education
Department:
Education
PROVINCE OF KWAZULU-NATAL

STEP AHEAD

LEARNER SUPPORT DOCUMENT

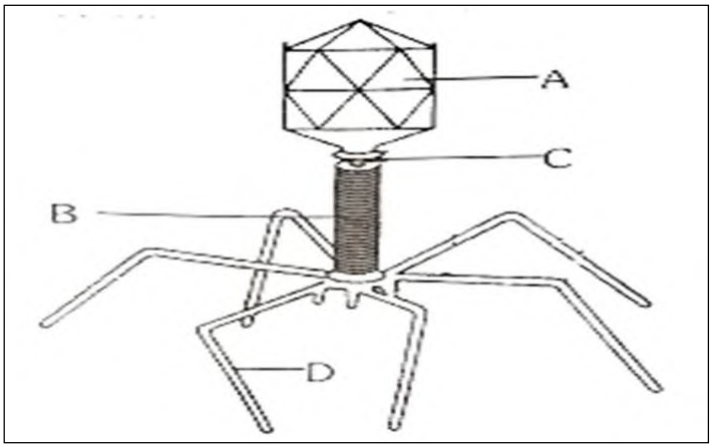
GRADE 11

LIFE SCIENCES

JANUARY 2021

D. CLASSWORK/HOMEWORK

Activity 1 (Viruses)

1.1		The diagram below represents the structure of a Bacteriophage. 		
	1.1.1	Identify the following parts: (a) A (b) B (c) C (d) D	4	
	1.1.2	Why are viruses referred to as being acellular?	1	
	1.1.3	State ONE characteristic of viruses that qualifies them as: i. Living things ii. Non-living things	2	
	1.1.4	Predict what would happen if a virus cannot find another living cell.	2	

Activity 2 (Viruses)

2.1		AIDS is a human disease caused by a virus. Viruses are referred to as obligate parasites.		
	2.1.1	What does AIDS stand for?	1	
	2.1.2	Name the pathogen that causes AIDS	1	
	2.1.3	Why are viruses referred to as being obligate parasites?	1	
	2.1.4	Describe the effects of drug abuse on the spread of HIV.	4	

2.2		Briefly describe how a virus multiplies inside a host cell.	6	
				(13)

Activity 3 (Bacteria)

3.1		Explain why bacteria are regarded as:		
	3.1.1 3.1.2 3.1.3	Autotrophic Heterotrophic prokaryotic	1 1 1	
3.2		For each of the phrases in column 1, state whether it applies to A only, B only, Both A and B or none in Column 2. Write down **A only, B only, Both A and B or None** in your answer book. **Column 1** / **Column 2** 3.2.1 Presence of a protein capsule and a well-defined nucleus — A. Viruses B. Bacteria 3.2.2 Not well-defined nucleus present — A. Viruses B. bacteria 3.2.3 May cause disease — A. viruses B. bacteria 3.2.4 Can occur as autotrophs, saprotrophs or parasites — A. bacteria B. viruses 3.2.5 Considered non-living — A. bacteria B. viruses 5x2	10	**(13)**

Activity 4 (Protists: malaria)

4		Study the extract below about malaria		
		Malaria is a parasitic disease which occurs mainly in the tropical and subtropical regions. It is transmitted in humans through the bite by a female mosquito of the *Anopheles species*, which is the vector for the parasite. It is estimated that 1 to 3 million people die every year from malaria and the majority are children from Sub-Saharan Africa. The most effective way of managing malaria is to destroy its vector. An insecticide which has been successful to date is DDT. The inner walls of the house are sprayed with DDT so that the mosquitoes die if they sit on or near them. However the use of DDT has been banned since 1972. In South Africa the incidence of malaria has been less than 10 000 cases per year. South Africa only stopped its use of DDT in 1996. The number of infections recorded since increased to 64 000 in 2000. When the use of DDT was re-introduced only for disease-vector control, the reported cases decreased to 7 000 in 2005 in South Africa.		
	4.1.1	To which group of micro-organisms does the malaria parasite belong?	1	
	4.1.2	State TWO ways to avoid contracting malaria	2	
4.2	4.2.1	Describe how the malaria parasite is passed from one human to another	2	
	4.2.2	Give ONE reason why a person with malaria cannot be treated by using an antibiotic	2	
	4.2.3	Explain how an increase in the number of malaria infections would affect the South African economy.	2	
	4.2.4	Suggest ONE way in which the data about the number infections was collected.	1	
	4.2.5	Give ONE reason why the number of infections might have been more than 7000 in year 2015	1	**(11)**

Activity 5 – Classwork –

(Summary table on comparison of micro-organisms)

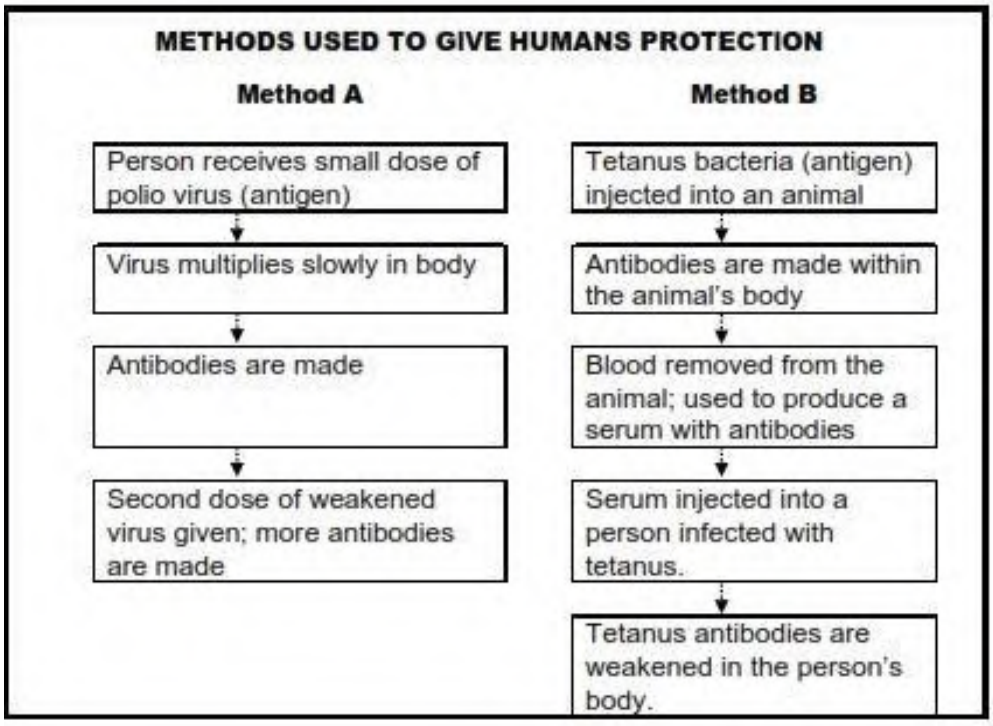
5 The table below summarises the diversity of micro-organisms. Complete the table under each appropriate column

	Characteristic			
Organism	**Kingdom**	**Type of cell**	**Mode nutrition**	**Mode of reproduction**
Viruses	No Kingdom	5.1…….	5.2…….	Inside a host cell
Bacteria	5.3……..	5.4…….	5.5…….	5.6…….
Protists	5.7…….	5.8…….	5.9…….	5.10……..
Fungi	5.11…….	5.12…….	5.13…….	5.14……..

14

Activity 6: Immunity (Vaccines)

6. The diagram below shows two methods, which are used to give humans protection against diseases. Method **A** shows active immunity and Method **B** shows passive immunity. Method **A** can be used against polio. Method **B** is often used against tetanus.



6.1 Name the substances that are produced by the body, which destroy harmful viruses and bacteria. 1

6.2 Why does method A give long-lasting protection against Polio? 1

6.3 Method B does not give long-lasting protection against tetanus, why? 1

6.4 In immunisation against polio, a second dose of the weakened virus is given (known as a booster). Suggest why this booster is necessary 1

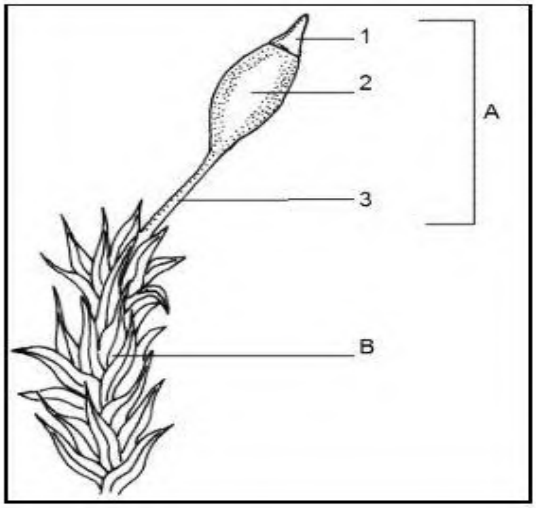
6.5 Why is method B very good for dealing quickly with an infection like tetanus? 1

				(5)

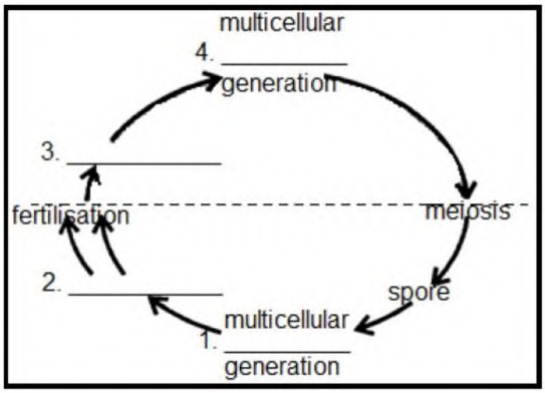
Topic: PLANT DIVERSITY

D. CLASSWORK/HOMEWORK Activity 1

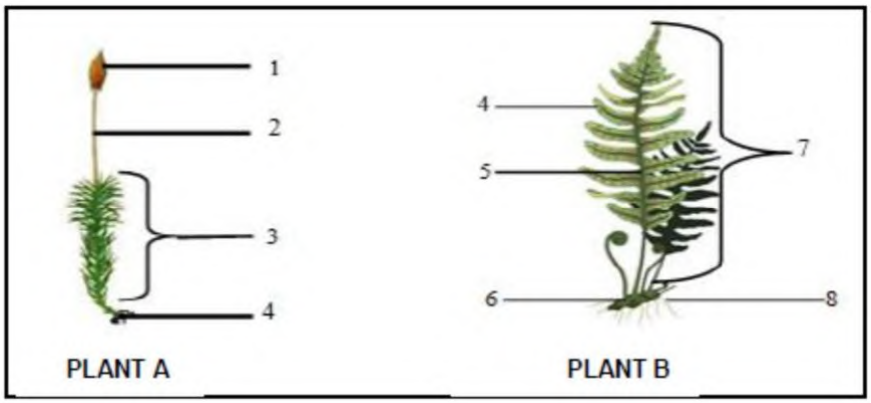
	1.1	Study the diagram below showing the structure of a moss plant and answer the questions that follow.		

				
	1.1.1	Name the parts labelled: (a) 1 (b) 2 (c) 3	 (1) (1) (1)	
	1.1.2	Which generations is represented by: (a) A (a) B	 (1) (1)	
	1.1.3	Give the letter and the name of part which is haploid	(1)	
				(6)

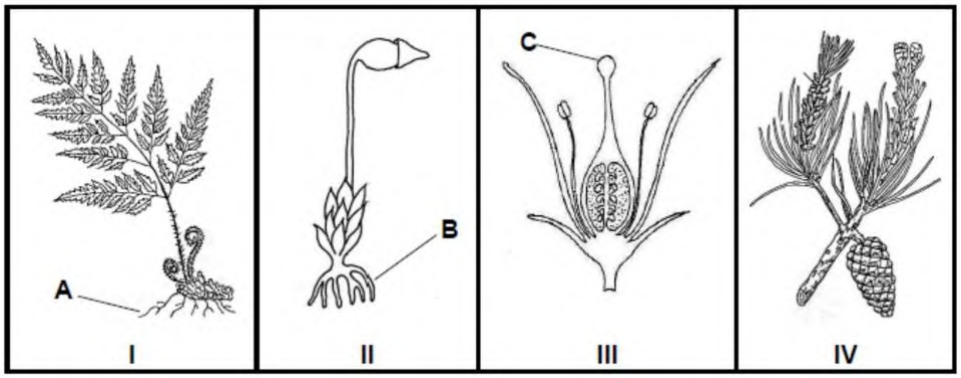
	1.2	Study the diagram, which shows the alternation of generations and answer the questions that follow.		

				
	1.2.1	Complete the missing terms on the diagram. (a) 1 (b) 3 (c) 4	(4)	
	1.2.2	Which process in plants cells will: (a) Increase and (b) Decrease the chromosome number?	 (1) (1)	
				(5)

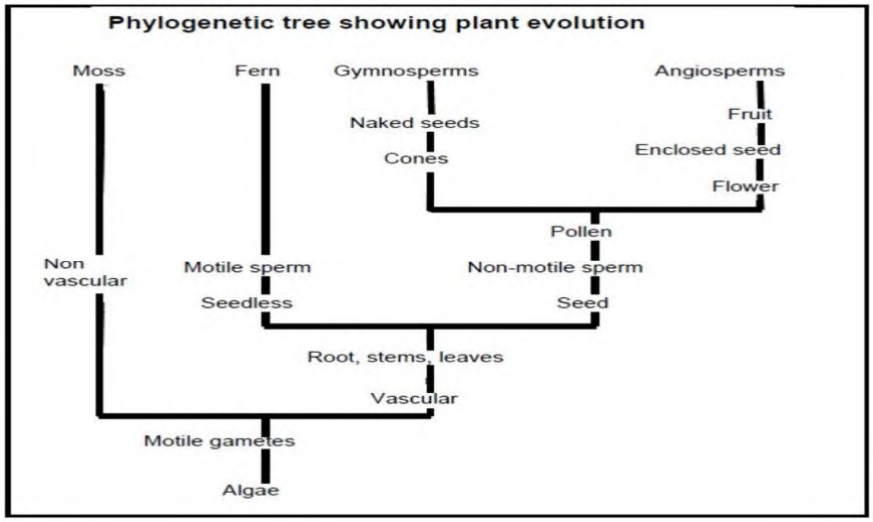
Activity 2

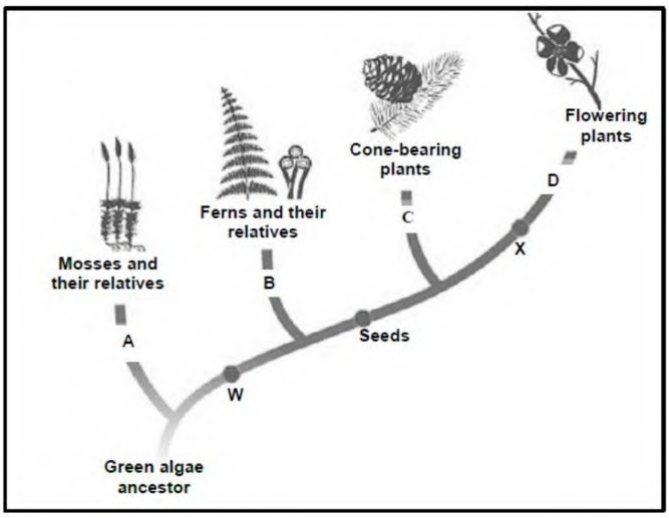
2.1		Study the two plants **A** and **B** from different groups and answer the questions that follow.		
				
	2.1.1	Study the two plants **A** and **B** from different groups and answer the questions that follow.	(2)	
	2.1.2	Name the reproductive structures formed inside the part numbered **1**	(1)	
	2.1.3	Is the gametophyte generation of these plants haploid or diploid?	(1)	
	2.1.4	Which plant (**A** or **B**) is a thallus?	(1)	
	2.15	Explain why the plant identified in QUESTION 3.3.4 is a thallus.	(1)	
				(6)

Activity 3

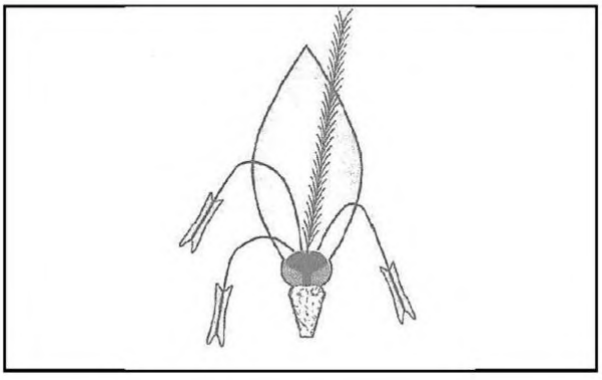
	3.1	The diagrams below shows plants from different divisions of the plant kingdom.		
				
	3.1.1	Name the division to which plants I and II belong, respectively.	(2)	
	3.1.2	State TWO differences between plants I and IV with reference to reproduction.	(4)	
	3.1.3	State only the NUMBER of the plant group which has no vascular tissue.	(1)	
	3.1.4	Place the plants in the correct sequence from primitive to most advanced.	(2)	
				(9)

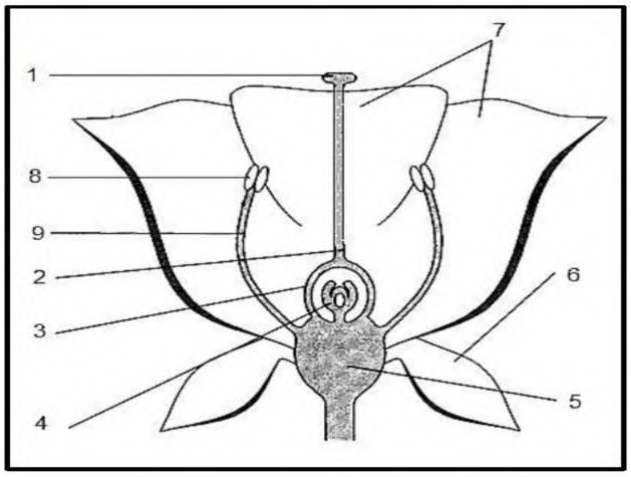
Activity 4

	4.1	Study the phylogenetic tree below, taking note of how the four plant divisions have evolved and answer the questions that follow.		
				
	4.1.1	What us the ancestral form of all the plant divisions shown?	(1)	
	4.1.2	Which plant division is the best adapted to life on land?	(1)	
	4.1.3	Which plants are the most closely related?	(2)	

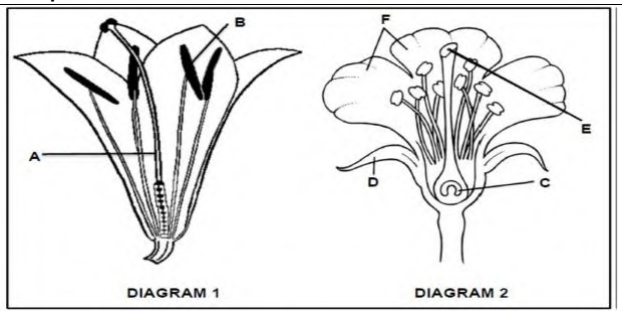
	4.2	The diagram below is a cladogram showing the evolution of various plant phyla.		
				
