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1. Living organisms can be put into major groups based on common features that they share. The table below shows some main groups of organisms, some of their features and some examples of each.

Complete the table to show the correct groups, **two** features of each group and **one** example of an organism in each group.

Group	Features	Example
animals	1 multicellular 2 do not contain chloroplasts	
bacteria	1 2	
	1 parasitic 2 only reproduce inside living cells	tobacco mosaic

(Total 5 marks)

Q1



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2. A pregnant woman asked her doctor about the chances of her baby being a boy. The doctor said that there was an equal chance of the baby being a boy or a girl.

Complete the diagram below to explain why the doctor said this.

Use **X** and **Y** to represent the sex chromosomes.



(Total 4 marks)

Q2



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3. Within organisms there are five different levels of organisation. These are listed below.

Examples of each level of organisation are also listed in the second column, but in random order.

(a) Draw a line to join each level of organisation to the correct example.

One has been done for you.

Level of organisation

Example

organelle	palisade cell
cell	mitochondria
tissue	heart
organ	phloem
system	circulation

(4)

(b) What level of organisation does a chloroplast belong to?

.....

(1)

Q3

(Total 5 marks)



4. Certain cells lining the pancreatic duct produce mucus. In people who inherit cystic fibrosis these cells produce very sticky mucus. This sticky mucus blocks the pancreatic duct.

The gene for mucus production has two alleles. The allele for producing normal mucus, **N**, is dominant to the allele for producing very sticky mucus, **n**.

(a) Two parents are heterozygous for this gene. They had four children.

(i) In the box below give the genotype of one of the parents.

(1)

(ii) The boxes below show the genotypes of their four children. Put a circle around the box showing the genotype of a child with cystic fibrosis.

(1)

NN

Nn

Nn

nn

(iii) How many of the children are homozygous?

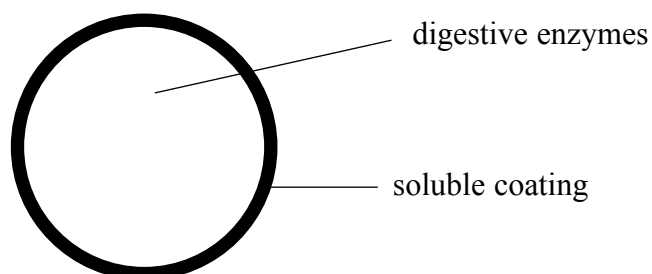
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(1)



(b) People with cystic fibrosis cannot easily digest their food because the digestive enzymes they need are not present in part of the small intestine (duodenum).

One way of treating cystic fibrosis is for people to take tablets containing digestive enzymes with their meals. The diagram shows a section through a tablet.



(i) Suggest why the digestive enzymes are not present in the duodenum.

.....
.....

(1)

(ii) Suggest **three** different types of digestive enzyme that might be in the tablet.

1
2
3

(3)

(iii) It is important that the soluble coating does not dissolve until the tablet has passed through the stomach. Suggest why the enzymes in the tablet might not work if they had been released in the stomach.

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(2)

(Total 9 marks)

Q4



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5. Farmers have attempted to increase the yield of crop plants by the use of glasshouses and fertiliser.

Explain how the use of glasshouses and fertiliser can result in an increase in crop yield.

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(Total 6 marks)

Q5

6. Humans control and coordinate their body function using either hormones or nerves to communicate between receptors and effectors.

(a) Name the **two** main parts that make up the central nervous system.

1

2

(2)

(b) Hormonal and nervous communication differ in a number of ways. Complete the table below to show how nervous and hormonal systems differ.

