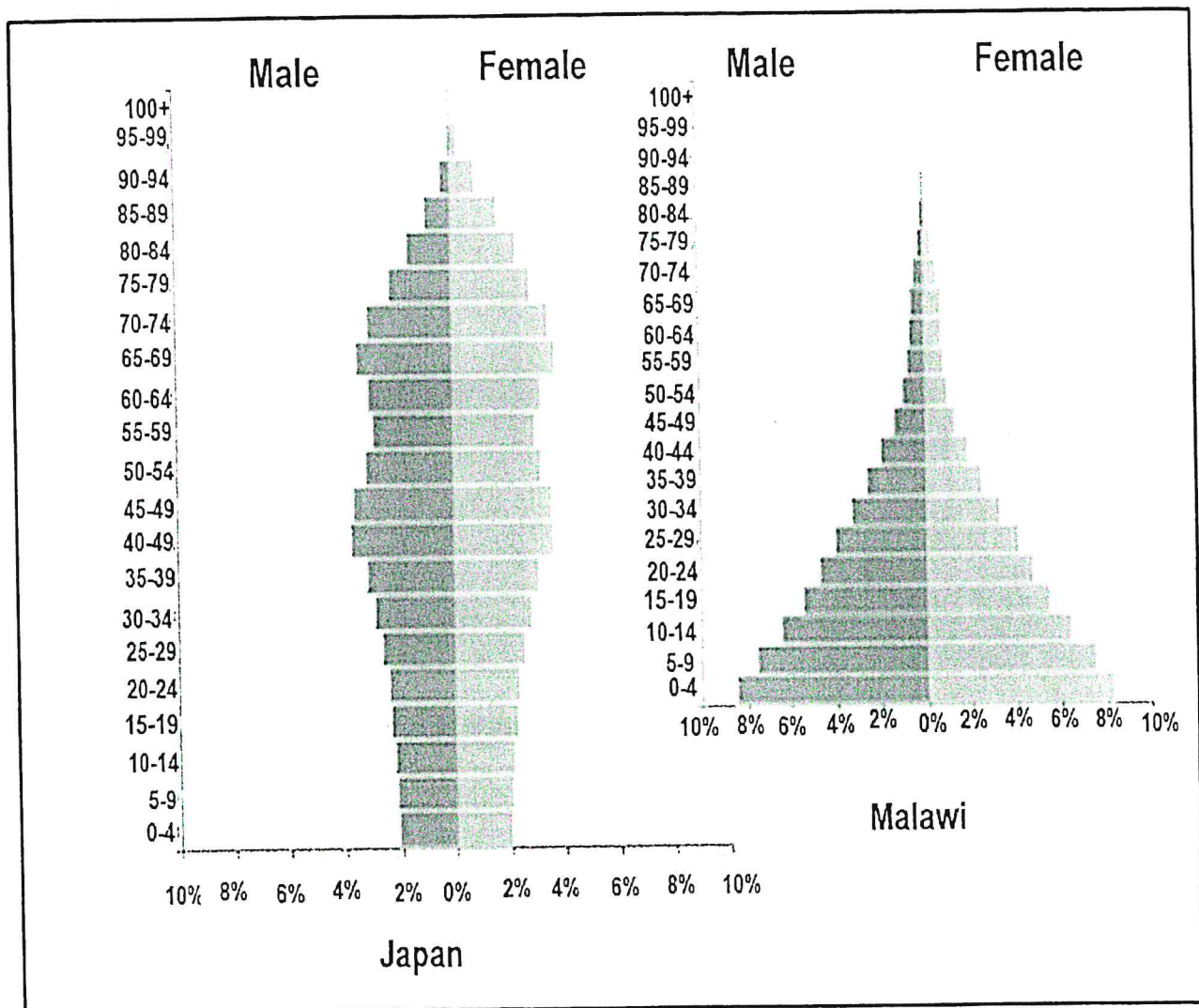
S = Number caught in the second sample

M = Number marked in the second sample

Show all workings. (3)

[5]

3.3 Study the diagrams below showing the population pyramids of Malawi and Japan taken in 2017.



- 3.3.1 Which of the countries represented in the population pyramids above, is a developed country? (1)
- 3.3.2 Give ONE visible reason for your answer in question 3.3.1. (1)
- 3.3.3 From the graph, what can you conclude about the age group 0 -19 years in Malawi? (2)
- 3.3.4 Name THREE factors which can cause the composition of the population to change in terms of size. (3)
- 3.3.5 Discuss THREE ways in which population pyramids are important for governments of a country in their planning. (6)

[13]

3.4 Farmers often add chemical fertilizers to their land to increase their yield of their crops. Sometimes they over-use chemical fertilizers which could lead to soil pollution.

The table below shows how the addition of a phosphate fertilizer to land on which crops of potatoes and barley are grown, affected their yield.

The yield is the amount of food harvested from the crop.