	4.2.1	Identify the plant division labelled A,B,C and D.	(4)	
	4.2.2	Name the evolutionary features at W and X , respectively, that distinguishes: (a) Mosses and ferns (b) Cone-bearing plants and flowering plants	 (1) (1)	
	4.2.3	Both cone bearing plants and flowering plants are seed-bearing plants. What is the collective term used for all seed-bearing plants?	(1)	
				(7)

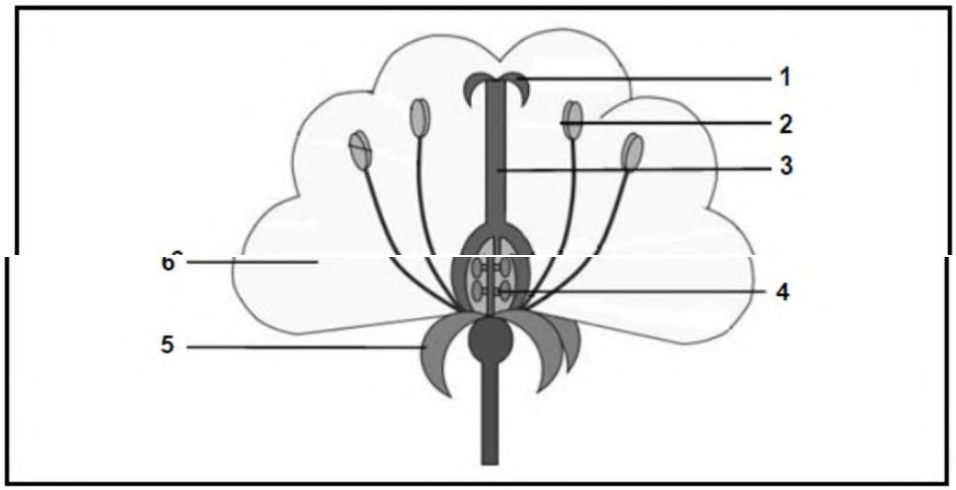
Activity 5

	5.1	Flowers are reproductive structures used for sexual reproduction in angiosperm plants. Study the diagram below and answer the questions that follow.		
		Flowers are reproductive structures used for sexual reproduction in angiosperm plants. Study the diagram below and answer the questions that follow. 		
	5.1.1	Is this flower insect, wind ,or bird pollinated?	(1)	
	5.1.2	List THREE characteristics of this flower that makes it well adapted for your answer given in question 7.1.1	(3)	
				(4)

	5.2	Study the diagram of a flower of an Angiosperm and answer the questions that follow.		
				
	5.2.1	Write down the number of the part where the female gametes would be produced.	(1)	
	5.2.2	Which number represents the whorl that is important for insect pollination?	(1)	
	5.2.3	On this flower, both male and female organs mature at the same time. Mention ONE observable feature that helps to prevent self-pollination.	(1)	
	5.2.4	State ONE way in which the Angiosperm is better adapted to a terrestrial life than the Bryophytes.	(2)	
				(5)

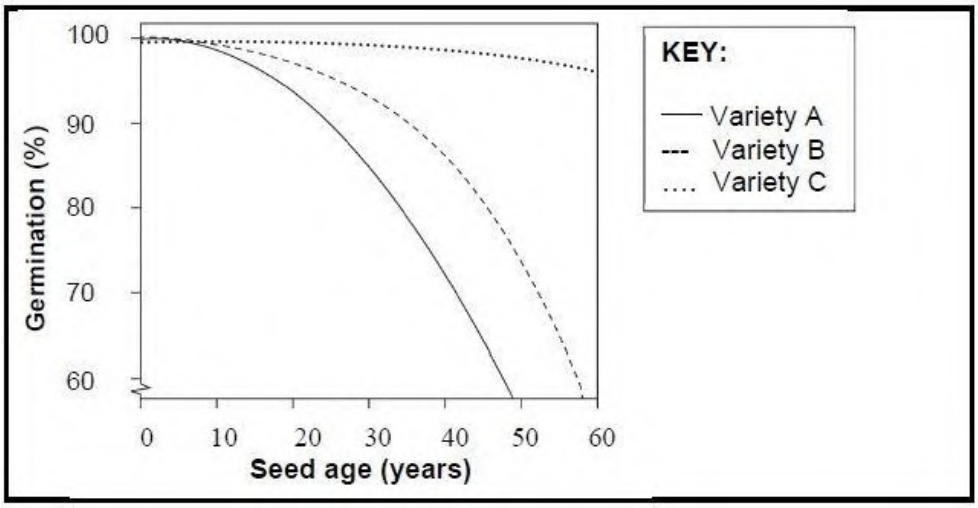
Activity 6

	6.1	Study DIGRAMS 1 and 2 of angiosperm flowers below and answer the questions that follow.		
				
	6.1.1	Provide labels for structures A to D.	(4)	
	6.1.2	Give the letter of the structure where the seed is formed.	(1)	
	6.1.3	Neither of these flowers is wind pollinated. Give TWO ways that you would identify a wind pollinated flower.	(2)	
	6.1.4	Give TWO advantages of sexual reproduction.	(2)	
	6.1.5	State TWO ways in which the Angiosperms are better adapted to a terrestrial life than Bryophytes.	(2)	(11)

	6.2	Study the diagram below showing the structure of a flower.		
				
	6.2.1	What type of pollination can be linked to this flower?	(1)	
	6.2.2	Identify the parts labelled 1 and 2.	(2)	
	6.2.3	What do we call 5 and 6 together?	(1)	
	6.2.4	Using the NUMBER only, identify the following: (a) Part which receives pollen (b) Structure where a seed can form	 (1) (1)	
				(6)

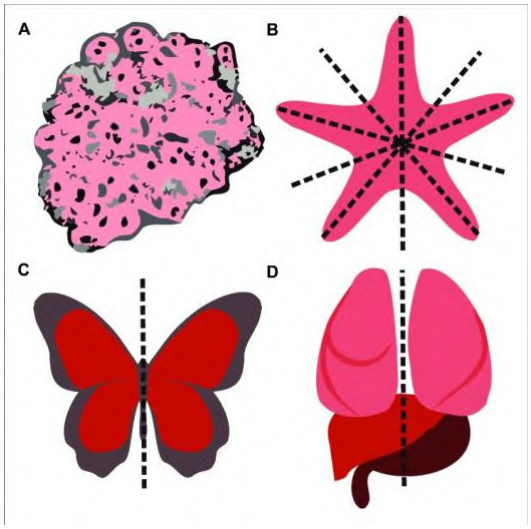
Activity 7

	7.1	Read the article below and answer the questions that follow.		
		THE "DOOMSDAY VAULT" IS IN DANGER Svalbard Global Seed Vault (SGSV) is a seed bank located in Arctic Norway. The seeds are kept at -18 °C with minimum access to oxygen in order to delay aging as much as possible. The vault is also surrounded by frozen soil called permafrost. However, global warming is causing the permafrost to melt and the vault is in danger of flooding. SGSV keeps seeds from almost 4 000 species of plants, focusing on food crops such as wheat, rice and maize. SGSV keeps seeds from more than 865 000 varieties of plants, including 200 000 varieties of wheat and rice. Some of these varieties are rare or extinct in the wild. [Adapted from *"The Doomsday Vault Is In Serious Danger"* by Alfredo Carpineti, 07 Feb. 2019.]		
	7.1.1	What are suitable conditions for keeping seeds in a seed bank, according to the article?	(1)	
	7.1.2	What environmental event is threatening the safety of the seeds at the Global Seed Vault?	(1)	
	7.1.3	Give THREE different ways in which seeds provide a source of food for humans.	(3)	
	7.1.4	Why are seed banks important for the future?	(2)	
				(7)

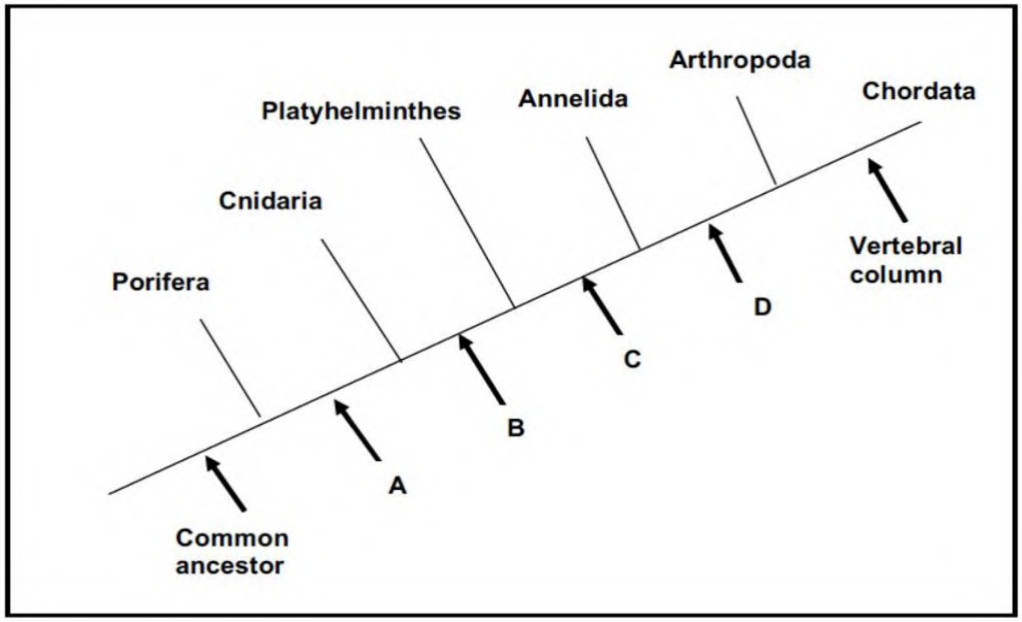
	7.2	The purpose of SGVSV is to store seeds for use 50 or more years from now. Seeds from these three varieties of maize were tested to see the effects of long term storage.		
				
	7.2.1	Explain how SGSV could generate these results	(2)	
	7.2.2	Which variety of seeds are best suited for long term storage	(1)	
	7.2.3	Determine the percentage of variety B seeds that would be still viable after being stored for 40 years.	(2)	
	7.2.4	A farmer sows 2100 seeds of variety A which have been stored for 35 years. Calculate the number of seedling that the farmer should expect.	(3)	
	7.2.5	State a hypothesis for this investigation	(2)	
	7.2.6	Identify the following variables: (a) Independent (b) Dependant	 (1) (1)	
			[12]	

Topic: Animal Diversity

Activity on symmetry



Teaching tool 2



ACTIVITY

Fill in the biological terms on the blank spaces

NO.	Description	Biological Term
1.	Body wall consisting of two germ layers	
2.	A gut with only one opening, used for both ingestion	
3.	The concentration of sense organs into the anterior part of an organism to form a 'head' region	
4.	The arrangement of body parts such that an organism can be divided into identical parts vertically along any radius	
5.	A gut having two openings, one for ingestion and one for egestion	
6.	Body wall consisting of three germ layers	
7.	The arrangement of body parts such that an organism can be divided into identical parts in only one way through the midlongitudinal line	
8.	Blood system in which blood flows from the blood vessels into open spaces	
9.	The germ layer giving rise to cells form the muscles and other internal organs in the body	
10.	Type of symmetry relating to organisms that have an irregular shape and can thus not be divided into two identical parts	
11.	A true body cavity that is lined on both sides by mesoderm	
12.	Blood system in which the blood is always confined to the blood vessels	
13.	The germ layer that gives rise to cells that line the gut	
14.	A body cavity that is line by mesoderm on one side only	

D. CLASSWORK/HOMEWORK

Activity1

Study the diagram representing two animals and answer the questions that follow.

A

B

1.1. Identify the phylum in which organism **A** belongs (1)

1.2. State the type of symmetry of animal **B**? (1)

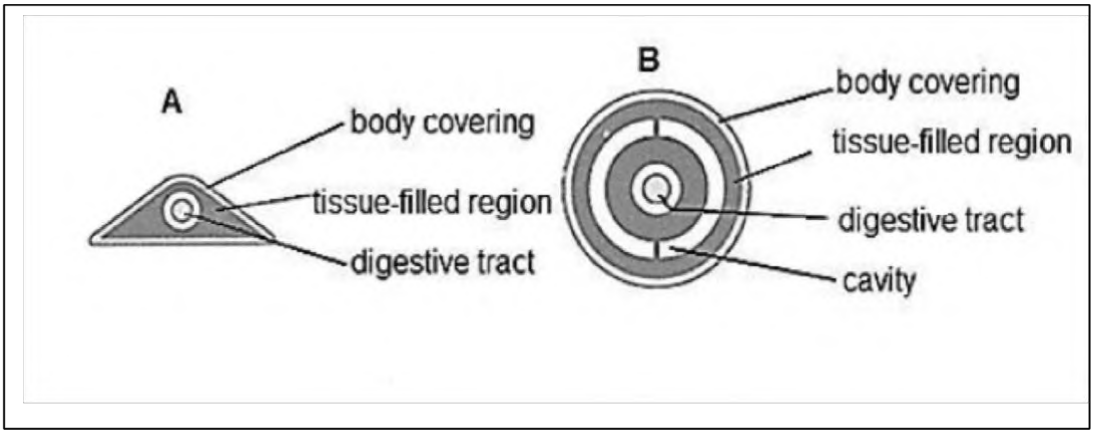
1.3 State whether each of organisms **A** and **B** are diploblastic or triploblastic. (2)

1.4 Explain how the body plan of the following organisms relate to their mode of live

(i) Organism **A** (3)
(ii) Organism **B** (3)

(11)

Activity 2



2.1. Write the LETTER only of the diagram that represents:

(a) An acoelomate

(b) A coelomate (2)

2.2.State TWO phyla that are represented by body plan B. (2)

2.3.From which embryonic layer does the tissue-filled layer develop? (1)

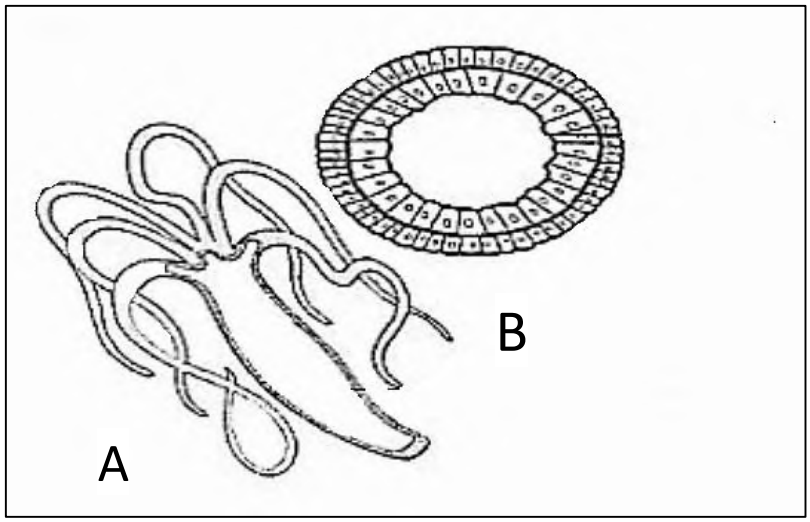
2.4.State the type of symmetry characteristic of organism B. (1)

2.5.Give TWO advantages of an exoskeleton in arthropods. (2)

(8)

Activity 3

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



3.1 Identify the phylum to which this organism belongs. (1)

3.2 What type of gut does this organism have? (1)

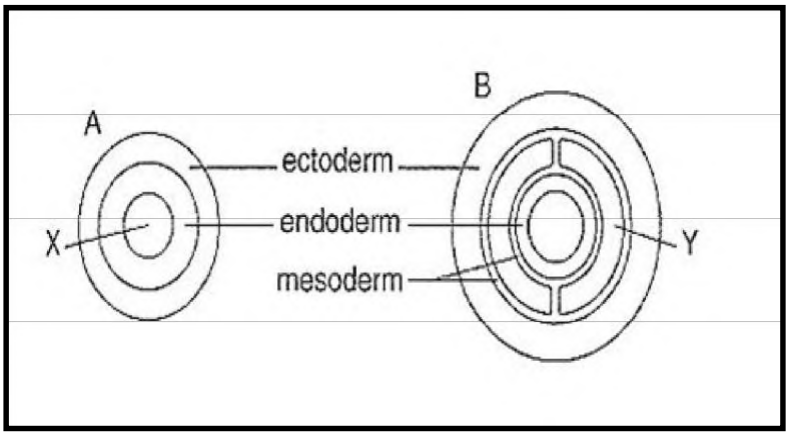
3.3 Explain ONE disadvantage of the type of gut named in Question 3.2. (2)

3.4 Explain ONE importance of the development of a coelom. (2)

(6)

Activity 4

Study the diagram, which represent the body plans of two animals and answer the questions that follow.



4.1. Provide labels for **X** and **Y**. (2)

4.2. Which body plan **(A or B)** represents an organism with radial symmetry? (1)

4.3. State whether body plan B represents a **diploblastic** or **triploblastic** animal. (1)

4.4.Give a reason for your answer to QUESTION 4.3. (1)

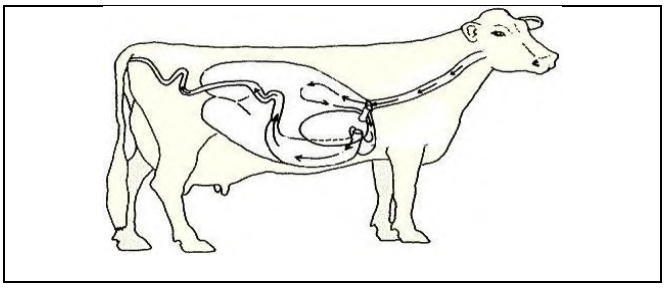
4.5.State TWO phyla that are represented by body plan **B**. (2)

4.6.Explain ONE advantage of the development of part **Y** to organisms with body plan **B** (2)

(9)

Activity 5

The diagram below shows the gut in an animal from one of the phyla you have studied.



5.1. State whether the animal has a blind gut or a through gut. (1)

5.2. Explain ONE advantage of the gut mentioned in 5.1. (2)

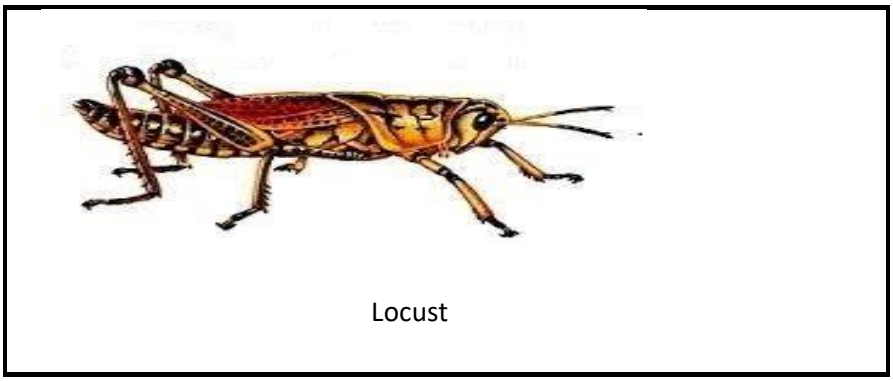
5.3. Name TWO phyla that have animals with a gut like the one in the diagram. (2)

5.4. State what is meant by cephalisation. (2)

(7)

ACTIVITY 6

The diagram below represents an organism in one of the phyla of the kingdom Animalia.



Locust

6.1 Identify the phylum to which the locust belongs. (1)

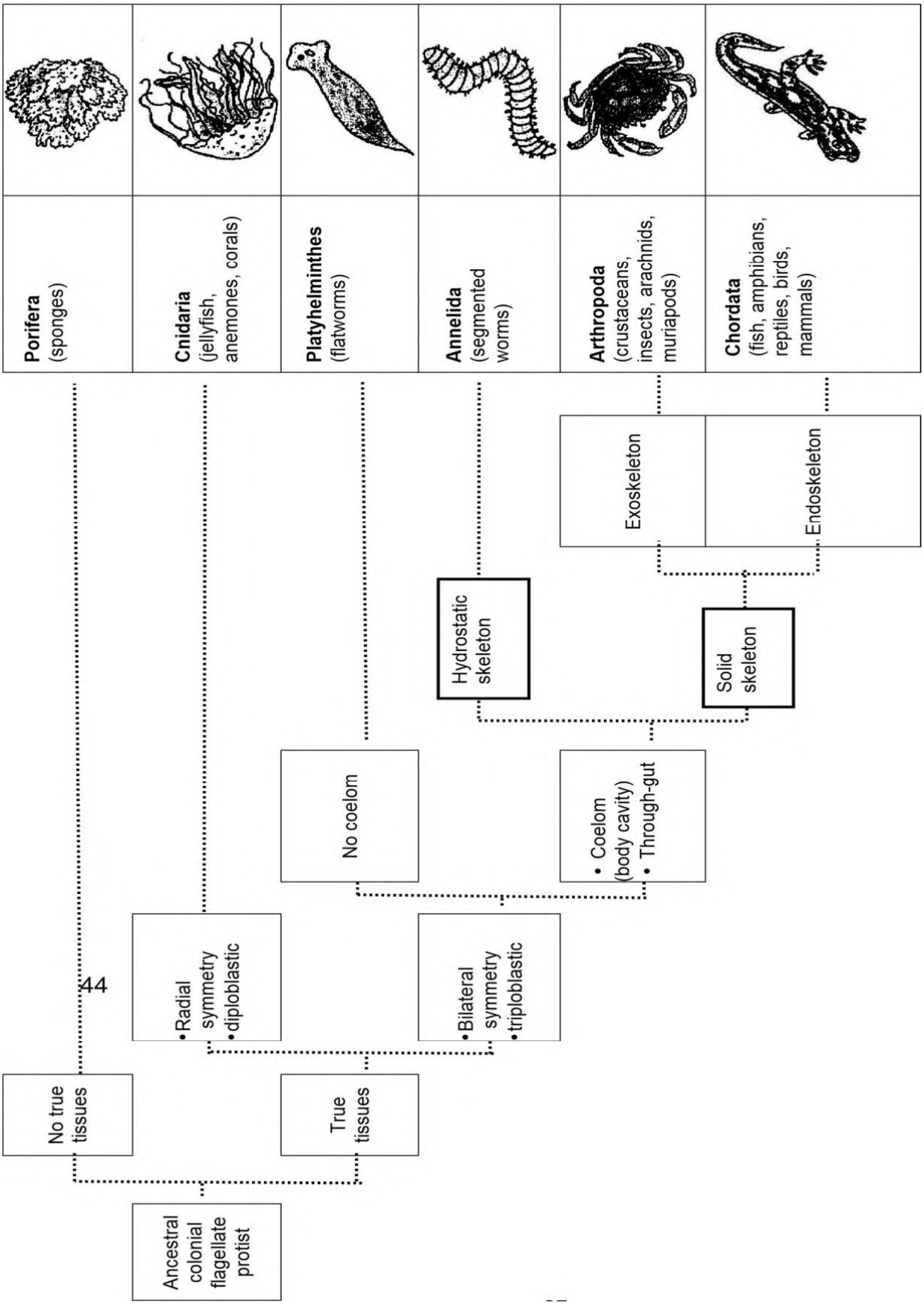
6.2 State whether the locust is diploblastic or triploblastic animal. (1)

6.3 Name the type of skeleton found in a locust. (1)

6.4 State TWO disadvantages of the type of skeleton mentioned in 6.3 and explain how the locust overcomes each of these disadvantages. (4)