Property	Nervous	Hormonal
speed of conduction		
message carried by		
duration of response		
nature of message		

(6)

Q6

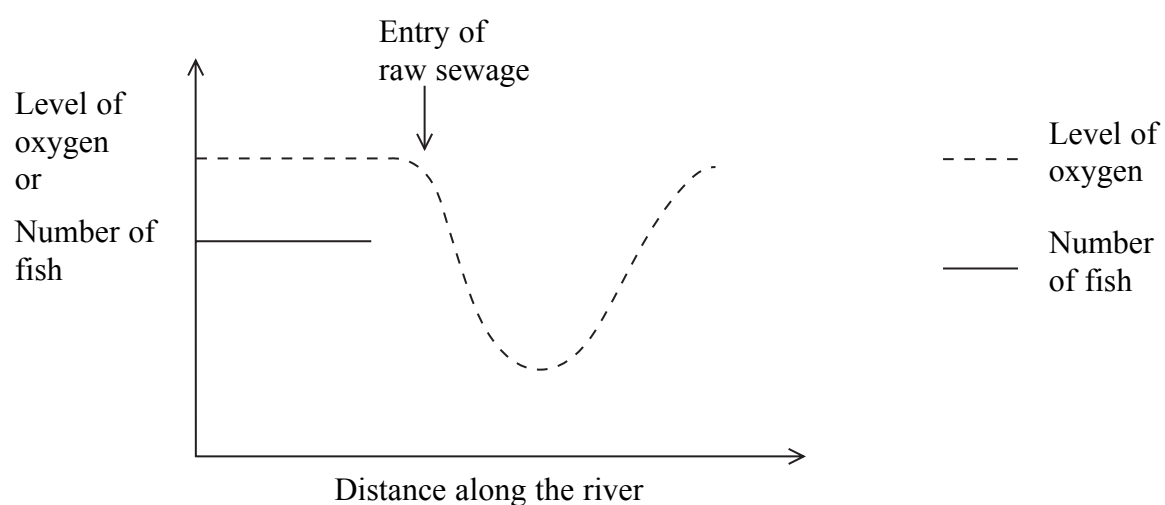
(Total 8 marks)



7. The diagram shows where raw sewage entered a river from a village.



The graph shows changes to the level of oxygen in this river. It also shows the number of fish up to the point where untreated sewage entered the river.



(a) (i) Describe how the level of oxygen changed in the river after the entry of raw sewage.

.....
.....
(1)

(ii) Explain the changes in the level of oxygen after the entry of raw sewage.

.....
.....
.....
(3)

(b) Continue the line on the graph to show what would happen to the number of fish in the river after the entry of raw sewage.

(2)

(Total 6 marks)

Q7



8. This is an extract from the brochure of a company specialising in unusual holidays.

South Pole Ski Expedition

“A journey to the end of the earth for the ambitious adventurer! ... We’ll load up our sleds at 89° South and travel the unmarked landscape to the South Pole”



©northpole.com

(a) People who are active in cold conditions need a lot of energy.

(i) What is the name of the process that releases energy in living organisms?

.....
(1)

(ii) Complete the word equation for the process that releases energy.

..... + oxygen → energy + carbon dioxide +

(2)

(iii) The oxygen needed for this process is present in the air.

Describe how air is taken into the lungs.

.....
.....
.....
.....
.....
(3)

(b) The people pulling the sleds have to work hard and may find it difficult to take in enough oxygen.

When this occurs, a substance is produced in the muscles and this causes cramp.

What is the name of this substance?

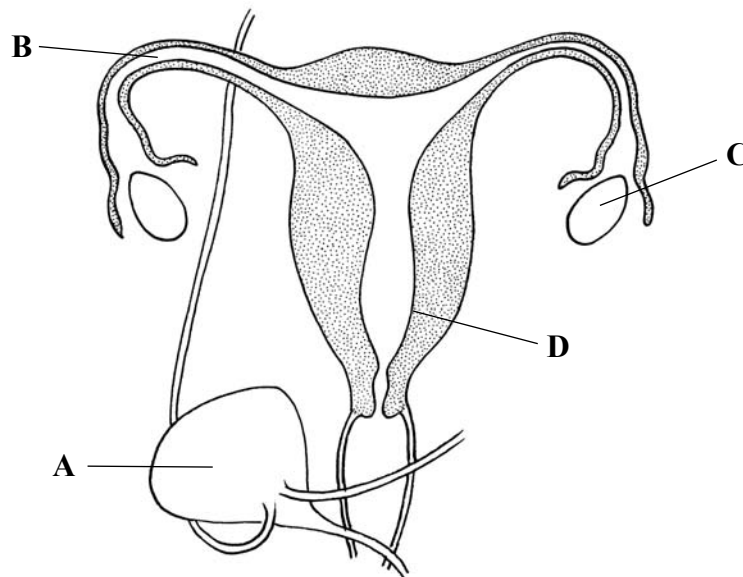
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(1)

