

Answer ALL the questions

1. The table below shows the characteristics of four groups of organisms.

Complete the table to indicate whether the characteristics are **always** present, **never** present or **sometimes** present in that group. Then give **one** example from each group.

Characteristic	Group			
	Bacteria	Plants	Fungi	Animals
Are multicellular			sometimes	
Contain chloroplasts	sometimes			
Have cell walls	always		always	
Are able to move from one place to another	sometimes			
Example			yeast	

(Total 7 marks)

Q1



2. The following passage is about osmoregulation in humans. Complete the passage by writing a suitable word or words in each space.

A student quickly drank one litre of a soft drink that contained no sugar and only a small amount of salt. This meant that her body had excess , which lowered the concentration of solutes in the liquid part of her blood called

As a result, the hormone ADH was secreted in quantities from her gland. This in turn affected the permeability of the walls of the in the nephrons of the kidneys. These walls became permeable so that the volume of urine produced was and the concentration of the urine was

Q2

(Total 8 marks)



3. Achondroplasia is a genetic condition caused by a dominant allele (A). In people with this allele, growth is restricted and their height is unlikely to exceed about 1.30 m.

(a) How does a dominant allele differ from a recessive allele?

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(2)

(b) (i) A man who is heterozygous for achondroplasia marries a woman of normal height.

Complete the genetic diagram below to show the genotypes of the parents, the gametes they form and the genotypes and phenotypes of any children they might have.

Father

Mother

Genotype of parents

Gametes

Genotypes of children

Phenotypes of children

(4)



Leave blank

(ii) Parents are often concerned about the likelihood of their children developing a genetic condition. What would you say to the mother in this case about the risk of producing a baby with achondroplasia?

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(2)

Q3

(Total 8 marks)



4. Connor carried out an experiment to investigate the effect of different solutions of sodium chloride on blood cells.

He made up one solution of 3% sodium chloride and one of 1% sodium chloride. He also obtained some pure distilled water.

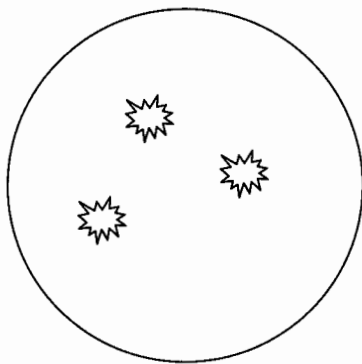
He placed 5 drops of sheep's blood into each of three test tubes. He added 5 cm³ of 3% sodium chloride to the first test tube of sheep's blood, 5 cm³ of 1% sodium chloride to the second and 5 cm³ of distilled water to the third.

He shook the tubes and then looked at them.

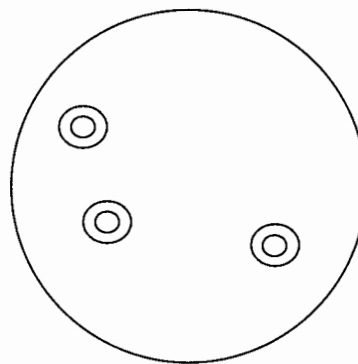
Contents of tube	Appearance of blood
3% sodium chloride	Cloudy red suspension
1% sodium chloride	Cloudy red suspension
Distilled water	Clear red solution

Connor then looked at the contents of each tube under a microscope.

He used the high power lens of the microscope to examine the red blood cells. He made the following drawings to show their appearance.



3% sodium chloride



1% sodium chloride



(a) Connor's biology teacher said that the changes in the red blood cells were the result of osmosis. Explain what is meant by osmosis.

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(3)

(b) (i) Explain what has happened to the red blood cells in the 3% sodium chloride solution.

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(2)

(ii) Connor could not find any red blood cells in the distilled water. What has happened to these cells?

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(1)



(iii) Explain why the red blood cells in the 1% solution appear unchanged from normal red blood cells.