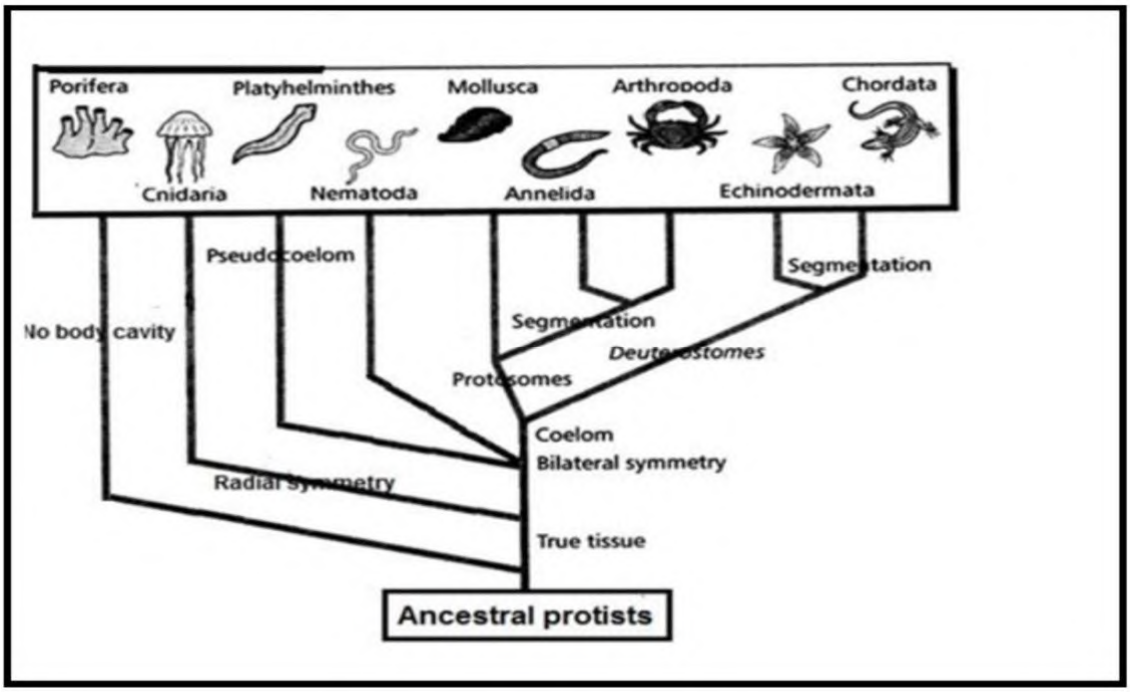
6.5 Explain why a blood system is necessary in coelomate organisms such as the locust (2)

(9)



Phylum	Examples	Habitat	Symmetry	Tissue layers	Coelom	Gut	Support
Porifera (Natural sponges)	Sponges	Aquatic (fresh-water and marine)	1. _____	2. _____	Acoelomate (no coelom)	3. _____	Hydrostatic skeleton
Cnidaria Having cnidocytes	Sea anemone, corals, jelly fish and blue bottle	Aquatic (fresh-water and marine	Radially symmetrical	4. _____	Acoelomate	5. _____	Hydrostatic skeleton
6. _____ (Flat body worm	Tapeworm, bilharzia worm	9. _____	7. _____	Triploblastic 3 tissue layers	8. _____	Poorly developed except Taenia	Hydrostatic skeleton
Annelida (Ringed body worm)	Earthworm, leeches nematode	Aquatic and terrestrial	Bilaterally symmetrical	Triploblastic 3 tissue layers	Coelomate	10. _____	11. _____
Arthropoda (Jointed legs)	Insects, arachnids, crustaceans, myriapods	All habitats of the biosphere	Bilaterally symmetrical	12. _____	Coelomate	Through-gut	13. _____
Chordata (Notochord and spinal cord)	Fish, amphibians, mammals, reptiles and birds	All habitats of the biosphere	Bilaterally symmetrical	Triploblastic 3 tissue layers	14. _____	Through-gut	15. _____

No gut but filter-feeder	Exoskeleton	Acoelomate
Endoskeleton	Parasitic and free-living	No tissue layer
Blind ending	Coelomate	Bilaterally symmetrical
Triploblastic	Through-gut	Diploblastic
Asymmetrical	Platyhelminthes	Hydrostatic



4.1. From the above phylogenetic tree, which group represents the ancestor of the animal kingdom? (1)

4.2. How many animal phyla are shown on this tree? (1)

4.3. The first major split in the animal kingdom was into radial and bilateral symmetry.

(a) Which phylum did not form a part of this split? (1)

(b) Which phylum has radial symmetry? (1)

4.4 The second split in the animal kingdom was based on the presence and absence of a true coelom.

(a) Name the phylum that does not have a true coelom. (1)

(b) State ONE way in which the coelom of annelids and arthropods are different from each other. (2)

4.5 From the diagram, identify ONE phylum you have studied which:

(a) Is diploblastic (1)

(b) Has a coelom and is bilateral symmetrical (1)

(9)

Topic: photosynthesis

B. TERMINOLOGY

. **Complete the following table by filling in the correct biological terms.**

NO.	Description	Term
1.	A process whereby green plants manufacture their own food using radiant energy	
2.	Organelle in a plant cell where photosynthesis occur	
3.	Green pigment that trap light for photosynthesis	
4.	Occurs in the grana of the chloroplast	
5.	Occurs in the stroma of the chloroplast	
6.	Energy carrier in the living things used for various activities	
7.	Used to test for the presence of starch	
8.	Organisms that use light energy to manufacture its own food	
9.	A scientific procedure undertaken to make a discovery, test a hypothesis or demonstrate a known fact.	
10.	Sugar that is the product of photosynthesis	
11.	Leaf that has more than one colour	
12.	Special building that is used for growing plants in an area where they would not normally grow that well.	
13.	Process of eliminating starch reserves in a plant for experiments concerning photosynthesis	
14.	A variable that is not changed throughout an experiment	
15.	Organisms that are unable to manufacture their own food (consumers &decomposers)	
16.	A carbohydrate that store energy in plants	
17.	Factor that limits the rate at which photosynthesis takes place	

A. CLASSWORK/HOMEWORK

Activity 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter A to D) next to the question number in the answer book.

1.1.1 The characteristics listed below are all applicable to chloroplasts.

(i) Contain a double membrane
(ii) Contain a fluid matrix with enzymes
(iii) Contain parallel sacs called lamellae
(iv) Contain a green pigment called chlorophyll
(v) Contain starch granules

Which combination of characteristics make the chloroplast suitable to perform its function?

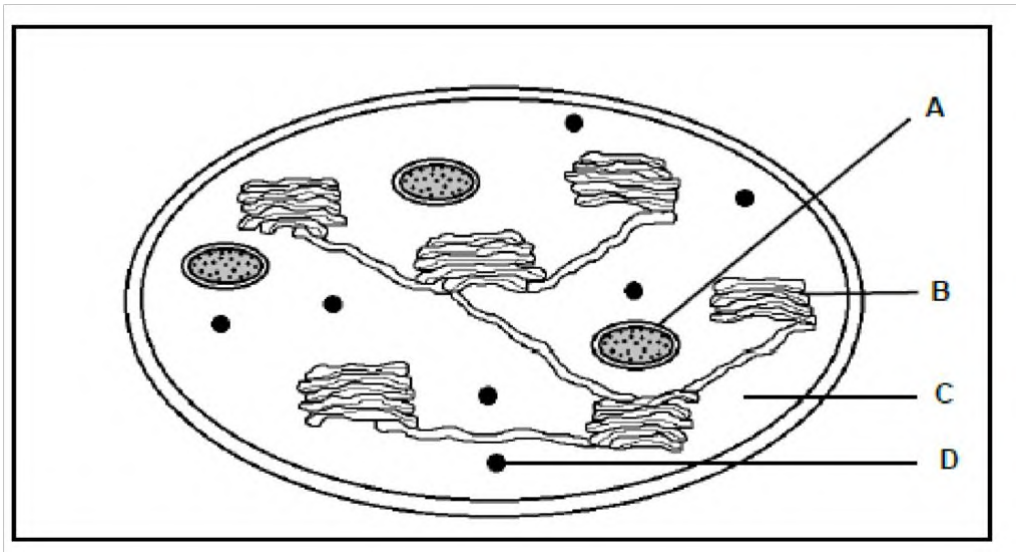
A (i), (ii), (iv) and (v)
B (ii), (iii) and (iv)
C (ii), (iii), (iv) and (v)
D (i), (ii), (iii) and (v)

1.1.2 Which ONE of the following characteristics make the leaf suitable for photosynthesis to take place?

A The spongy mesophyll is elongated
B The leaf has many stoma for gaseous exchange in the lower epidermis
C The upper epidermis has a white cuticle
D Xylem is present to the products of photosynthesis

2x2=4 marks

1.2 The diagram below represents the structure of a chloroplast.



1.2.1 Identify:

(a) Part C (1)

(b) Structure D (1)

1.2.2 Give the function of the part labelled A. (1)

1.2.3 Name the part that will be active in light only. (1)

Activity 2

2.1 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers in the answer book.

2.1.1 The simple sugar formed during photosynthesis in green plants (1)

2.1.2 The type of plastid that absorbs radiant energy during photosynthesis (1)

2.1.3 The splitting of water molecules into hydrogen and oxygen in the presence of light

2.1.4 Site of reactions of the dark phase in the chloroplast

2.1.5 The form in which excess glucose is stored in a plant

2.1.6 The green, light–trapping pigment in photosynthesis found in plant leaves

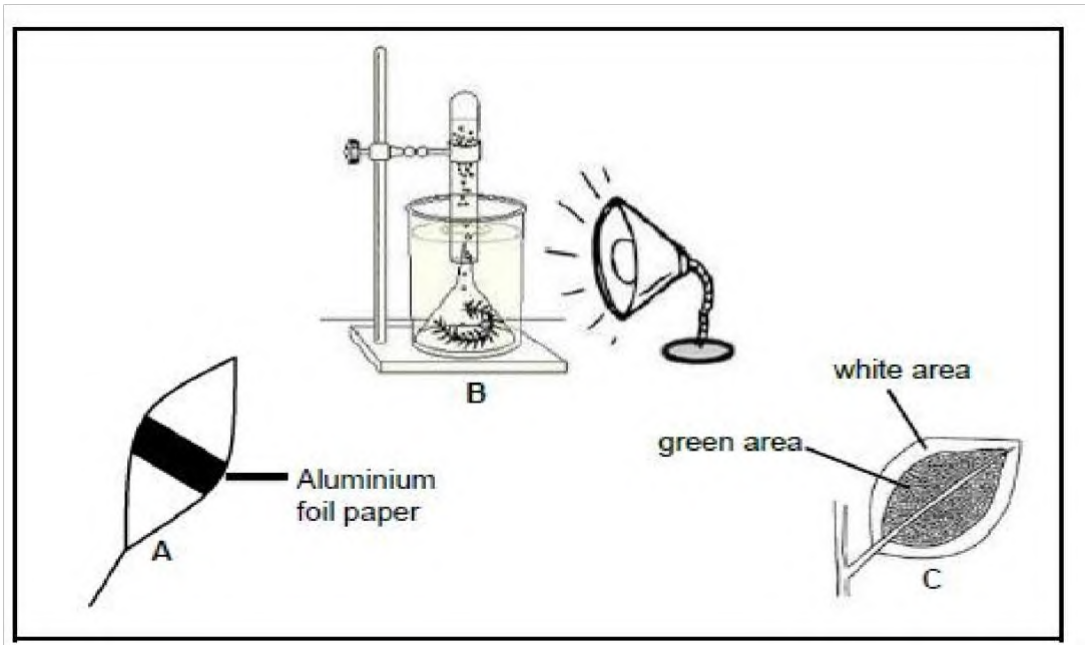
2.1.7 The type of energy absorbed by chlorophyll

2.2 Indicate whether each of the descriptions in COLUMN I apply to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question numbers (1.3.1 to 1.3.3) in the answer book.

2.2.1	The type of energy stored in food molecules during photosynthesis	A: Chemical energy B: Potential energy
2.2.2	Raw material(s) essential for photosynthesis	A: Oxygen B: Carbon dioxide

(4)

2.3 The following diagrams represent investigations involved in a process which takes place in green plants. The plant/leaves represented as A and C were exposed to sunlight for 4-5 hours.



2.3.1 Which investigation (A, B or C) is designed to test for the following?

(a) Chlorophyll is necessary for photosynthesis (1)

(b) Light is required for photosynthesis (1)

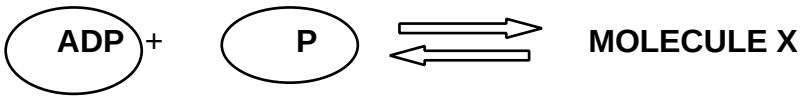
(c) Oxygen is produced during photosynthesis (1)

2.3.2 Give the LETTER of the investigation that does not show a control. (1)

2.3.3 Which investigation(s) need(s) a chemical to test for whether photosynthesis took place? (2)

Activity 3

3.1 Study the equation below showing the formation of the energy carrier molecule X



3.1.1 Give the full name of ADP (1)

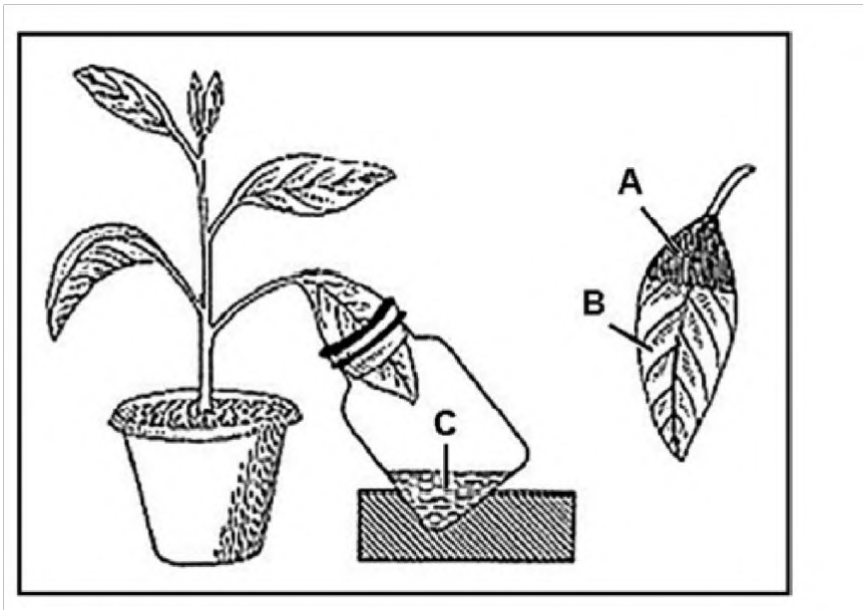
3.1.2 Name molecule X (1)

3.1.3 Give one reason why molecule is biologically important. (1)

Activity 4

4.1 The diagram below shows the set-up of an experiment to investigate whether carbon dioxide is necessary for photosynthesis to take place. The plant was

destarched before the apparatus was set up as in the diagram and placed in a sunny room.



4.1.1 Name liquid C. (1)

4.1.2 Give the function of liquid C. (1)

4.1.3 What result can be seen at A? (1)

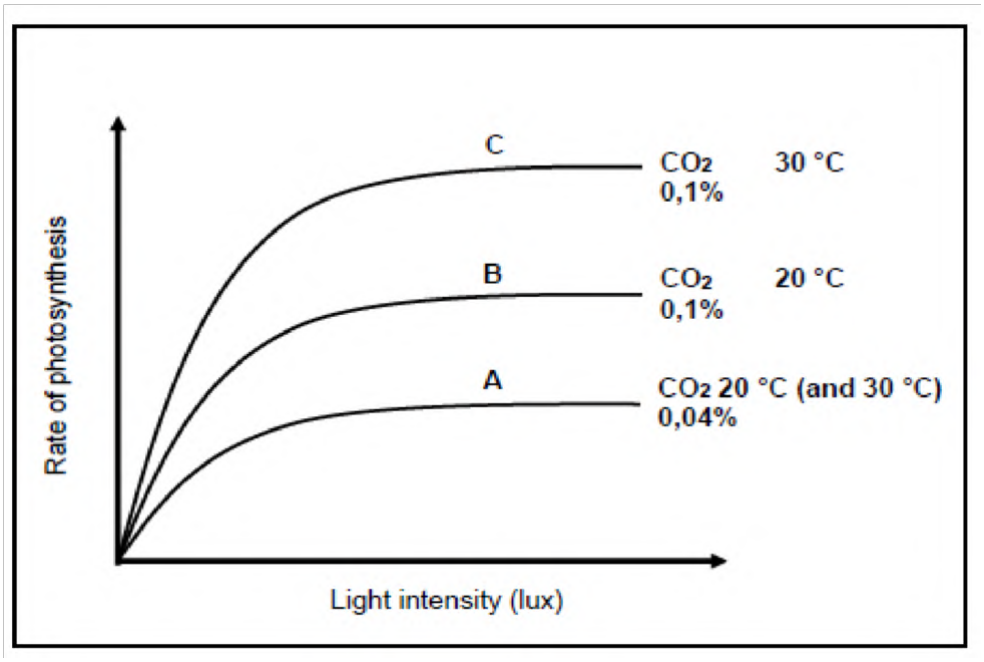
4.1.4 Explain ONE reason for the result at B. (2)

4.1.5 In which phase of photosynthesis will carbon dioxide be used? (1)

4.1.6 Where in the cell will the phase named in Question 4.1.5 take place? (1)

4.1.7 Why was the plant destarched before the experiment was conducted? (1)

4.2 The graph below shows the rate of photosynthesis under different environmental conditions. Study the graphs and answer the questions that follow.

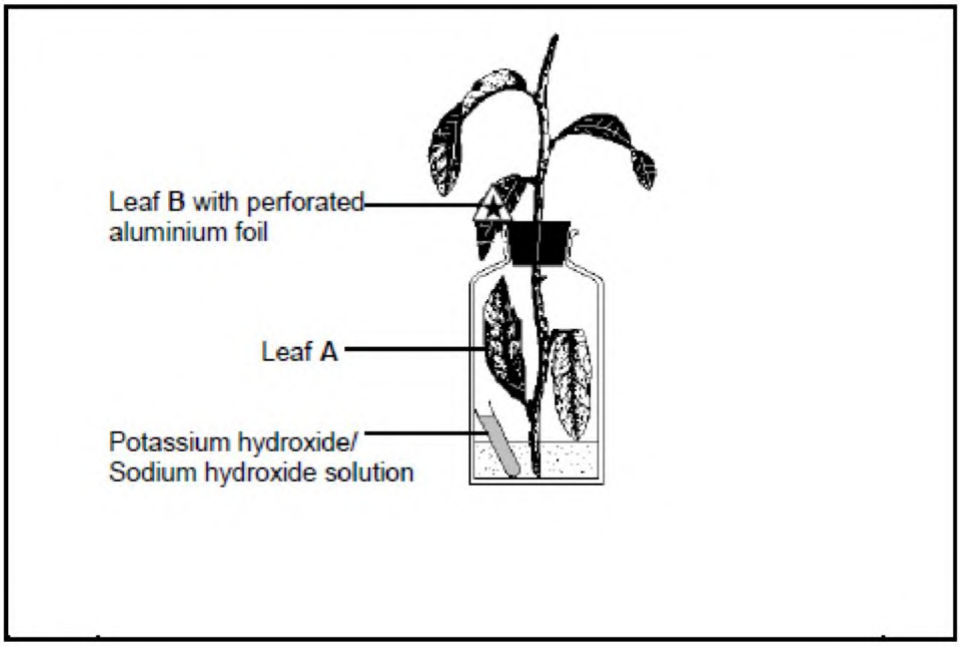


4.2.1	Which of the graphs shows the highest production of glucose?	(1)
4.2.2	Why is the production of glucose in graph **A**, low?	(1)
4.2.3	What factor in graph **B** and **C** limits the rate of photosynthesis?	(1)
4.2.4	Predict what the graphs would look like if the temperature were increased first to 40 °C and then to 60 °C.	(2)
4.2.5	Give a reason for your answer in QUESTION 4.2.4.	(1)

Activity 5

5.1 Study the diagram and then answer the questions.

Study the diagram and then answer the questions.



5.1.1 Why was the plant kept in a dark place for 48 hours before it was placed in sunlight? (1)

5.1.2 Looking at the diagrams given, which leaf (**A** or **B**) would be used:

(a) To show that CO_2 is necessary for photosynthesis? (1)

(b) To show that light is necessary for photosynthesis? (1)

5.1.3 What is the role of the potassium hydroxide / sodium hydroxide in this experiment? (1)

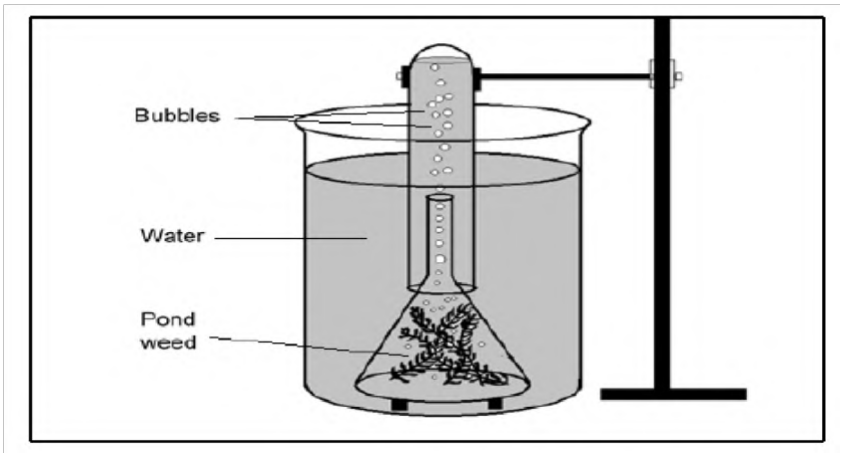
5.1.4 With which chemical will you test to see if photosynthesis takes place? (1)

5.2

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 apparatus was set up as shown in the diagram below.