Amount of phosphate fertilizer added to soil (kg/hectare)	Yield of potato crop (ton/hectare)	Yield of barley crop (ton/hectare)
0	13	2
4	18	4
8	22	6
12	26	8
16	28	8
20	28	8

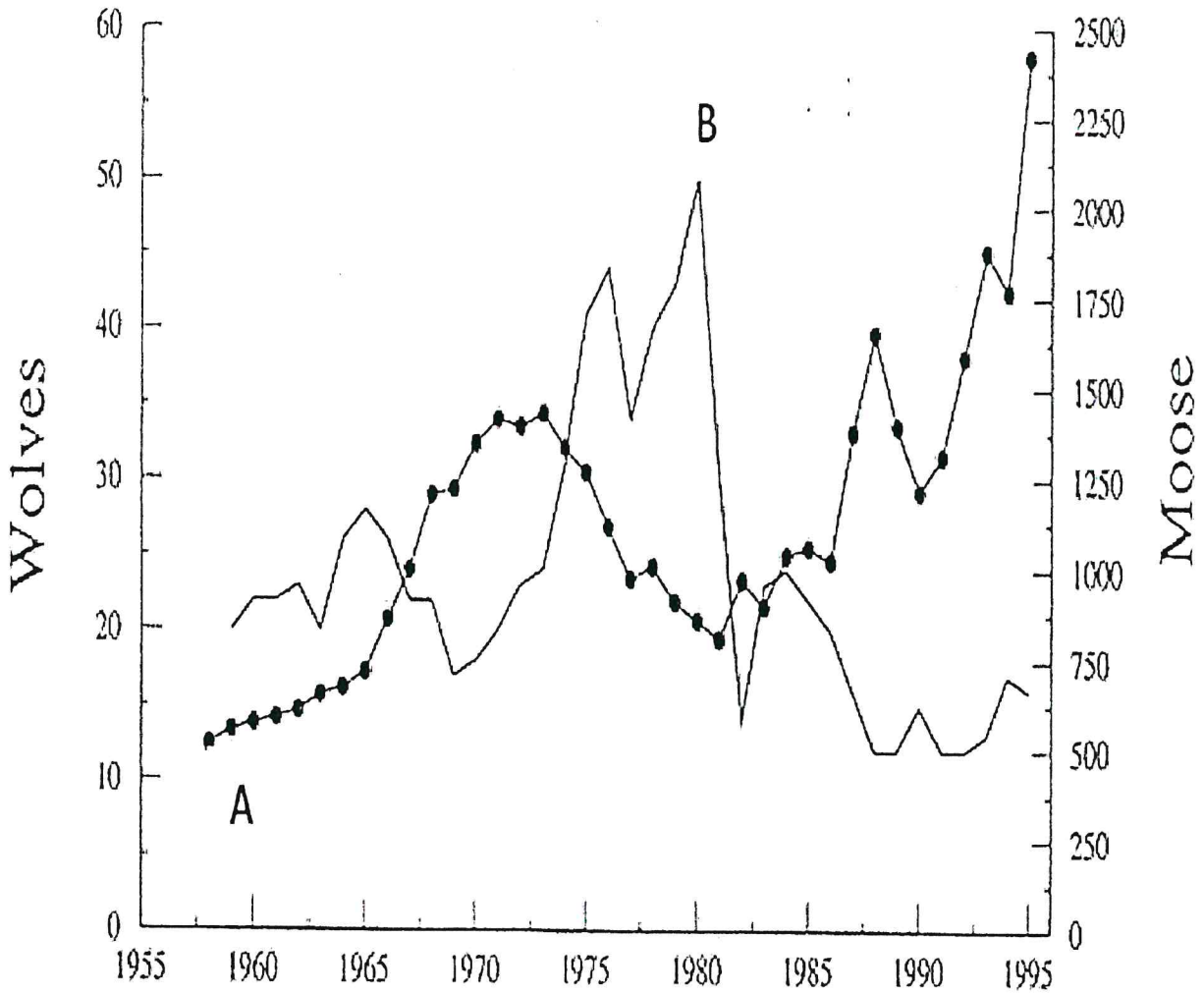
3.4.1 Draw a bar graph to illustrate the effect of fertilizer on the yield of potato crops. (5)

3.4.2 What is the maximum amount of fertilizer that had to be added to the barley crop to achieve the maximum yield? (1)

3.4.3 State TWO disadvantages of adding more than 16kg/hectare phosphate fertilizer to the soil (2)

[8]

3.5 Study the diagram below which shows the relationship between a population of wolves and a moose population. Study the graph and answer the questions that follow.



Rolf O. Peterson:
 Ecological Studies of Wolves in Isle Royale
 Annual Report 1994-95

3.5.1 Which population A or B represents the moose population? (1)

3.5.2 Give a reason for your answer in 3.5.1. (1)

3.5.3 Describe and explain the trend of the wolf population each time the number of Moose increases. (2)

[4]

TOTAL QUESTION 3: 40 MARKS
GRAND TOTAL: 120 MARKS