(Total 7 marks)

Q8



9. The diagram below shows the human female reproductive and urinary system.



(a) Name the structures labelled **A**, **B**, **C** and **D**.

A

B

C

D

(4)

(b) (i) Give **two** functions of the structure labelled **C** in the diagram.

1

2

(2)

(ii) On the diagram, use an arrow and the letter **F** to show the site of fertilisation.

(1)

(iii) On the diagram, use an arrow and the letter **I** to show the site of implantation.

(1)

(c) The female has separate reproductive and urinary passages. In males these passages are combined.

Give the name of this combined passage in males.

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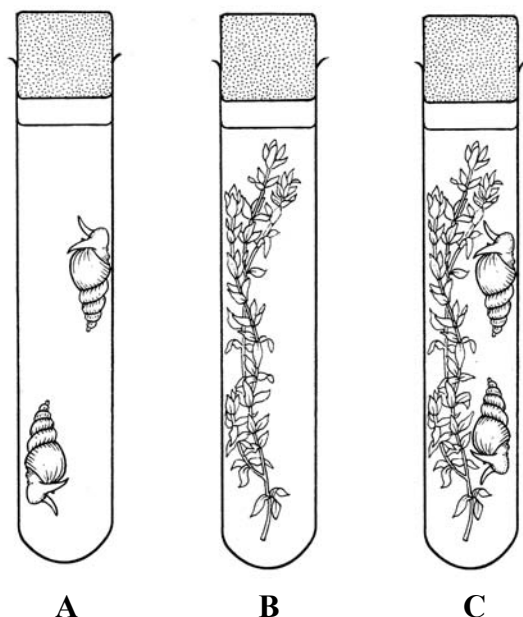
(1)

Q9

(Total 9 marks)



10. A student set up three test tubes **A**, **B** and **C** to study gas exchange in aquatic organisms. Each tube contained pond water and hydrogencarbonate indicator. The student placed two water snails in tube **A**, some pondweed in tube **B** and two water snails and some pondweed in tube **C**. The tubes were then left in bright sunlight for 12 hours.



The key below shows the colour of hydrogencarbonate indicator with different levels of carbon dioxide in the pond water.

Key

Colour of indicator	Level of carbon dioxide in the water
purple	low
red	normal
yellow	high

(a) The changes in the colour of the indicator are shown in the table below.

(i) Complete the table to show the colour you would expect hydrogencarbonate indicator to be after 12 hours in the light.

Tube	Contents	Colour of hydrogencarbonate indicator	
		At start	After 12 hours in the light
A	water snails	red	
B	pondweed	red	
C	water snails and pondweed	red	red

(2)



(ii) Using your biological knowledge, give reasons for the changes in carbon dioxide level in each tube.

Tube A

.....

Tube B

.....

Tube C

.....

(3)

(b) The experiment was repeated but the three tubes were left in the dark for 12 hours.

Complete the table below to show the colour you would expect the hydrogencarbonate indicator to be after 12 hours in the dark.

Tube	Contents	Colour of hydrogencarbonate indicator	
		At start	After 12 hours in the dark
A	water snails	red	
B	pondweed	red	
C	water snails and pondweed	red	

(3)

Q10

(Total 8 marks)



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11. The passage describes some functions of human blood. Write on the dotted lines the most suitable word or words to complete the passage.

Human blood consists of plasma and cells. The two main types of cells are red blood cells and white blood cells.

Red blood cells contain the pigment, which

transports White blood cells

prevent by engulfing pathogens or by

producing to destroy them.