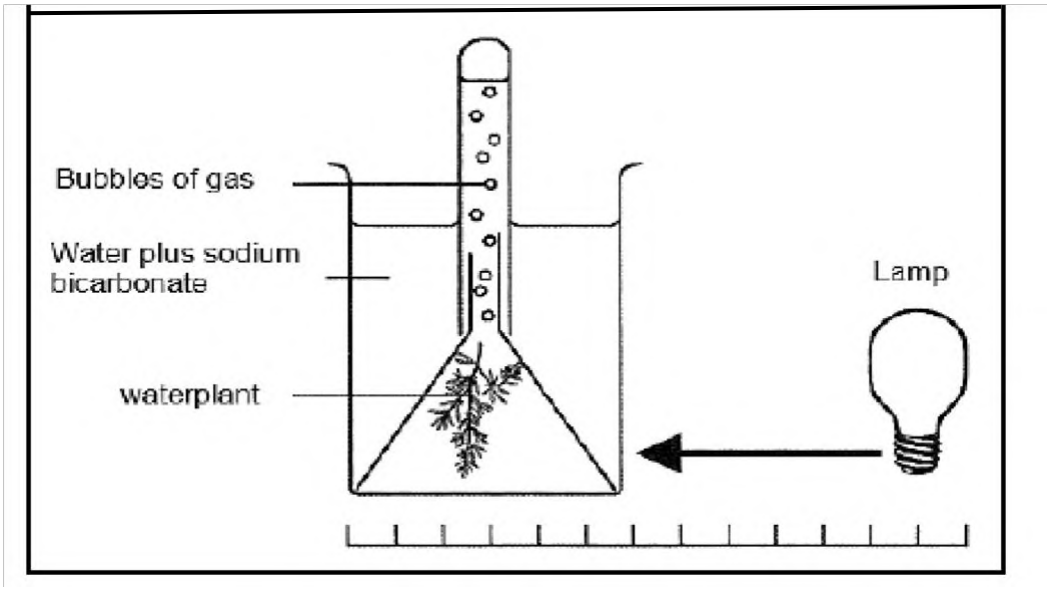
- The pondweed was exposed to one colour of light and left for 5 minutes before measurements were taken.
- The time taken for the release of 20 bubbles was recorded.
- The procedure was repeated using light of different colours but of equal intensity.
- The results are given in the table below.



Colour of light	Time (in seconds)for 20 bubbles to form
Violet	80
Green	40
Blue	160
Red	140
Yellow	70

	5.2.1	Which colour light is the best for photosynthesis? (1)		
	5.2.2	Name the:		
		(a) Independent variable (1)		
		(b) Dependent variable (1)		
		(c) Two fixed variables (2)		
	5.2.3	Calculate the average time taken to release 20 bubbles for all the colours together. Show all your calculations. (2)		
	5.2.4	Draw a bar graph of the results shown in the table. (6)		

5.3 An experiment was conducted to investigate the effect of light intensity and the rate of photosynthesis. The apparatus was set up as shown in the diagram below. Study the diagram and answer the questions



5.3.1 State a reason:

(a) for choosing a water plant instead of a terrestrial plant in this particular experiment. (1)

(b) for the addition of sodium bicarbonate (baking powder) to the water. (1)

5.3.2 How was the rate of photosynthesis measured using this experiment? (1)

5.2.3 The data in the table below was recorded during the experiment:

A	B	C
Distance between the water plant and light source (metres)	**100 W bulb** Light intensity = power/Area Light intensity = W/m^2	Number of bubbles given off in one minute.
1,0	7,96	8
0,5	31,85	28
0,25	127,39	105
0,125	510,20	105

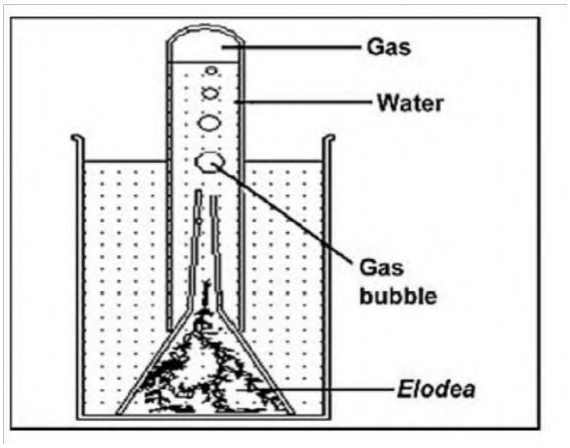
With reference to the results given above, what deduction can be made with regard to the relationship between the intensity of light and rate of photosynthesis? (3)

Activity 6

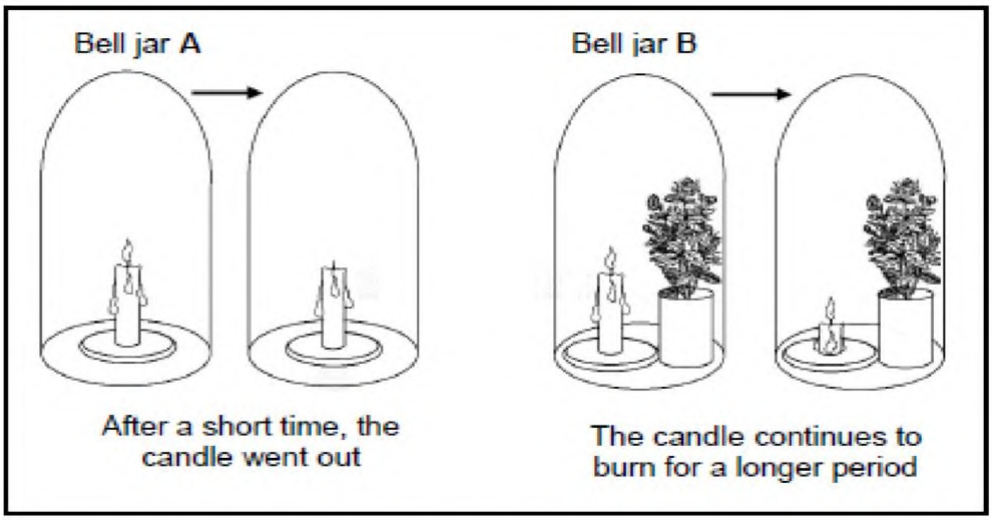
6	6.1	Complete the missing words in the statements below:		
	6.1.1	As the light intensity increases, the rate of photosynthesis_____	(1)	
	6.1.2	Structures in which crops are grown in a protected and controlled environment are called _____	(1)	
	6.1.3	ATP stands for _____	(1)	
	6.1.4	_____ energy is found between phosphates.	(1)	
	6.1.2	Photosynthesis helps maintain a healthy level of carbon dioxide in the _____	(1)	

Activity 7

7.1	The diagram below shows a photosynthesis experiment done to investigate if a gas is produced during the process. A small amount of sodium carbonate was added to the water before the experiment was started.

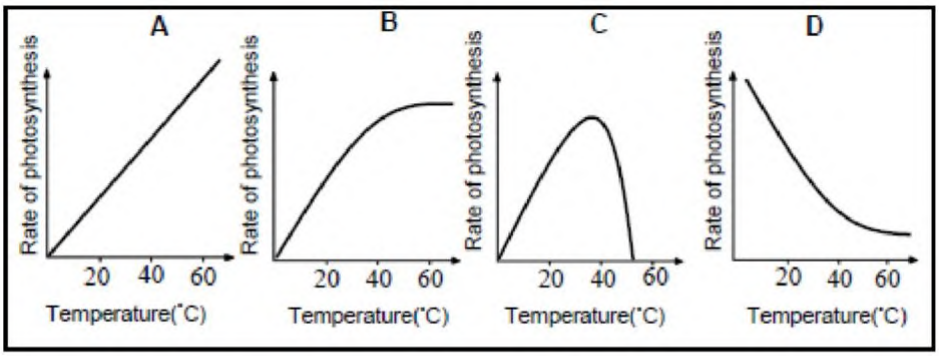


7.1.1	Name the gas produced by the plant.	(1)
7.1.2	Describe a test for the gas mentioned in QUESTION 2.4.1.	(2)
7.1.3	Explain why sodium carbonate was added to the water.	(2)
7.1.4	Why was this experiment done under water?	(1)
7.1.5	Explain TWO ways in which the rate of this experiment could be increased.	(4)

7.2		An experiment was set up to investigate whether oxygen is released during photosynthesis. The result of the experiment is represented in the following diagram.		
	7.2.1	 The following deductions were made before arriving at the final conclusion. (i) Photosynthesis reduces the amount of CO_2 inside bell jar **B** (ii) The oxygen in bell jar **A** was completely used up and the burning is not supported (iii) The photosynthesis increases the amount of oxygen inside bell jar **B** (iv) The vapour produced inside bell jar **A** due to combustion extinguished the burning candle Which ONE of the following set of deductions is correct? A (i) and (iv) only B (i), (ii) and (iii) only C (i), (iii) and (iv) only D (iii) and (iv) only	2	

Activity 8

8.1 The graphs below (A, B, C and D) represent the relationship between the rate of photosynthesis and temperature.



8.1.1 Which ONE of the graphs (A, B, C or D) represent the correct relationship between the temperature and the rate of photosynthesis?

A D
B A
C B
D C

(2)

8.2 An experiment was carried out to calculate the rate of photosynthesis in a group of plants at different concentrations of carbon dioxide. This was repeated at two different light intensities. The results are given below.

CO_2 concentration (%)	Rate of photosynthesis (Arbitrary units)	
	Low light intensity	High light intensity
0,00	0	0
0,02	20	20
0,04	29	35
0,06	35	47
0,08	39	68
0,10	42	84
0,12	45	89
0,14	46	90
0,16	46	90
0,18	46	90

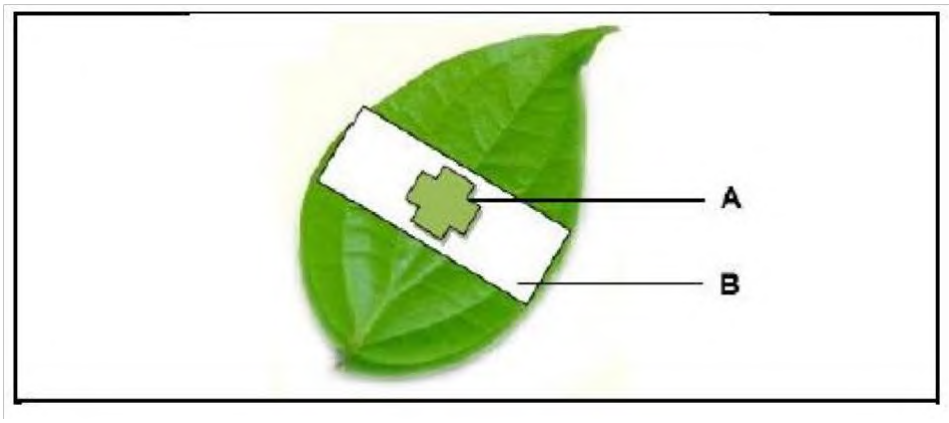
8.2.1 Identify the dependent factor in the above graph. (1)

8.2.2 Up to what values does CO_2 concentration act as a limiting factor at high light intensities? (1)

8.2.3 Name TWO limiting factors of photosynthesis other than the ones mentioned in QUESTION 3.4.2. (2)

8.2.4 Draw a line graph to represent the rate of photosynthesis under various concentrations of CO_2 at low light intensity. (7)

8.3 The diagram below shows how the leaf in a destarched plant was set up by a learner to perform an experiment on photosynthesis. Study the diagram and answer the questions below.



8.3.1 What was the aim of this experiment? (2)

8.3.2 What was the dependent variable in this experiment? (1)

8.3.3 What chemical was used to test for the presence of starch in the leaf? (1)

8.3.4 What was the colour change observed in areas of the leaf that were:

(a) Not exposed to sunlight (1)

(b) Exposed to sunlight (1)

8.3.5 State the:

(a) Human enzyme responsible for the digestion of the stored product of photosynthesis (1)

(b) Glands that secrete the enzyme mentioned in QUESTION 1.4.5(a) into the mouth cavity (1)

8.3.6 There are two gases involved in the process of photosynthesis.

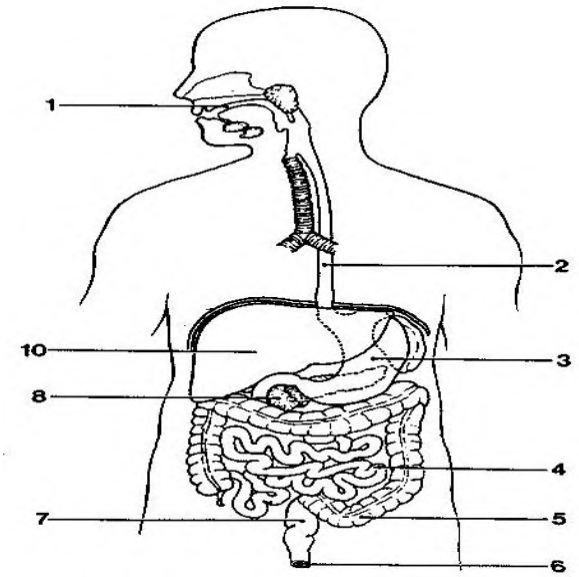
(a) Which gas would not be produced, if the plant is placed in a dark box? (1)

(b) Which of the gases mentioned above is required by living organisms to generate energy for body processes? (1)

Activity 9

	9.1	Which ONE of the following factors will cause optimal growth in greenhouses?		
		A Carbon dioxide enrichment B Temperatures between 10 °C and 15 °C C Dim lighting in the greenhouse D Only irrigating once a week	(2)	

Topic: Animal nutrition



Complete the following table:

PART NUMBER	FUNCTION
1	
2	
3	
4	
5	
6	
7	
8	

			10				

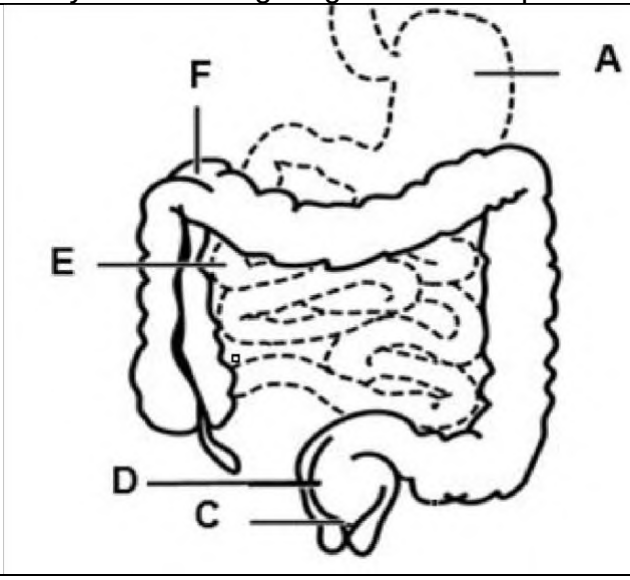
D. CLASSWORK/HOMEWORK

Activity 1

1.1	Provide the correct **biological term** for each of the following terms	
1.1.1	Ejection of solid waste from the body	
1.1.2	The breakdown of large insoluble food molecules into smaller water soluble molecules so that they can be absorbed into blood plasma	
1.1.3	The products of digestion become part of the protoplasm of the body cells	
1.1.4	4 The process of taking soluble food substances into blood stream	

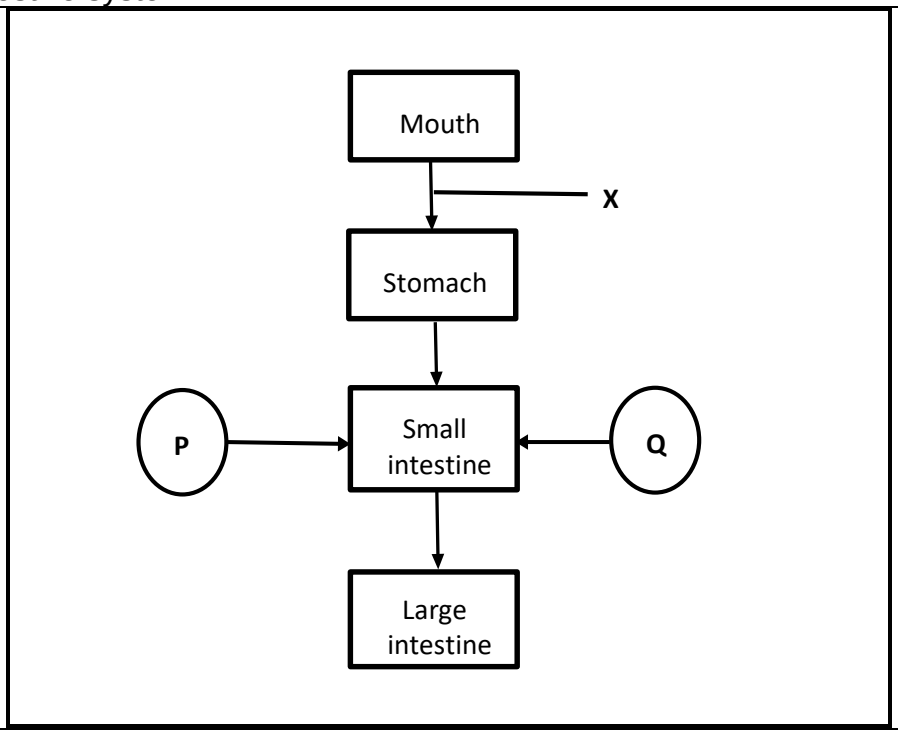
1X1=**(4)**

Activity 2

	2.1	Study the following diagram about a part of human alimentary canal.		
				
	2.1.1	Give labels for the following parts: (a) A (b) B (c) C (d) E	 (1) (1) (1) (1)	

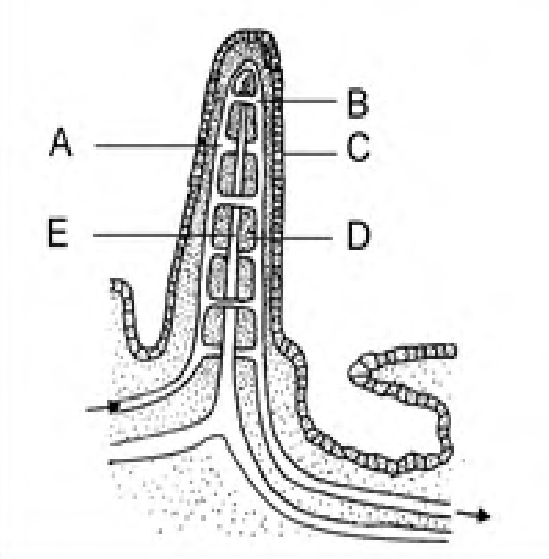
	21.2	Give the LETTER of the part with the following function or characteristics	
		(a) Responsible for the absorption of most water	(1)
		(b) Responsible for breaking down of food molecules by mechanical and chemical digestion	(1)
		(c) Contains the sphincter muscle responsible for controlling defecation	(1)
	2.1.3	State TWO functions of the liver associated with nutrition	(2)
			(9)

Activity 3

	3.1	The diagram below shows a diagrammatic representation of the digestive system		
				
	3.1.1	Name the part of the alimentary canal represented by **X.**	(1)	
	3.1.2	By which process is food moved through structure **X?**	(1)	
	3.1.3	Name the glands P and Q that release their secretions into the small intestine.	(2)	
	3.1.4	Name the part of the alimentary canal where the digestion of proteins begins. (1)		
				(5)

Activity 4

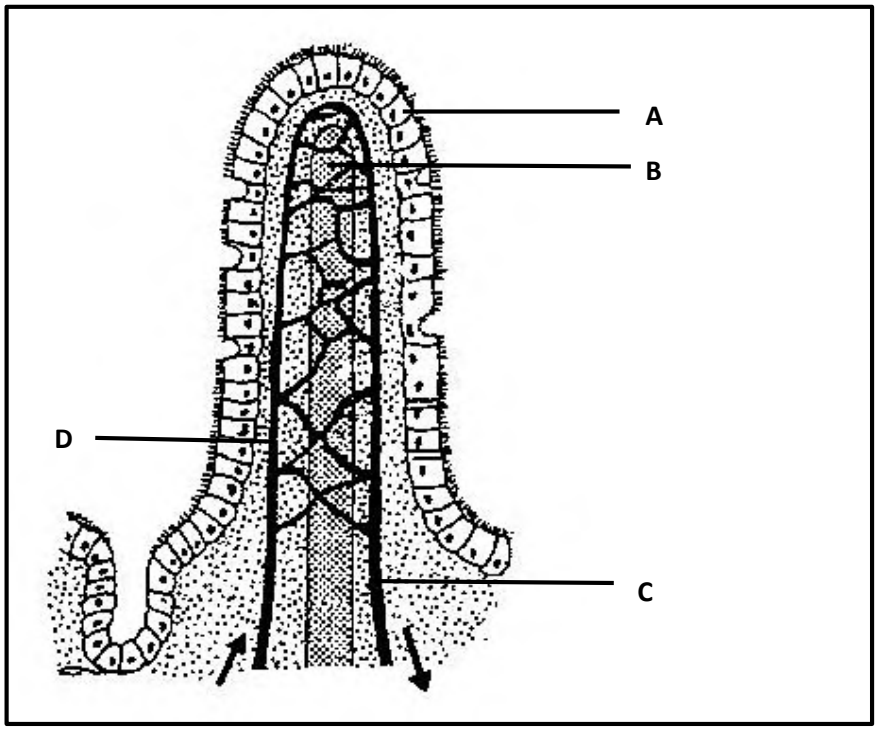
4.1 Study the following diagram and then answer the questions by filling in the missing words. Write the numbers 4.1.1 to 4.1.10 in your answer book and next to each the missing word.