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(2)

(c) Connor wanted to find out what happens to plant cells when placed in 3% sodium chloride and in distilled water. Suggest and explain how the plant cells will behave in each of these solutions.

3% sodium chloride

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distilled water

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(4)

(Total 12 marks)

Q4



5. The table below describes the functions of parts of the heart and circulation system.

Select names from the following list of parts to match their correct function. Write numbers in the final column to show the order in which blood passes through these parts.

Arteries Atria Capillaries Veins Ventricles

Name of part	Function	Order
	Chambers of heart that contract to produce the pressure that pumps blood through the lungs and the body	
	Tubes that carry blood to various organs at high pressure	
	Small tubes that allow exchange of materials between blood and tissues	
Venules	Small vessels that take the blood from capillaries	6
	Tubes that carry blood back to the heart at low pressure	7
	Chambers of heart through which blood flows from veins to ventricles	1
Arterioles	Major sites of resistance to flow; responsible for the pattern of blood flow to the various organs	

(Total 7 marks)

Q5



6. Chantelle was given a sample of breakfast cereal to test for carbohydrates.

(a) Name the elements present in carbohydrates.

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(b) First, she decided to test the sample for glucose. Describe the test she should carry out and the results she might expect if glucose is present.

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..... (3)

(c) She noticed on the packet that the cereal was enriched with iron. Explain why the manufacturers would add iron to a breakfast cereal.

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..... (2)



(d) (i) Some students in her class said that 'eating a cereal containing carbohydrates such as glucose is bad for you'. Chantelle tried to explain that glucose has an important role in the body. What would she have said?

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(2)

(ii) Other students said that 'rather than having breakfast containing carbohydrates you are better not having breakfast at all'. Explain why you would recommend that all students should have a breakfast containing carbohydrates.

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(2)

(Total 12 marks)

Q6

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7. All living organisms exchange gases with the environment. This is required for metabolic processes that take place in the cells and to remove the waste gases.

(a) (i) Complete the table below to show the various features involved in the process of gas exchange in the leaf of a flowering plant and in humans.

Feature	Flowering plant	Human
Name of specialised organ involved	leaf	
Process by which gas enters the organ		
Structures that provide a large surface area		
Location of moist surface membrane		

(7)

(ii) Name **two** waste gases released from a flowering plant.

1

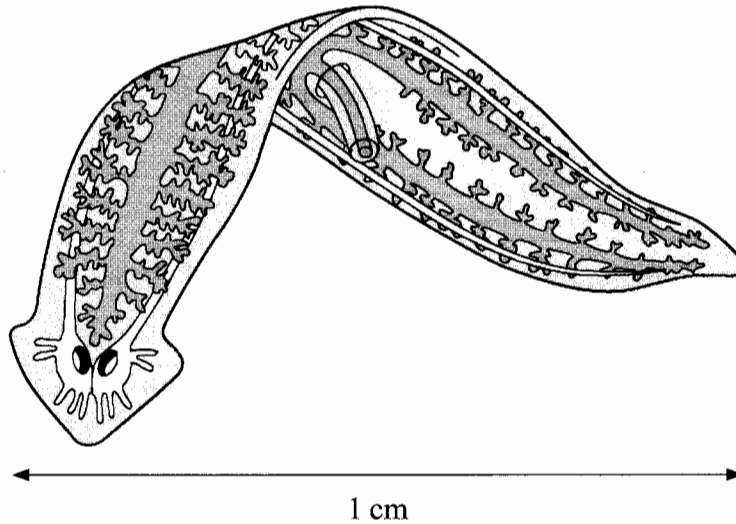
2

(2)



(b) Large multicellular organisms require a transport system to ensure that the gases required for cell respiration are provided and those produced as waste products are removed.

Suggest why a small multicellular organism like the flatworm shown below does not need a transport system. This flatworm is about 1 cm long and is often found in ponds.