The plasma is the liquid part of the blood and transports various waste substances

including and

If the skin is cut, cell fragments known as prevent

further blood loss by helping to the blood.

(Total 8 marks)

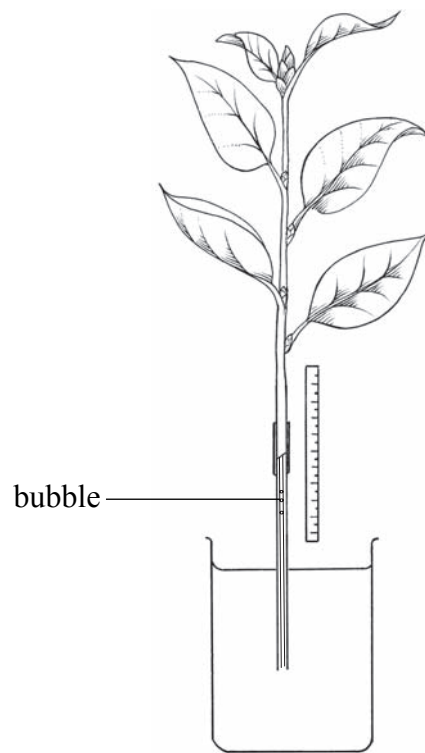
Q11



12. (a) What word is used to describe water loss from the leaves of a plant?

.....
(1)

(b) Loss of water from a leafy shoot can be measured using the apparatus below.



This apparatus was used by a student, in a brightly lit room, to measure the rate of water loss from a leafy shoot. He measured how far the bubble moved in five minutes. He measured this three times.

The results are shown in the table.

Measurement	Distance moved by the bubble in cm
1	11.9
2	12.6
3	13.0

(i) Use these results to calculate the mean (average) rate of water loss in cm per minute. Show your working.

Answer..... cm per minute.
(2)



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(ii) If the room became colder, explain what would happen to the distance moved by the bubble.

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(2)

(iii) If the light intensity became lower, explain what would happen to the distance moved by the bubble.

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(2)

(c) Another student investigated the rate of water loss using a similar sized leafy shoot from a different species of plant. She noticed that the upper and lower surfaces of these leaves were covered with tiny hairs.

Suggest how these hairs would affect the rate of water loss from this leafy shoot.

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.....

(2)

(Total 9 marks)

Q12



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13. Fish farming is a way of providing a source of protein as food for humans.

Describe and explain **three** different ways a fish farmer can help to increase the yield of fish.

1
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(2)

2
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(2)

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(2)

(Total 6 marks)

Q13

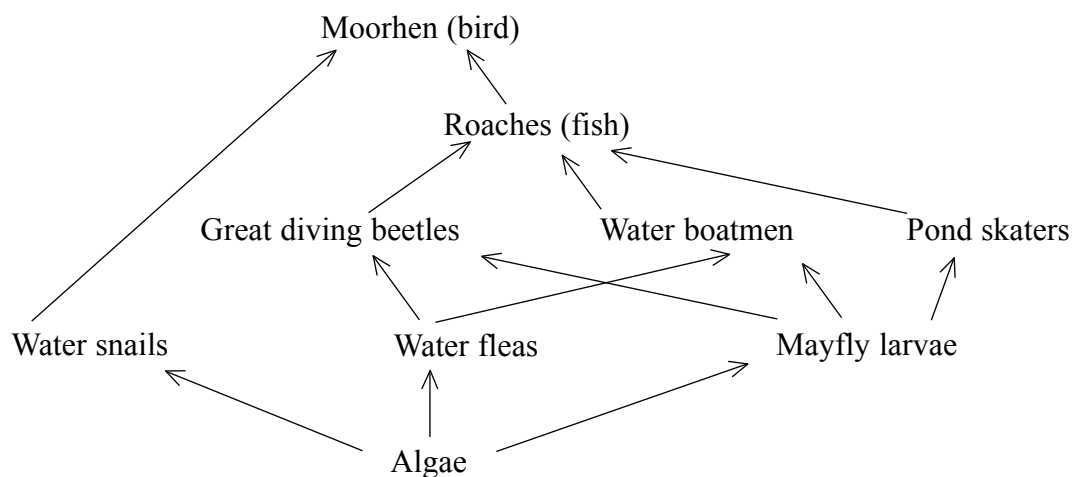


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14. The diagram below shows a food web in a pond.