The diagram shows the structure of a ___**4.1.1**___ which is found lining the ___**4.1.2**___. The layer C consists of ___**4.1.3**___ cells. The part labeled D is ___**4.1.4**___ tissue. Parts A and B represent ___**4.1.5**___ into which the products of digestion, ___**4.1.6**___ and ___**4.1.7**___, pass so that they can be transported away. Vessel E represents the ___**4.1.8**___ into which diffuses products of digestion such as ___**4.1.9**___ and ___**4.1.10**___. (10)

Activity 5

5.1 The diagram below shows a structure associated with the digestive system.



5.1.1 Identify the structure shown in the diagram. (1)

5.1.2 Name the following parts:

(a) A (1)
(b) B (1)

5.1.3 In which part of the digestive tract would this structure be found? (1)

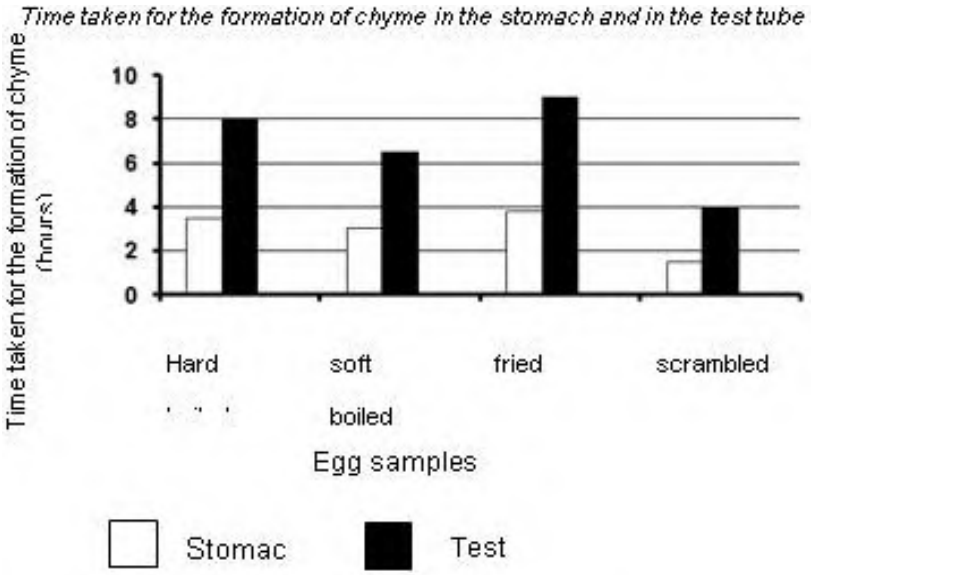
5.1.4 Explain TWO structural adaptations of the part mentioned in QUESTION 5.1.3 that enables it to perform its functions (4)

5.1.5 In which part (C or D) would you expect to find more nutrients? (1)

5.1.6 Explain your answer in QUESTION 5.1.5 (4) **(13)**

Activity 6

6.1 A scientist conducted an investigation on digestion, involving gastric juice. She compared the time taken for 50 g of different cooked egg samples to form chyme in the stomach, with the time taken for the same sample to form chyme in a test tube containing gastric juice. The test tube was maintained at 37°C. The results are indicated in the graph below.



6.1.1 Why was the temperature of the test tube maintained at 37°C? (1)

6.1.2 Name ONE factor other than temperature which was kept constant during the investigation (1)

6.1.3 Determine the following from the graph:

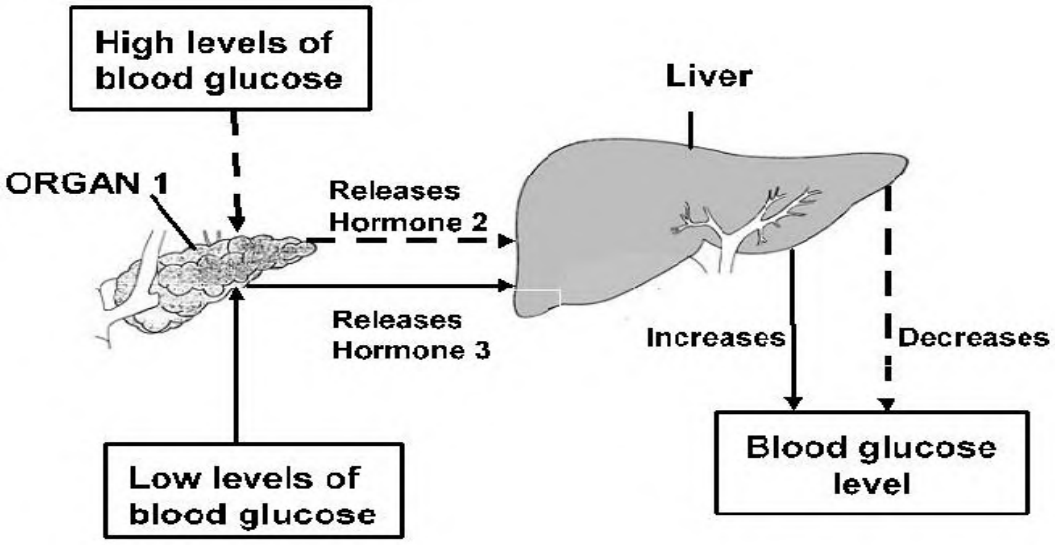
(a) The sample which took the longest time to form chyme in the stomach (2)

(b) The sample which took the shortest time to form chyme in the test tube. (2)

6.1.4 Describe the absorption and transportation of end product of food that contains only carbohydrates. (8) **(14)**

Activity 7

7.1 Study the flow diagram below.



7.1.1 Identify: - **(a)** Organ **1** (1)

(b) Hormone **2** (1)

(c) Hormone **3** (1)

7.1.2 The disorder caused when organ 1 fails to release amounts of hormone 2 (1)

7.1.3 The mechanism that controls the levels of glucose in the body (1)

(5)

Activity 8

8.1 Read the extract below and answer the questions that follow.

TOO MUCH CARBOHYDRATES AND TOO LITTLE PROTEINS The World Health Organisation (WHO) defines malnutrition as "the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions." The term protein-energy malnutrition (PEM) applies to a group of related disorders. This involves inadequate intake of protein and calories and is characterised by emaciation (extreme thinness). The term was first used in 1933, and it refers to an inadequate protein intake with reasonable caloric (energy) intake.

[Adapted from http://emedicine.medscape.com]

8.1.1 State the World Health Organisation's definition of malnutrition. (2)

8.1.2 What condition can children suffer from if they get enough energy foods like bread, rice and porridge but not enough proteins? (1)

8.1.3 Describe the chemical digestion of proteins in the stomach. (5)

(8)

Activity 9

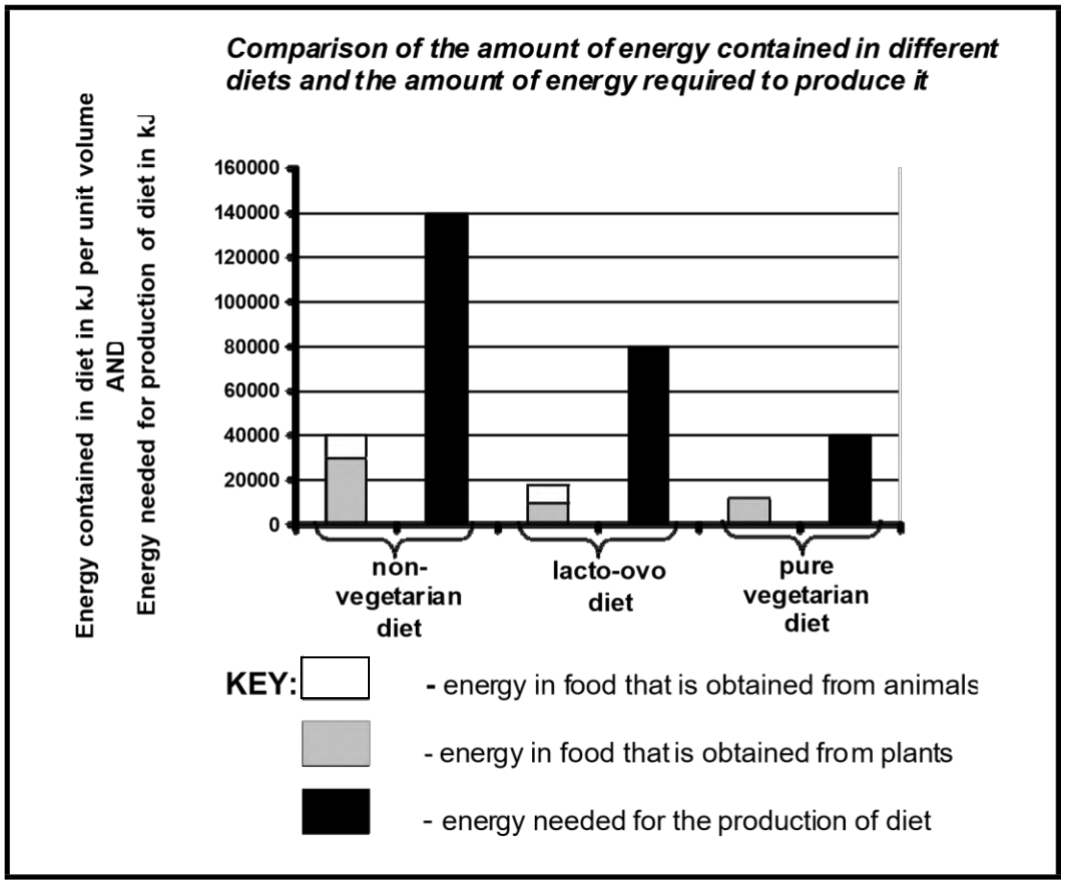
9.1 In general, people's eating patterns can be divided into three basic kinds of diet based on the type of protein eaten.

(a) *Non-vegetarian diet*: where people eat / drink all types of food

(b) *Lacto-ovo diet:* where people do not eat meat but do eat eggs milk, and milk products

(c) *Pure vegetarian diet*: where people do not eat/ drink any animal-based food

The bar graphs below show the amount of energy contained in each of these three types of diets per unit volume as well as the amount of energy needed to produce each type of diet.



9.1.1 Which of the above three diets requires the greatest volume of food to be eaten? Give a reason for the answer. (3)

9.1.2 Suggest a reason why this diet named in QUESTION 2.2.1 might cause

problems for very young children. (2)

9.1.3 What is the main source of proteins for pure vegetarians? (1)

9.1.4 Calculate the food energy intake that is provided by animals in the non- vegetarian diet, as a percentage. (3) **(9)**

TOPIC: Cellular Respiration

D: ACTIVITIES (CLASSWORK/HOMEWORK)

Activity 1

Define the following terms:

a. Cellular respiration
b. Aerobic respiration
c. Anaerobic
d. Co-enzymes
e. ATP
f. Oxygen
g. Glycolysis
h. Mitochondrion
i. Kreb's Cycle
j. Ethanol
k. Lactic acid
l. Carbon dioxide(CO_2) **(12)**

Activity 2

2. Answer the following questions on cellular respiration.

2.1 Describe the process of cellular respiration (7)

2.2 Where in the cell does cellular respiration take place? (2)

2.3 Name the types of cellular respiration and describe the conditions required for each to occur. (4)

2.4 List all the:

(a) requirements of cellular respiration (3)
(b) the product of cellular respiration (3)

2.5 Give the equation of aerobic cellular respiration (6)

2.6 Discuss the reasons why cellular respiration is important for life on earth (8)

(33)

Activity 3

3. Answer the following questions on aerobic respiration.

3.1 Define aerobic respiration. (2)

3.2 List all the raw materials needed / required for cellular respiration. (3)

3.3 Draw a labelled structure of an organelle responsible for cellular respiration. (6)

3.4 Discuss FOUR structural adaptations of mitochondrion to facilitate the process of cellular respiration. (8)

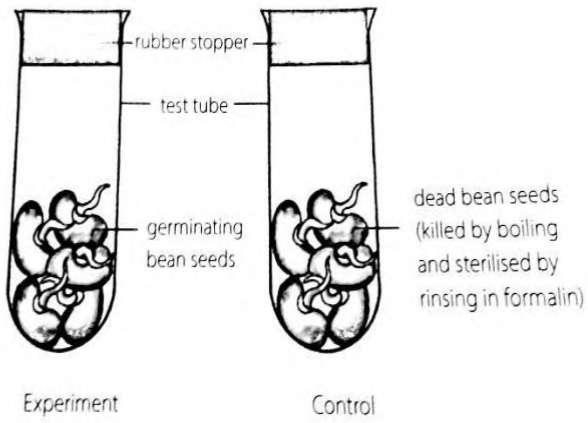
3.5 Describe the process of aerobic respiration. (10)

3.6 Name the products of aerobic respiration. (3)

(32)

ACTIVITY 4

4.1 Study the investigation showing that oxygen is used by living organisms during cellular respiration and answer the questions.



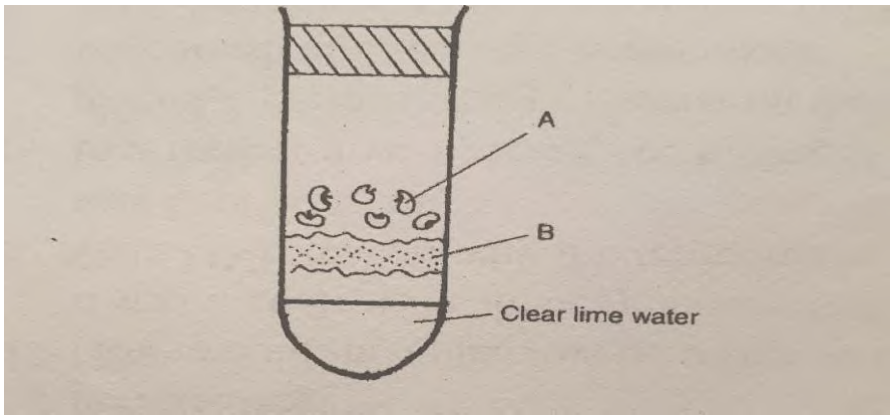
4.1.1 What is the role of the control in this investigation? (2)

4.1.2 In which set up (experiment or control) would oxygen be still present after 12 - 24 hours? (1)

4.1.3 Give the reason to support the answer in question number 2. (2)

(5)

4.2 Study the experimental design and answer the questions that follow.



4.2.1 State the aim of the experiment. (2)

4.2.2 Name the parts labelled A and B. (2)

4.2.3 State TWO precautions you would take in setting up this experiment. Give a reason in each case. (4)

4.2.4 Explain the purpose of lime water? (3)

4.2.5 Explain how you would set up a control for this experiment. (2)

(13)

ACTVITY 5

5. Answer the following questions on anaerobic respiration.

5.1 Define what anaerobic respiration means. (2)

5.2 Describe how anaerobic cellular respiration occurs. (5)

5.3 State the significance of anaerobic respiration in industries. (3)

5.4 Tabulate differences between aerobic and anaerobic cellular respiration, using the following criteria:

- relative to amount of energy
- raw materials and products

(5)

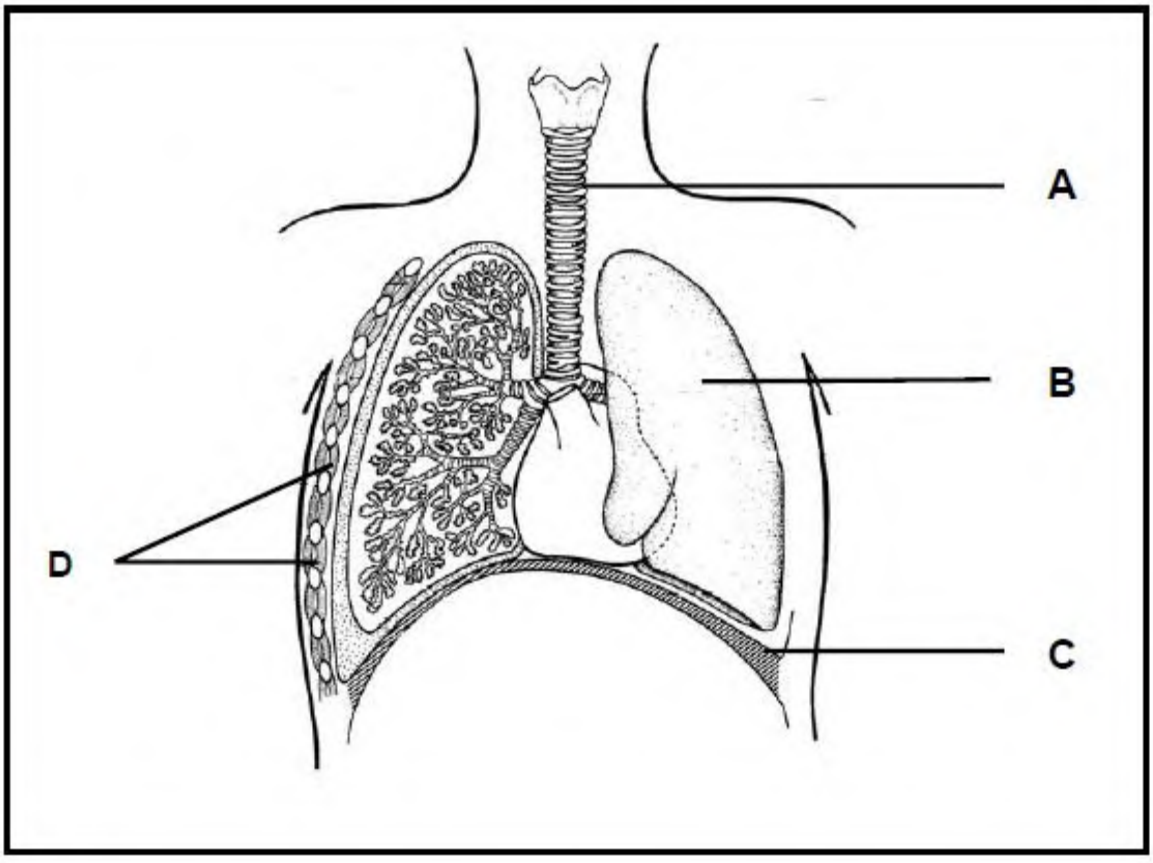
(15)