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(4)

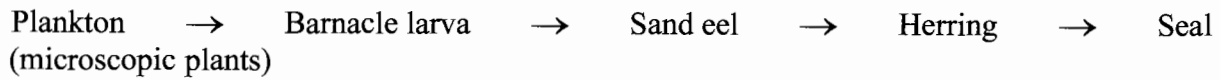
(Total 13 marks)

Q7

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8. The diagram below shows a simple food chain found in the ocean.



(a) (i) Name the secondary consumer in this food chain.

..... (1)

(ii) What is the source of energy for the microscopic plants?

..... (1)

(b) Draw and label a pyramid of numbers to represent this food chain.

(3)

(c) This food chain contains five different organisms.

Suggest why the number of organisms in a food chain is rarely more than five.

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(3)

(Total 8 marks)

Q8



9. Some people are concerned about the use of chemical pesticides on crop plants.

(a) Give **two** reasons why people are concerned about using chemical pesticides on crop plants.

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(2)

(b) Scientists have developed methods known as biological control to reduce the numbers of some pest species.

(i) Describe what is meant by biological control.

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(2)

(ii) Give an example of biological control.

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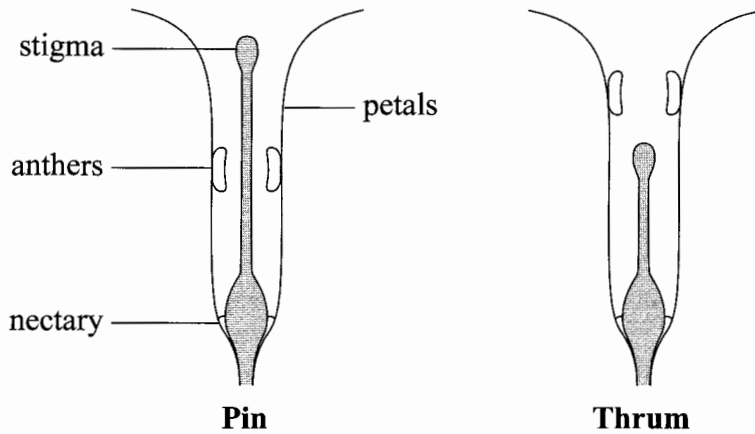
(1)

(Total 5 marks)

Q9



10. Primrose flowers have a number of different forms. One of these is described as 'pin' and another is described as 'thrum'. The structure of the flowers is shown below:



The different forms encourage cross-pollination of the flowers. Pollination is carried out by insects that visit the flowers to collect nectar.

(a) Explain what is meant by cross-pollination.

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(2)

(b) (i) Give **two** differences, shown in the diagram, between the pin and thrum forms.

1
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2
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(2)



(ii) Suggest how the pin and thrum forms make cross-pollination more likely in primroses.

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(2)

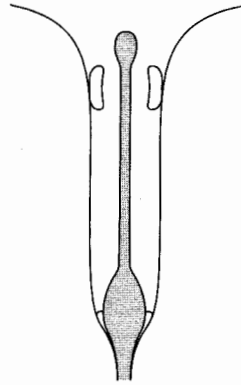
(iii) Suggest an advantage to the primrose of a mechanism that encourages cross-pollination.

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(2)



- (c) The diagram below shows a third form of a primrose flower. This is known as the 'homostyle' form.



Homostyle

- (i) Give **one** difference, shown in the diagrams, between the pin and the homostyle forms and **one** difference between the thrum and the homostyle forms.

Pin and homostyle

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Thrum and homostyle

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(2)

- (ii) Suggest how pollination takes place in the homostyle form.

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(1)

(Total 11 marks)

Q10



11. The photograph below shows a potted plant about twelve hours after it fell over.



(a) (i) Name the **two** stimuli that the plant is responding to.

1

2

(2)

(ii) Describe the responses to these two stimuli.

1

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2

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(4)



(b) Suggest why the responses shown by the plant to these stimuli are much slower than a human response (such as the withdrawal reflex).

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(3)

Q11

(Total 9 marks)

TOTAL FOR PAPER: 100 MARKS

END