(a) How many trophic levels are shown in the food web?

..... (1)

(b) Name **one** secondary consumer in the food web.

..... (1)

(c) What do the arrows in the food web represent?

..... (1)

(d) Identify and draw a food chain from the food web shown that contains five organisms and includes the water boatman.

(2)

(e) Food chains rarely include more than five organisms.

Use your knowledge about energy transfer to explain why.

.....

(3)



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(f) Suggest how the population of mayfly larvae in the pond might change if the number of water fleas in the pond decreased. Explain your answer.

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(2)

(Total 10 marks)

Q14

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15. Scientists have successfully cloned a mammal (a sheep known as 'Dolly'). Describe the stages used in producing a cloned mammal.

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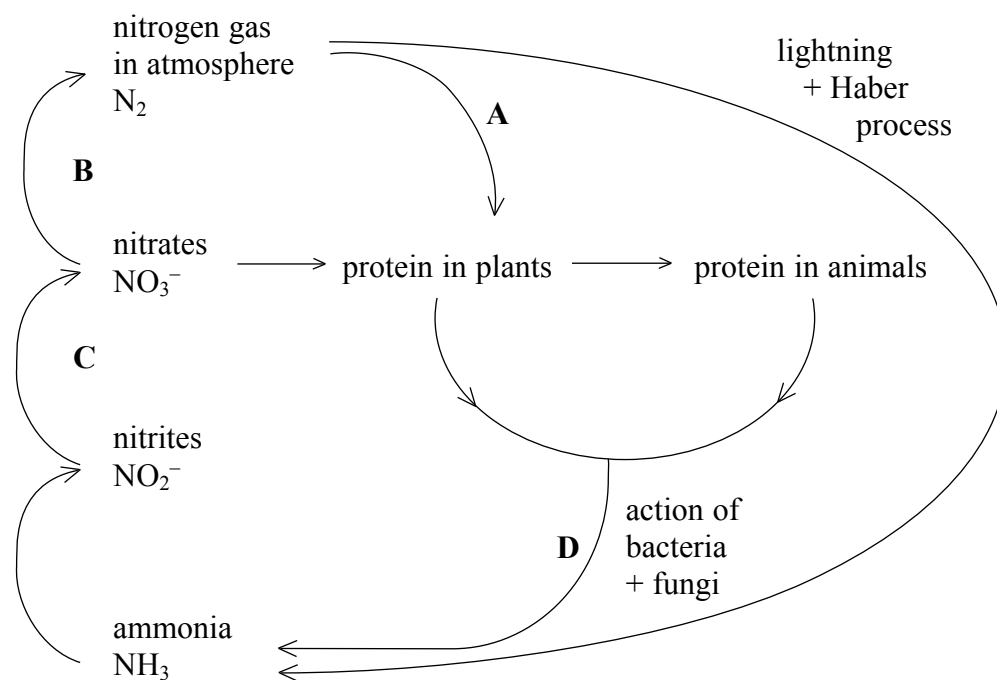
(Total 6 marks)

Q15

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16. The diagram shows the nitrogen cycle.



(a) (i) Name processes **A**, **B**, **C** and **D** shown in the diagram.

A

B

C

D

(4)

(ii) Name the type of organism responsible for process **A**.

.....

(1)

(b) Describe how nitrogen in the soil can be converted into plant protein.

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(3)

(Total 8 marks)

Q16



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17. Farmers can improve their crop plants or farm animals by the use of selective breeding.

Explain what is meant by selective breeding and give **two** examples of its use.

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(Total 6 marks)

Q17

TOTAL FOR PAPER: 120 MARKS

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