Topic: Gas exchange

A. CLASSWORK/HOMEWORK

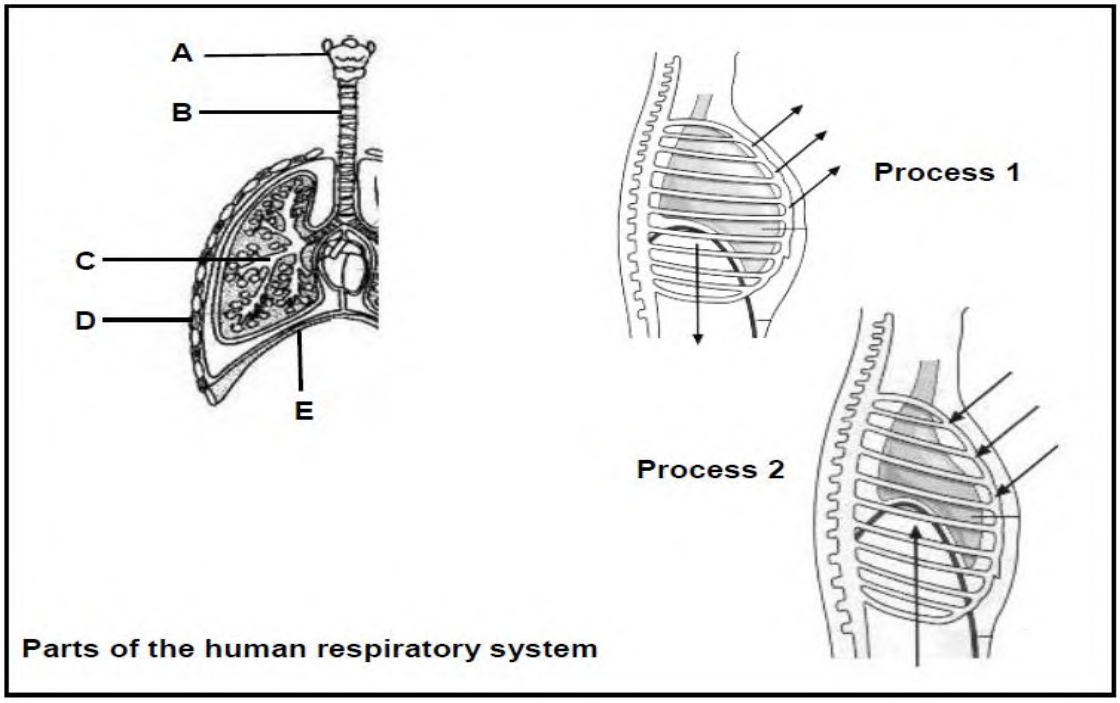
Activity 1

1.1 Study the diagram of the respiratory system of the human below and answer the questions that follow.



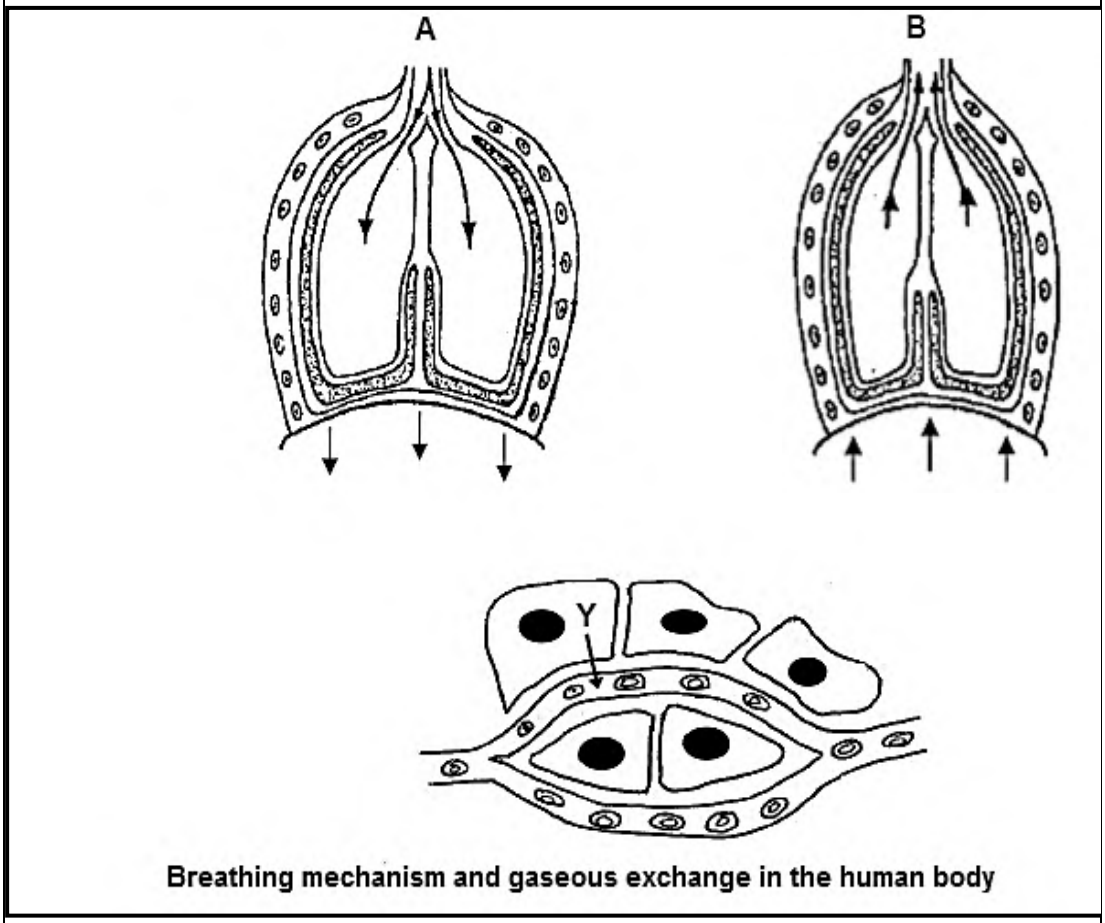
	1.1.1	Identify the parts labelled **A** and **D**.	(2)	
	1.1.2	Explain ONE way in which the part labelled **A** is adapted to perform its function.	(2)	
	1.1.3	(a) Name the parts labelled **B** and **C**. (b) Describe what happens to each of the parts named in QUESTION 5.1.3(a) during inhalation.	(2) (2)	
			[8]	

Activity 2

1.1		Study the diagrams below showing some parts of the human respiratory system. Answer the questions that follow.		
		 Parts of the human respiratory system		
	1.1.1	Identify parts **A**, **B** and **C**.	(3)	
	1.1.2	Which process in the above diagrams illustrates inhalation (**Process 1** or **Process 2**)?	(1)	
	1.1.3	Give TWO reasons from the diagrams to support your answer to QUESTION 1.1.2	(2)	
	1.1.4	Give the LETTERS and the NAMES of the muscles shown in the diagram that are involved during inhalation.	(4)	

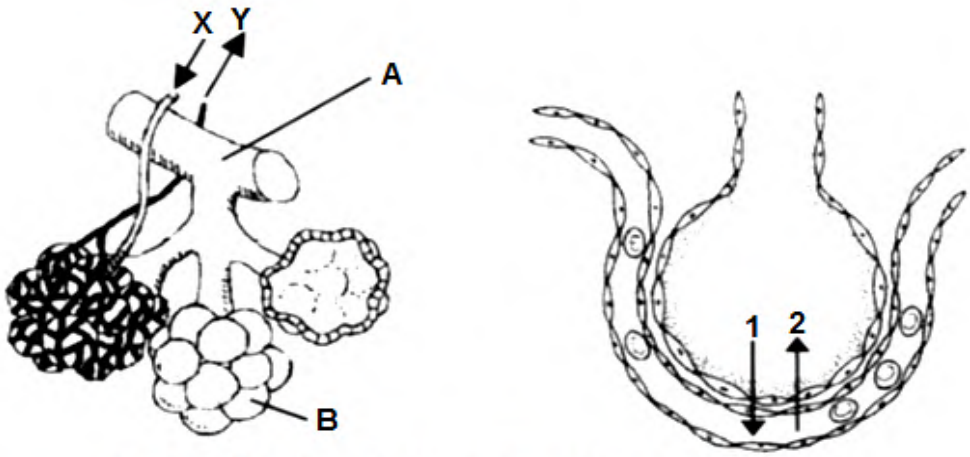
	1.1.5	Draw and label a diagram showing gaseous exchange across an alveolus. Use arrows to show the direction of gas movement.	(5)	
	1.1.6	When one makes use of a heater to warm a room, one is advised to place a small bowl of water next to the heater. Explain the purpose of this practice.	(4)	
	1.1.7	A person's thoracic wall is punctured during a motor vehicle accident. Explain how this injury will affect the breathing process.	(2)	
			[21]	

Activity 3

1.1		The following diagrams are based on the breathing mechanism and gaseous exchange in the human body. The arrows represent the movement of air/gases.		
		 Breathing mechanism and gaseous exchange in the human body		
	1.1.1	Identify the phase in the breathing mechanism represented by **A.**	(1)	
	1.1.2	Describe the changes that occur in the body to bring about the process represented by **B**.	(5)	

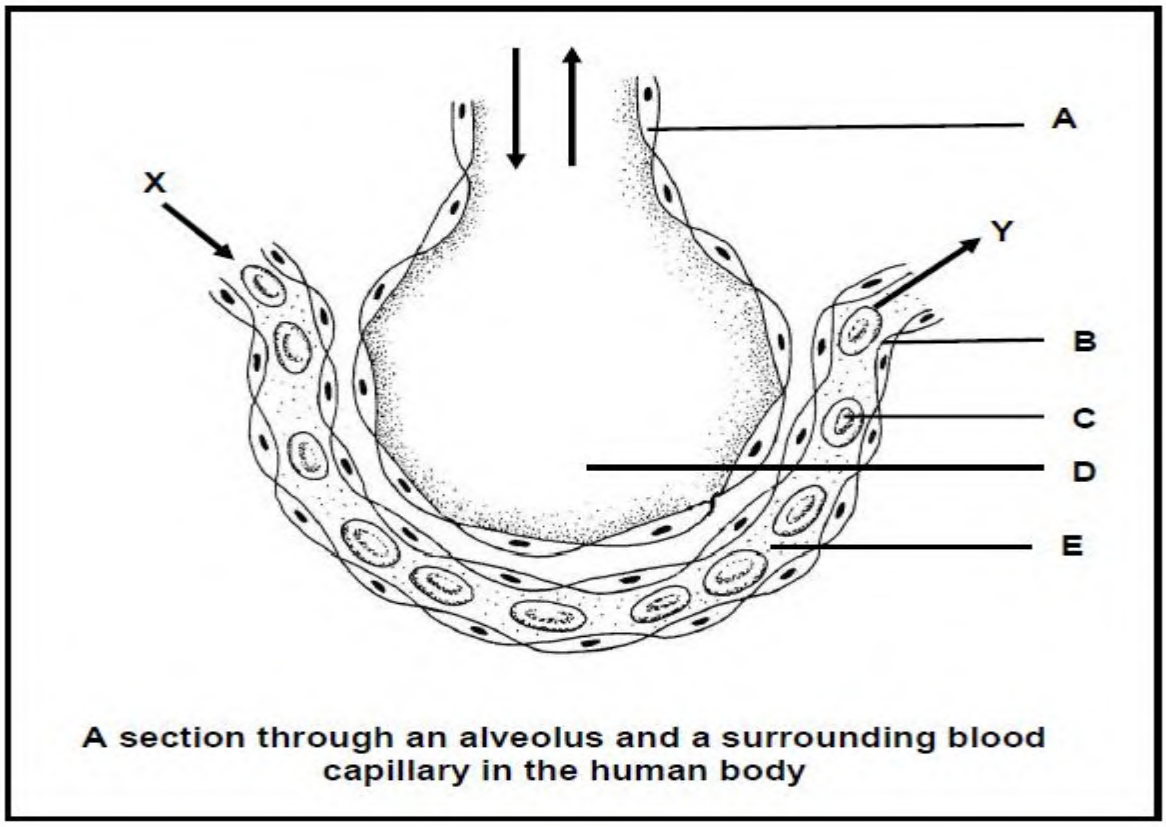
	1.1.3	State TWO ways in which CO_2 is transported after it moves in the direction indicated **Y**.	(2)	
			[8]	

Activity 4

1.1		Study the diagram showing parts of the human exchange system and answer questions that follow.		
		 Parts of the human gaseous exchange system		
	1.1.1	Identify part **A**.	(1)	
	1.1.2	Identify the process represented by **1** and **2**.	(1)	
	1.1.3	With regard to carbon dioxide and oxygen concentrations, which one will be the highest at: (a) X (b) Y	 (1) (1)	
	1.1.4	List TWO features visible on the diagram which make the above structure an efficient respiratory surface.	(2)	

			[6]	

Activity 5

1.1		Study the diagram representing a section through an alveolus and surrounding blood capillaries in the human body below and answer the questions that follow.  **A section through an alveolus and a surrounding blood capillary in the human body**		
	1.1.1	Name the type of epithelium found in the parts labelled **A** and **B**.	(1)	

	1.1.2	Explain ONE structural adaptation of the epithelium you named in QUESTION 5.2.1 that enables the alveolus to function efficiently.	(2)	
	1.1.3	Identify the blood cell labelled **C**.	(1)	
	1.1.4	Which type of blood: (a) Enters the blood capillary at X (b) Leaves the blood capillary at Y	(1) (1)	
	1.1.5	Will the oxygen level be low or high in **D** during inhalation?	(1)	
	1.1.6	Name the physical process that occurs between the air in **D** and the blood in **E**.	(1)	
	1.1.7	List THREE ways in which carbon dioxide is transported by the blood.	(3)	
			[11]	

Activity 6

1.1 The table below shows the results of an investigation involving a fit and healthy human. The person involved in the investigation was subjected to the following conditions:

- Required to lie down throughout the investigation
- Was given air to breathe which had different concentrations of carbon dioxide while the oxygen concentration remained the same throughout the investigation

During the investigation the rate and depth of breathing of this person was measured and from this the volume of air breathed was determined.

Concentration of CO_2 breathed in (%)	Number of breaths per minute (rate)	Total volume of air breathed per minute (litres) (depth)
0,04	14	9,4
0,08	14	10,3
1,50	15	11,9
2,30	15	13,7
3,10	15	18,5
5,50	20	29,5
6,00	27	56,8

	1.1.1	Suggest an aim for this investigation.	(2)	
	1.1.2	Describe how the increase in carbon dioxide concentration affects the following: (a) The rate of breathing (b) The volume of air breathed in per minute	(3) (2)	
	1.1.3	Why did the volume of air breathed in per minute increase from 11,9 litres to 18,5 litres while the number of breaths remained the same at 15 per minute?	(2)	
	1.1.4	Describe the homeostatic mechanism that causes the rate and depth of breathing to increase when a person engages in strenuous exercise.	(5)	
			[14]	

1.1		Read the extract below and answer the questions that follow: **Miss SA talks about her battle with TB, launches new campaign** Miss SA for 2018, Tamaryn Green, was diagnosed with TB in 2015. She has launched Tamaryn's #BreakTheStigma campaign and hopes to highlight the TB epidemic. She had the following to say: "My campaign is based around breaking the stigma with regards to TB. It's about raising awareness that TB is curable, but it's still killing so many people, so action needs to be taken. … I'm going to be the voice behind TB". One of the side effects she suffered from the treatment to fight the disease was drug-induced hepatitis (inflammation of the liver). As part of her campaign she plans to create short educational videos that will teach people about the signs and symptoms of the disease, testing for the disease and the treatment of the disease. *https://www.channel24.co.za/The-Juice/News/miss-sa-talks-about-her-battle-with-tb-launches-new-campaign-20180830-2*		
	1.1.1	Which pathogenic organism causes TB?	(1)	
	1.1.2	Tamaryn suffered with side-effects while on treatment for her TB. What is the recognised treatment for the disease?	(1)	

	1.1.3	Give three symptoms that a TB sufferer might experience.	(3)	
	1.1.4	What viral disease has caused TB infection to rise in the South African population?	(1)	
			[6]	

Activity 7

Activity 8

1.1		An investigation was conducted to determine the effect of smoking on the prevalence of other diseases. Study the table below and answer the questions that follow.		

Diseases	Mortality rate per 100 000		
	Active-smoker	Passive smoker	Non-smoker
Lung cancer	200	190	11
Cancer of the mouth or larynx	30	20	6
Other cancers	195	80	105
Respiratory diseases	60	56	12
Heart diseases	220	138	80
Other medical conditions	70	40	35
Suicide, homicide, accidents	70	75	20

	1.1.1	State the dependent variable for this investigation.	(1)	
	1.1.2	Draw a bar graph representing the above information for active smokers	(6)	
	1.1.3	State how many smokers per 100 000 die of heart disease.	(1)	
	1.14	Indicate the ratio between active smokers, passive smokers and non-smokers that die of respiratory disorders.	(2)	
	1.1.5	Suggest TWO controlled variables that can improve this investigation	(2)	
	1.1.6	What is the effect of smoking on the prevalence of lung cancer? Use the information in the table to explain your answer	(1)	
	1.1.7	Discuss the effect that smoking has on the bronchioles and alveoli of the lungs.	(3)	

TOPIC : EXCRETION IN HUMAN

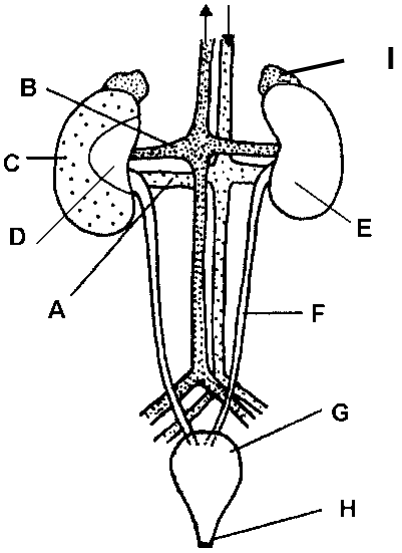
B. CLASSWORK / HOMEWORK

Activity 1

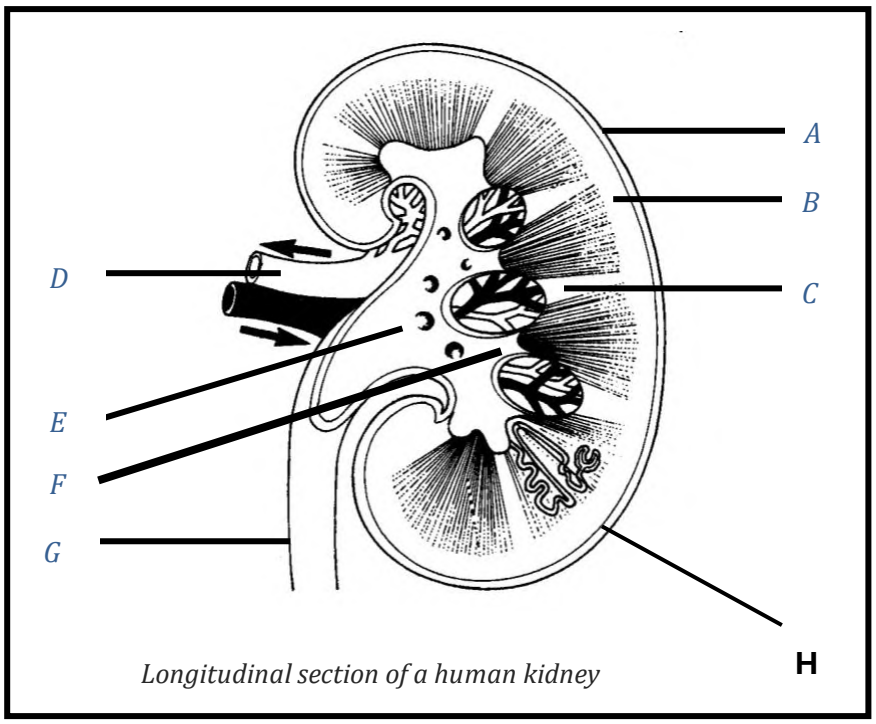
Redraw the following table in your notebook and fill in the missing spaces.

ORGAN	WASTE PRODUCT/S	ORIGIN	PRODUCT EXCRETED
1. _____	CO_2 and water	_____	CO_2 and water in exhaled air
2. Skin (sweat glands)	_____	Extracted from blood	_____
3. _____	Urea	_____	_____
	_____	Breakdown of Haemoglobin	faeces
4. Colon	_____	Breakdown of Haemoglobin	_____
	Excess mineral salts	_____	faeces
5. _____	Urea	_____	Urine
	_____	Excess taken in with food	Urine
	Water	_____	Urine

Activity 2

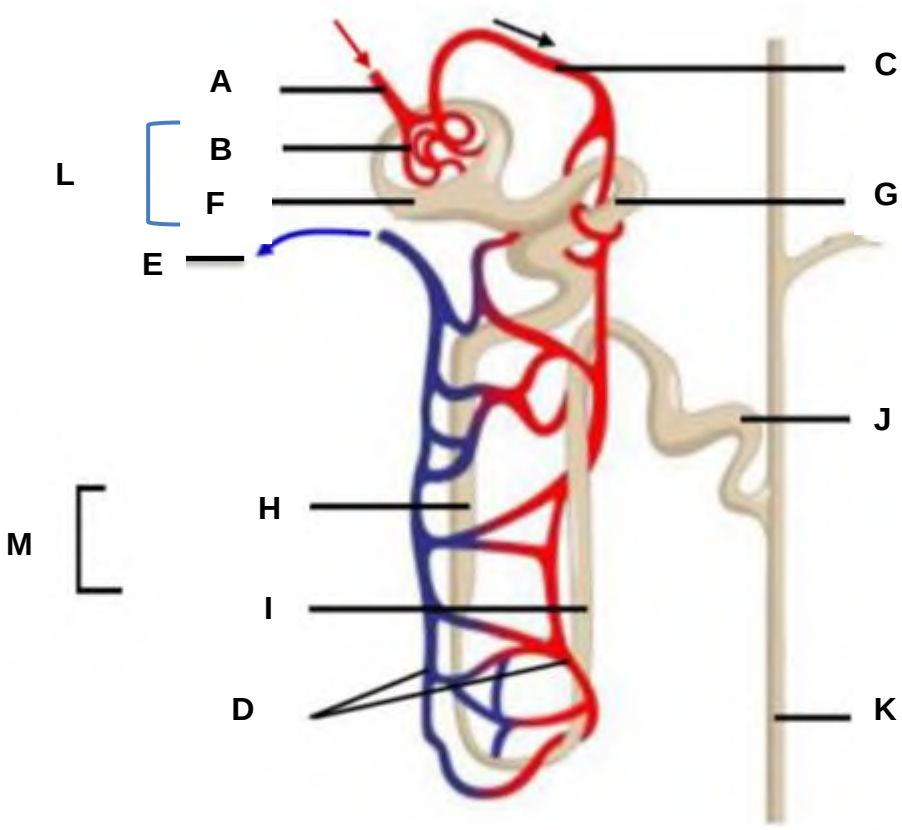
2.		The diagram shows the structure of the human urinary system.  		
	21	Provide labels for the parts **A**, **B, G** and **I**		(4)
	2.2	Identify the regions of the kidney marked **C** and **D**		(2)
	2.3	State ONE function of each of the following: (a) **E** (b) **F** (c) **H**		(3)
	2.4	State THREE ways in which carbon dioxide is transported by the blood vessel **B**.		(3)
	2.5	Write the NAME and the LETTER of the: (a) Vessel that contains a relatively high concentration of nitrogenous wastes.		(4)
		(b) Part where glomerular filtration occurs.		(4)
	2.6	Describe the functions of the kidney		
				(20)

Activity 3

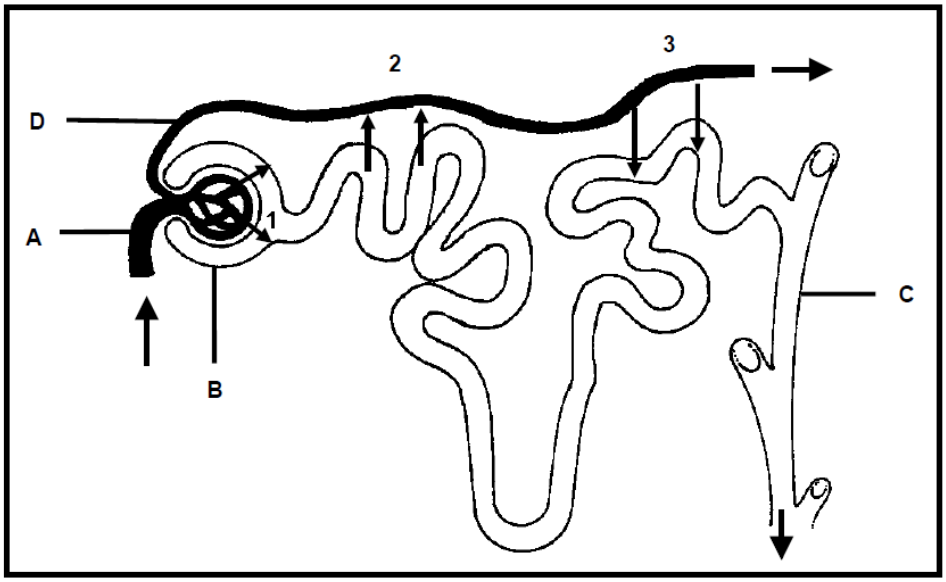
3		Study the diagram below of a longitudinal section through a kidney and answer the questions that follow.  *Longitudinal section of a human kidney*		
	3.1	Identify parts A, E and F.		(3)
	3.2	State the **LETTER** and **NAME** of the blood vessel that contains the highest percentage of waste products.		(2)
	3.3	Why is region B darker in colour compared to region C in an actual specimen?		(2)
	3.4	State the role of the fatty tissue surrounding the kidney.		(2)
	3.5	In which labelled oarts do each of the following occur? (a) Malphigian bodies (b) Loops of Henle		(3)
	3.6	(c) Ducts of Bellini		(5)
	3.7	Explain why urine in part **G** is sometimes very concentrated. Explain how the functioning of the kidney will be affected if part G is blocked by a large kidney stone.		(3)
				(20)

Activity 4

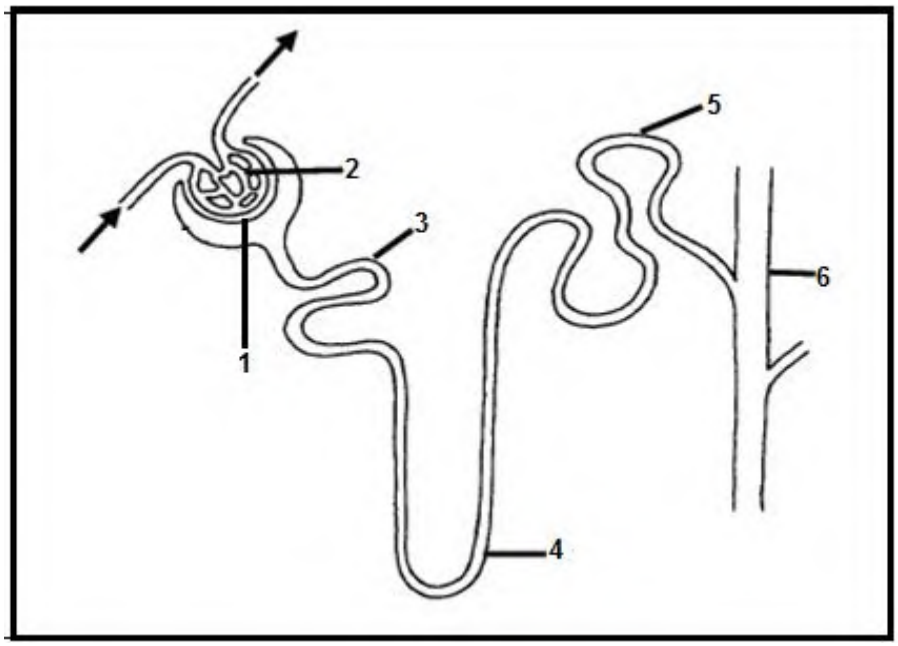
	Compile a table with the numbers A - M. In the next column complete the labels for the numbered parts and in the last column indicate the function of the part.		



Activity 5

5.1		Study the following diagram and table and answer the questions that follow. 		
	5.1.1	Label parts A, B and C		(3)
	5.1.2	Identify the processes indicated by 1, 2 and 3.		(3)
	5.1.3	Explain why there are a larger number of mitochondria in the cells of the tubule in region 2.		(2)
	5.1.4	Explain the significance of the difference in diameter between vessels A and D.		(2)
	5.1.5	Explain the role of part C in ensuring that concentrated urine is excreted when there is a shortage of water in the body.		(6)
				(16)

5.2 The diagram below represents the structure of the nephron.



The table below shows the concentration of some of the substances found in the nephron of a human being.

Part of the nephron	Urea g/100 cm^3	Glucose g/100 cm^3	Proteins g/100 cm^3	Salts g/100 cm^3
2	0,03	0,10	8,00	0,72
3	0,03	0,10	0,00	0,72
6	2,00	0,00	0,00	1,50

5.2.1 Name the specialized cells found at part **1**. (1)

5.2.2 Which substance:

(a) Did not pass from part **2** to part **3** (1)

(b) Was completely reabsorbed from part **3** (1)

5.2.3 Calculate the difference in the salt concentration between part **3** and part **6**. Show all working. (3)

5.2.4 Explain why the concentration of urea is greater in part **6** than in part **3**. (2)

(8)

Activity 6

6.1 Study the table below which shows the flow rate and concentration of certain substances taken at regions A, B, C and D of the nephron in the human kidney.

Part of the nephron	Flow rate (cm^3/min)	Solute concentrations (g/100 cm^3)				
		Proteins	Glucose	Sodium ions	Ammonium ions	Urea
A	4	0,0	0,0	0,6	0,04	1,80
B	200	0,0	0,10	0,72	0,0	0,05
C	40	0,0	0,0	0,3	0,0	0,15
D	2 000	7,0	0,10	0,72	0,0	0,05

6.1.1 State, **with a reason**, which of the parts (A, B, C or D) of the nephron represent the following:

(a) Afferent arteriole (2)

(b) Bowman's capsule cavity (2)

(c) Loop of Henlé (2)

(d) Duct of Bellini (2)

6.1.2 Explain the difference in the flow rate between B and D. (5)

6.1.3 What conclusion could you make if the value for protein in A was 0,5 g/100 cm^3? (2)

6.1.4 State TWO functions of the kidneys, other than pH regulation, that can be supported by the data given in the table. (2)

6.1.5 Will there be amino acids in A in a healthy person?
State ONE reason for your answer. (2)

6.1.6 (a) Name the inorganic substance, shown in the table, that can pass out against a concentration gradient from the renal tubule into the medulla of the kidney. (1)

(b) Why is it necessary for this substance to move out of the renal tubule? (2)

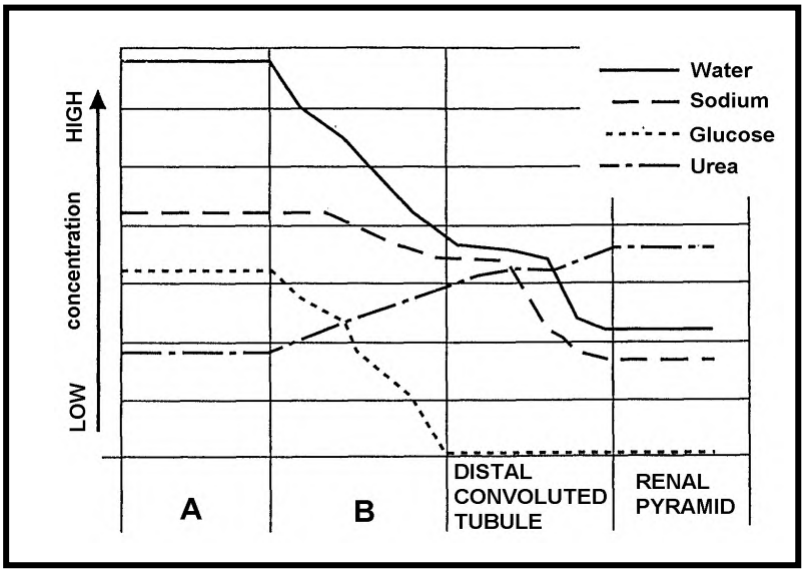
	6.1.7	Explain TWO ways in which the Bowman's capsule is structurally suited for its function.		(4)
	6.1.8	Account for the increase in Sodium ions between parts C and A.		(4)
				(30)

6.2		Study the table below and answer the questions that follow.		

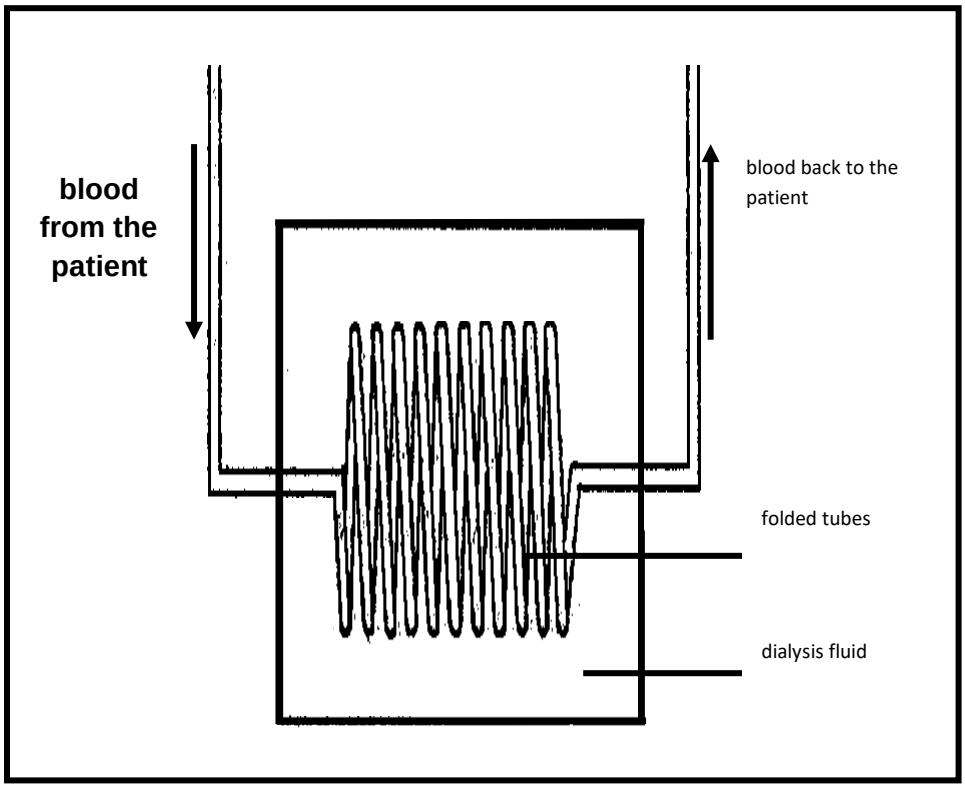
Substance	% in plasma	% in filtrate	% in urine
Water	90 - 93	99 - 100	97,5
Protein	7,00	0	0
Glucose	0,10	0,10	0
Salts	0,35	0,35	0,50
Urea	0,03	0,03	2,00

	6.2.1	Which substance(s)present in the plasma did not filter into the Bowman's capsule? Give a reason for your answer.		(2)
	6.2.2	Provide an explanation for each of the following: (a) No glucose in the urine (b) A higher concentration of salts in the urine compared to the filtrate		(3)
	6.2.3	State ONE possible reason why glucose is sometimes present in the urine of a person.		(3)
	6.2.4	Could the composition of the urine shown in the table be that of a dehydrated person? Explain your answer.		(2) (3)
				(13)

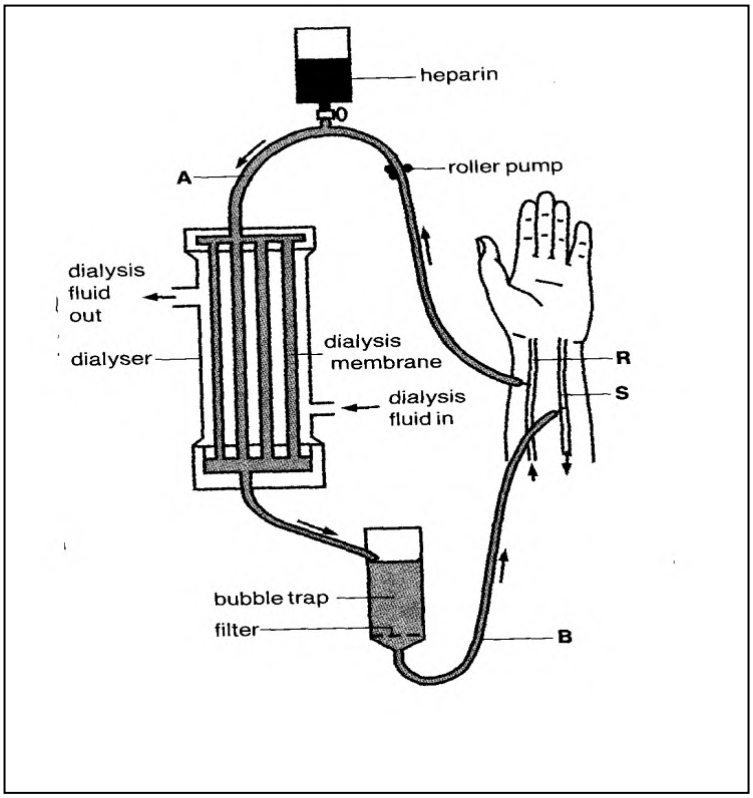
Activity 7

7.		The following graph indicates the concentrations of certain substances as they move through the various regions of the nephron. Study the graph and answer the questions that follow.  		
	7.1	Name the regions indicated by A and B.		(2)
	7.2	Which of the substances indicated on the graph is not excreted as part of urine?		(1)
	7.3	Which product, according to the graph, occurs in a higher concentration in urine than in the blood entering the kidney?		(1)
	7.4	Explain the changes in the glucose concentration during the movement through region B.		(5)
	7.5	Explain the decrease in water concentration in the distal convoluted tubules.		(6)
				(15)

Activity 8

8.1		The diagram below shows a part of a kidney machine which is used in cases of kidney failure. Study the diagram and answer the questions that follow  ***Part of kidney machine***		
	8.1.1 8.1.2 8.1.3 8.1.4	Explain why the tubes are folded rather than straight. Explain ONE requirement that the material which makes up the folded tubes, should meet to ensure effective functioning. Describe the composition of the dialysis fluid for the effective functioning of the kidney machine.		(2) (2) (4) (2)

		Give TWO reasons why a successful kidney transplant would be better for a patient than treatment on a kidney machine.		
				(10)

8.2		The figure below shows how a kidney dialysis machine works. The machine works on similar principles as a real kidney.  		
	8.2.1	Why must the membrane separating the blood from the dialysis fluid be selectively permeable?		(2)
	8.2.2	What must the composition of the dialysis fluid be? Give a reason for your answer.		(4)
	8.2.3	At what temperature must the dialysis fluid be kept? Why?		(2)
	8.2.4	Why might it be dangerous if air bubbles got into the patient's blood?		(2)
	8.2.5	Give two reasons why a successful kidney transplant would be better than treatment on a kidney machine.		(2)
	8.2.6	Which vessel (**R** or **S**) is an artery? Give a reason for your answer.		(3)

	8.2.7	Tabulate TWO differences in the composition of blood at point **A** and at point **B**.		(5)
	8.2.8	State TWO similarities in the composition of blood at point **A** and at point **B**.		(2)
				(22)

Activity 9

Complete the missing information in the table below.

1. Definition of Excretion

2. Excretory Organs

Organ		Product
2.1.	-	
2.2.	-	
2.3.	-	

3. Four functions of the kidney

3.1

3.2

3.3

3.4

4. Nephron : 3 processes

3.1 Bowmans capsule

_____

3.2 Proximal tubule

_____

3.3 Distal tubule

_____

5. Composition

5.1 of blood

5.2 of glomerular filtrate

5.3 of urine

6. Differences between afferent and efferent arteriole

Afferent-arteriole	Efferent-arteriole

7. WHY?

7.1 Glucose in urine

7.2 No proteins in urine

7.3. More urea in urine than in glomerular filtrate

8. Adaptations of Malpighian Body

8.1 Diameter

8.2 Pores

8.3 Large surface area

8.4 Cup-shaped

8.5 Slit-pore

9. Adaptations of renal tubule

9.1 Long

9.2 Convoluted tubules

9.3 Second capillary network

9.4 Sodium pump

9.5 Microvilli

9.6 Mitochondria

Activity 10

10.1		Discuss THREE ways how each of the following parts of the kidney are structurally suited to perform its function:		
	10.1.1 10.1.2	Malphigian Body Renal tubule		(6) (6)
				(12)
10.2		Answer the following questions on the regulation of water in mammals.		
	10.2.1 10.2.2	Will a mammal that spends most of its life in fresh water have a well developed loop of Henlé? Explain your answer. Will a high ADH concentration increase or decrease blood pressure? Explain your answer.		(3) (3)
				(6)
10.3		Describe the role of the kidney in the regulation of blood pH.		(6)

Topic: Population Ecology

C. CLASSWORK/HOMEWORK

Activity 1

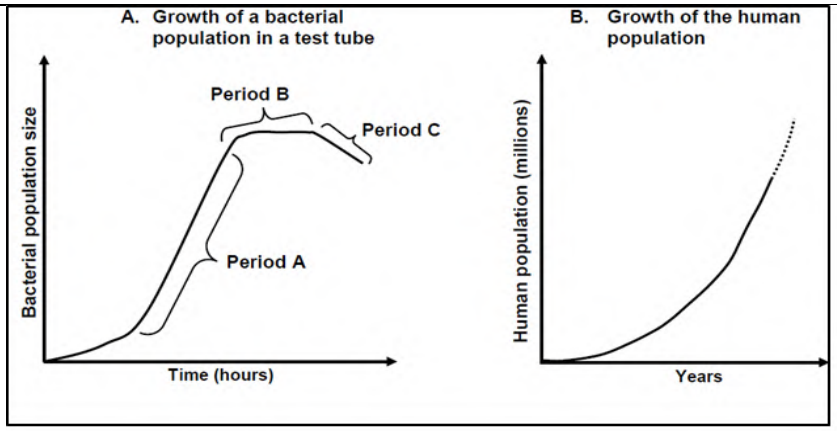
1.1	**Provide the correct term for each of the following descriptions**		
1.1.1	A pattern of relationships among individuals that benefits the society		1
1.1.2	Method of determination of population size by counting the individuals in a representative sample area		1
1.1.3	Competition for resources between individuals of the same species		1
1.1.4	Co-existence of different species living in the same habitat by using resources differently		1
1.1.5	A symbiotic relationship in which one organism benefits and the other one is unaffected		1
1.1.6	The death of individuals in a population		1
1.1.7	Countries with a characteristic high birth rate and decreased life expectancy		1
1.1.8	A group of organisms of the same species, occupying a particular habitat and having the ability to interbreed randomly		1
1.1.9	The inherent ability of a population to increase by birth		1
1.1.10	The tendency of certain species to defend an area within a habitat that they occupy against intruders		1
1.1.11	The killing of elephants through hunting in order to regulate their population size		1

Activity 2

2.1		Various options are provided as possible answers to the following questions. Write down the question number (1.1.1 to 1.1.10), choose the answer and make a cross (X) over the letter (A to D) of your choice in the ANSWER BOOK.		
	2.1.1	Which one of the following contains two factors that contributes to an INCREASE in population size? **A** natality and emigration **B** Immigration and natality **C** emigration and immigration		

		D mortality and natality	2	
	2.1.2	The mark-recapture-mark method of a population size estimation can be **A** animals become trap-shy and cannot be caught. **B** animals are left for a year before recapture. **C** no immigration occurs. **D** markings are temporary	2	
	2.1.3	An individual becomes infected with bilharzia parasite (Schistosoma) when A urinating in freshwater B an individual infected with bilharzia parasite urinates in water C an individual comes into contact with fresh water contaminated with bilharzia parasite D when swimming in fresh water together with a friend infected with bilharzia parasite	2	**6**

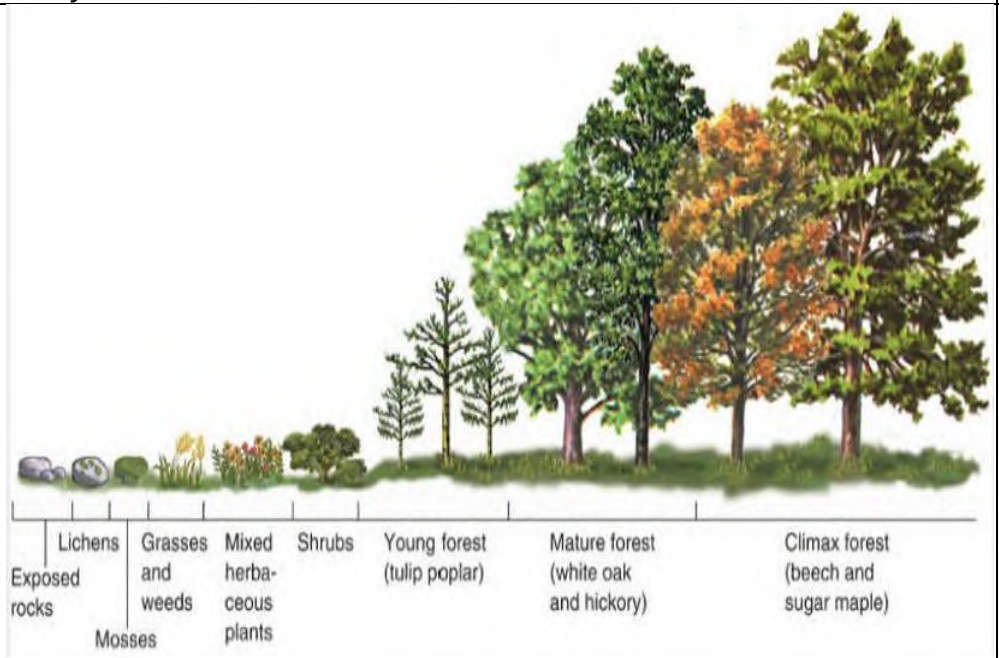
Activity 3

3.1		Graph A below represents the number of bacteria in a growth culture over a period of time. Graph B shows changes in the human population size over a period of time.		
				
	3.1.1	Explain the pattern of growth during period **A** in Graph **A**	2	
	3.1.2	Explain the pattern of growth during the first few hours of the investigation, before period **A** in Graph **A**.	2	
	3.1.3	In what way is the growth of human population (Graph **B**) similar to that of bacterial population (Graph **A**)?	1	
	3.1.4	Explain why it might take the human population longer to reach the type of growth shown by bacteria population in period **B**.	2	
	3.1.5	State TWO precautionary measures that may be implemented in South Africa to slow down the growth in the population.	2	
				9

Activity 4

<table>
<tr><td>4.1</td><td></td><td colspan="2">The data table below shows the estimated human population measured at different times.</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>YEAR</th><th>ESTIMATED POPULATION (MILLIONS)</th></tr>
<tr><td>1650</td><td>500</td></tr>
<tr><td>1850</td><td>1000</td></tr>
<tr><td>1900</td><td>1500</td></tr>
<tr><td>1925</td><td>2000</td></tr>
<tr><td>1950</td><td>2500</td></tr>
<tr><td>1960</td><td>3000</td></tr>
<tr><td>1975</td><td>4000</td></tr>
<tr><td>1999</td><td>6000</td></tr>
<tr><td>2011</td><td>7000</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td></td><td>4.1.1</td><td colspan="2">Draw a line graph to represent the data in the table.</td><td>6</td><td></td></tr>
<tr><td></td><td>4.1.2</td><td colspan="2">What is the shape of the curve you have drawn?</td><td>1</td><td></td></tr>
<tr><td></td><td>4.1.3</td><td colspan="2">How long did it take the population of the world to increase from 500 million to 1000 million (I billion)?</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td colspan="2"></td><td></td><td>8</td></tr>
</table>

Activity 5

5.1		The diagram below represents ecological succession in a forest over 500 years.		
				
	5.1.1	What is ecological succession?	2	
	5.1.2.	Name the type of ecological succession shown in the diagram.	1	
	5.1.3.	Explain your answer in the above Question	2	
	5.1.4.	Identify two examples from the diagram that can be regarded as part of pioneer community in this habitat.	2	
	5.1.5	Explain the importance of the pioneer species in the type of the ecological succession you identified in QUESTION 3.1.4 above.	2	
				9

Activity 6

<table>
<tr><td>6.1</td><td></td><td>The Colorado Beetle is a pest because it feeds on potato crops. In an investigation, the population of beetles in 2000 m^2 potato field estimated as described below: -

• A sample of beetles was collected from the field and counted
• Each beetle was marked with a spot of paint then released back into the field
• Three days a second sample was collected and counted
• The number of marked beetles in this second sample was noted
The results are shown in the table below</td><td></td><td></td></tr>
<tr><td></td><td></td><td><table><tr><th>Number of beetles that were marked and released</th><th>Number of beetles in the second sample</th><th>Number of marked beetles in the second sample</th></tr><tr><td>500</td><td>450</td><td>5</td></tr></table>
The population of beetles can be estimated using the following formula:

$P = \frac{M \times C}{R}$

P = population estimate
M = number of beetles captured and marked
C = number of beetles captured
R = number of marked beetles in the second capture</td><td></td><td></td></tr>
<tr><td></td><td>6.1.1</td><td>Calculate the population size of the beetles in the field. Show all calculations</td><td>3</td><td></td></tr>
<tr><td></td><td>6.1.2</td><td>State whether the population size of the beetles will be UNDERESTIMATED or OVERESTIMATED under the following conditions</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(a) Some of the on the beetles were off before the second catch</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(b) The second sample is taken from the same place as the first, long after the first sample was taken</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>5</td></tr>
</table>

Activity 7

7.1		Read the extract on South Africa's human population growth and answer the questions that follow.		
		In 2010, South Africa's population was 49,1 million. By 2011, the population had increased to 50,5 million. Around 33 % of the current population is younger than 15 years and 40% of the population is between 15-35 years. Statistics predicts that the proportion of young people (15-35 years) will increase in the future. There is growing demand by the young for free tertiary education. Due to a decrease in income tax revenue and increased unemployment this demand will be difficult to meet. Every South African needs to contribute towards the economy and concentrate on ways of using our resources in a more sustainable manner.		
	7.1.1	What percentage of the current population is 35 years and younger?	1	
	7.1.2	State TWO reasons why for planning purposes it is important for the government to look at projected growth in the population.	2	
	7.1.3	State TWO reasons, according to the extract, why providing free tertiary education is problematic for the government.	2	
	7.1.4	Explain ONE possible consequence for the economy if we do not use 'our resources in a more sustainable manner'.	2	
				7

Activity 8

<table>
<tr><td>8.1</td><td></td><td>Study the information given in the table draw the table in your answer book and provide answers in spaces provided

<table><tr><td></td><td>Type of interaction</td><td>reason</td></tr><tr><td> 
Hummingbird</td><td></td><td></td></tr><tr><td> 
Flea bites on human</td><td></td><td></td></tr><tr><td> 
Egret waiting for rhino to disturb insects to eat</td><td></td><td></td></tr></table></td><td></td><td></td></tr>
<tr><td></td><td>8.1.1</td><td>Identify the type of the interdependence in each case and give one reason for your answer</td><td>6</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>6</td></tr>
</table>

TOPIC : HUMAN IMPACT ON ENVIRONMENT

4. TERMINOLOGY

Give the correct biological term for the following descriptions.

NO.	Description	Biological term
1.	A process by which nutrients become highly concentrated in a body of water, leading to increased growth of organisms such as algae.	
2.	Measurement of the total amount of carbon dioxide emissions of an individual, a defined population or a company per year.	
3.	The type of pollution caused when water is released into a river after being heated in power stations or industries.	
4.	A layer in the atmosphere that is damaged by chlorofluorocarbons (CFCs).	
5.	Measurement of the total amount of carbon dioxide emissions of an individual per year.	
6.	Having access to enough food on a daily basis to ensure healthy living.	
7.	The illegal removal of organisms from their habitat	
8.	The variety of plant and animal species on Earth	

5. ACTIVITIES

Activity 1: Read the passage below.

On 9 May, 2013, the daily mean concentration of carbon dioxide in the atmosphere measured at Mauna Loa Observatory, Hawaii, surpassed 400 parts per million for the first time since measurements began in 1958.

One of the major contributors was the increase in deforestation.

[Adapted from *www.theguardian.com/environment*/2013/may]

1.3 Explain how afforestation (to cover with forests) will contribute to decreased levels of carbon dioxide in the atmosphere. (2)

1.4 Describe the negative impact of the rise in the carbon dioxide concentration in the atmosphere on the greenhouse effect. (2)
(8)

Activity 2

2. Read the passage below which deals with methane emissions around the world.

Methane is the primary component of natural gas, but is at the same time, also a major greenhouse gas (GHG).

Methane is released (emitted) during the production and transport of coal, natural gas and oil. Emissions also result from livestock and other agricultural practices and from the decay of organic waste and certain waste water treatment systems.

The global warming potential is 25 times greater than CO_2.

[Adapted from *www.globalmethane.org*]

2.1 According to the information in the passage, what can be regarded as a danger of methane? (1)

2.2 Describe to what extent certain municipalities in South Africa could use the decay of organic waste emitting methane to their advantage. (2)

Activity 3

The table below shows the estimated percentage of global methane emissions for 2010 from different sources.

Estimated Global Methane Emissions by different sources.

Source of emission	% Contribution
Agriculture (manure)	4
Coal mining	6
Landfills	11
Oil and gas	20
Waste water	9
Other sources	X

[Adapted from *www.globalmethane.org*]

3.1 (a) Calculate the value of X. Show all calculations. (2)

(b) Draw a pie chart that will represent the information as illustrated in the table above. (6)

Activity 4

4.1 Read the article below

Poor farming techniques, rather than drought, was the main reason why a hectare of arable land (land suitable for cultivation) in Africa produced less than half the amount of crop as the rest of the developing world.

While unreliable weather patterns have been identified as another factor contributing to food insecurity, this factor was not sufficient to explain the high levels of undernourishment.

Researchers said two basic, but essential farming techniques were not practised widely enough in Africa - irrigation and the application of fertiliser.

The problem is that irrigation is costly on a continent that is the world's poorest. Also it has been shown that African farming is affected due to a lack of the large river systems needed for irrigation.

Sub-Saharan Africa would need to double its crop output in order to eliminate hunger and malnourishment on the continent.

[http://www.iol.co.za/news/africa]

4.1.1 According to this passage, mention TWO ways in which food security in Africa could improve. (2)

4.1.2 Besides poor farming practices, name ONE other factor, mentioned in the article that may be the cause of decreased crop production in

Africa. (1)

4.1.3 Give ONE reason, according to the article, why there is reduced water availability to farms in Africa. (1)

4.1.4 Describe how the use of fertilisers may lead to reduced water quality. (4)

(8)

Activity 5

A group of learners wanted to investigate the effect of temperature on oxygen solubility. They collected water samples along a river, situated next to many industries that use water from the river for cooling purposes. Learners used the same type of thermometer to measure water temperature.

5.1 Formulate a hypothesis for the investigation above. (2)

The results obtained, are indicated in the table below:

Temperature (°C)	**O_2/100 g H_2O**
0	7,0
10	5,4
12	4,2
17	3,5
23	3,0
25	2,5
28	2,2
32	2,0
34	1,8
41	1,7
42	1,7

[Adapted from: *Introduction to Chemistry*]

5.2 What effect would the releasing of water at higher temperatures have on organisms living in the river? (2)

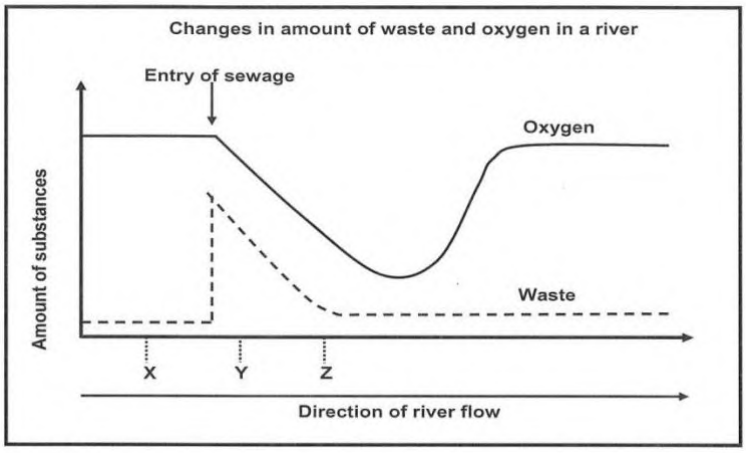
5.3 Why was it important for learners to use the same type of thermometer? (2)

5.4 State ONE way to improve the reliability of the results. (1)

(7)

Activity 6

A group of learners collected water samples at different places (X, Y and Z) along the same river to compare the level of substances (oxygen and waste) as well as the organisms present. The graph below shows the changes in the amount of substances (waste and oxygen) in the water along the course of the river. The point at which sewage enters the river is indicated.



The presence or absence of certain animal species can be used as indicators of the degree of water pollution in a river, as shown below:

Organism Present	Degree of water pollution

Mayfly nymph	Unpolluted
Leeches	Moderately polluted
Sludge worms	Severely polluted

6.1 Which organism (listed in the table) would most likely have been present at:X Y (2)

6.2 State **TWO** factors that should be kept constant while collecting the water samples. (2)

6.3 Name the dependant variable in this investigation. (1)

6.4 Explain how the entry of sewage will affect the amount oxygen in the water (5)

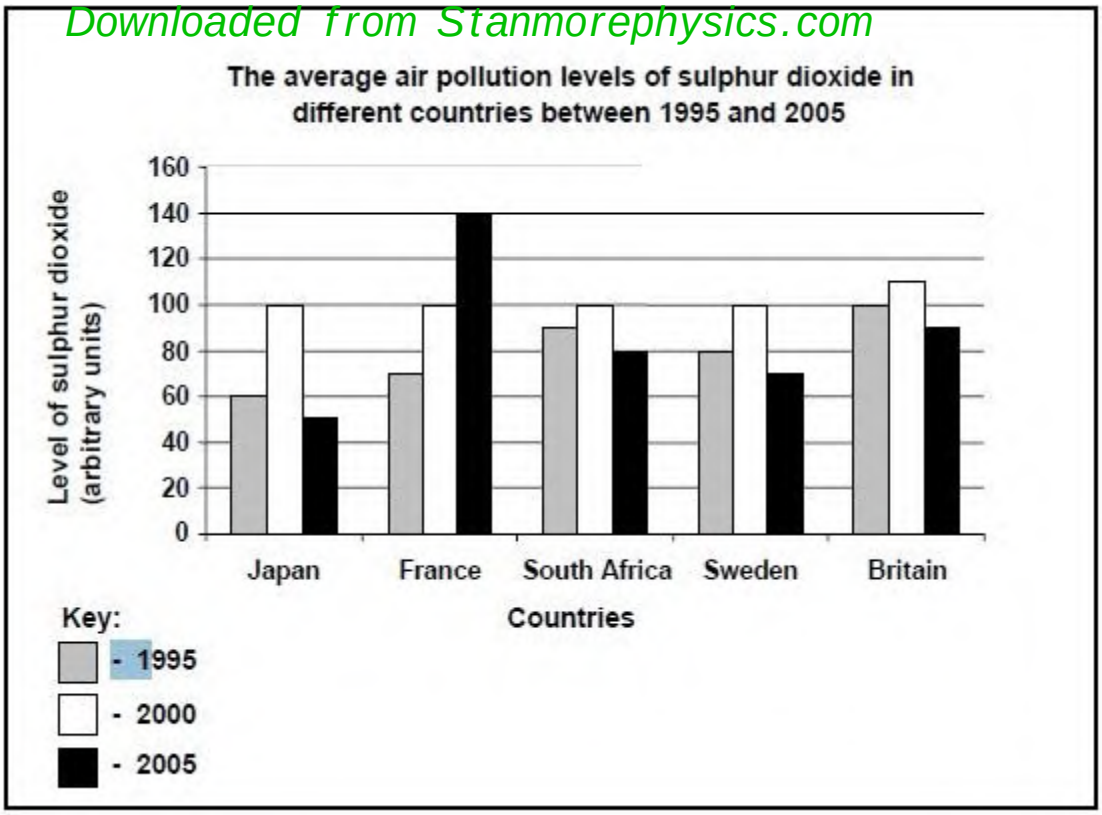
(10)

Activity 7

7.1 Describe the advantages and disadvantages of landfills as a (6) solution to land pollution and disposal of solid waste.

Activity 8

8. Study the bar graph below and answer the questions that follow.



8.1 By how much did the level of sulphur dioxide pollution in Sweden decrease between 2000 and 2005? (1)

8.2 Compare the general pattern of air pollution levels of France to that of the other countries.

State the following:

(a) ONE similarity (1)

(b) ONE difference (2)

8.3 Which country had the lowest level of sulphur dioxide pollution in 2005? (1)

Activity 9

9.1 Read the passage below and answer the questions.

POPULAR DAM IS A BIOLOGICAL 'DESERT'

The Hartebeespoort Dam is situated in a residential area in North West. Unfortunately, it is rapidly becoming a biological 'desert' due to pollution by 2,7 million people living in the surrounding area, as well as the 720 megalitres of treated sewage water flowing into the dam. The inflow of treated sewage water increased the amount of phosphates present in the dam. This reduced the biodiversity of the dam resulting in only two plant species (water hyacinth and algae) and only three fish species (common carp, barbel and canary kurper) remaining in the dam, leading to an overpopulation of these species.

The Department of Water Affairs started a biological control programme to reduce the population of the remaining species so that other species could recolonise the dam. After a year the biodiversity of the dam increased.

[Adapted from *The Times*, 10 October 2013]

'

9.1 Define biodiversity (1)

9.2 Explain why the increased phosphate levels caused a decrease in biodiversity. (3)

9.3 Explain how the reduction in biodiversity can affect the ecological balance in the dam. (4)

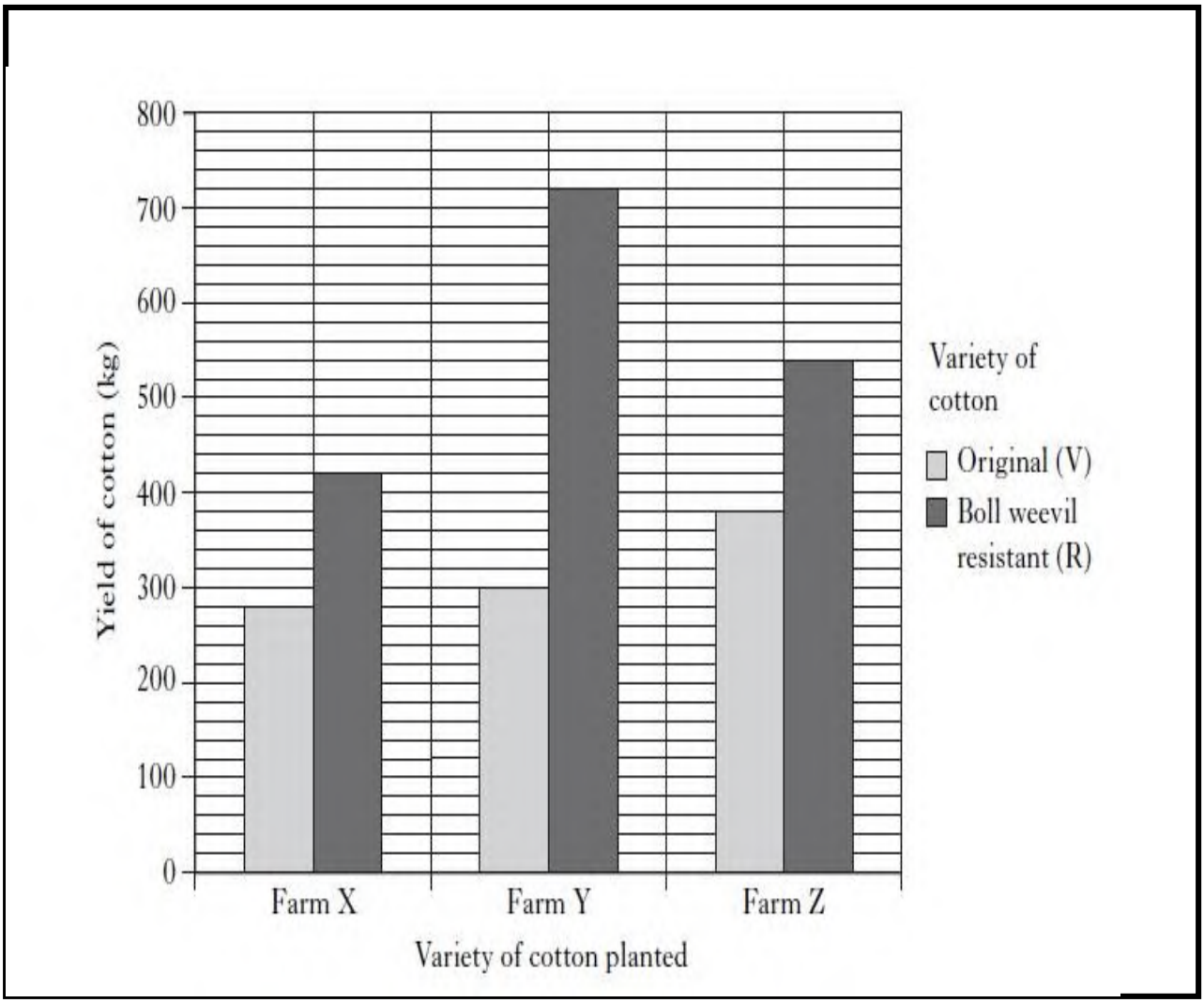
9.4 What is meant by biological control? (2)

Activity 10

10.1 Boll weevil insects, shown in the picture below, feed on cotton plants. There are two varieties of the cotton plant, original variety (V) and boll weevil resistant variety (R).

Three farms were used to compare the yield of the two varieties. Each farmer planted two fields, one of each variety. All fields were treated identically.

The yield of cotton from each field was weighed. The results are shown in the bar graph below.



10.1 Calculate the difference in yield between the two varieties of cotton grown at Farm X. Show all workings. (3)

10.2 Name the variable that was changed in this investigation. (1)

10..3 The fields planted with V cotton were used as a control. Give a reason for using V cotton as the control. (2)

10.4 Explain why using ten farms instead of three would have improved this Investigation. (2)

10.5 State a hypothesis for this investigation. (3)

10.6 What conclusion can be drawn from these results? (3)

10.7 The farmers use pesticides to kill insects which damage their crops. Explain why less pesticide is needed when growing R cotton than when growing V cotton. (2)

10.8 Would an increase in the prevalence of R cotton over V cotton be an example of artificial selection , natural selection or both? Explain your answer. (4)