BENENDEN

SIXTH FORM 2018

BIOLOGY

1 hour 30 minutes

Full Name: _____

Current School: _____

Date: _____

Instructions to Candidates:

- Answer all the questions
- Write your answers in the space provided in this booklet
- You may use a calculator
- Total marks for this paper = 100

Q1.

The passage describes the consequences of air pollution.

Complete the passage by writing a suitable word or words on each dotted line.

(10)

The release of the gas sulfur ..... into the atmosphere is an example of air pollution because the gas dissolves in water in air to form ..... rain. This rain can kill trees on land and fish in lakes.

Another gas that pollutes the air is ..... monoxide. This gas combines with ..... in red blood cells and makes it more difficult for them to carry out their function.

Other gases that pollute the atmosphere are greenhouse gases such as ..... and nitrous oxide from the burning of ..... fuels, and ..... from the digestive system of cattle.

These gases increase the ..... effect and may lead to a problem known as ..... in which the air temperature may rise.

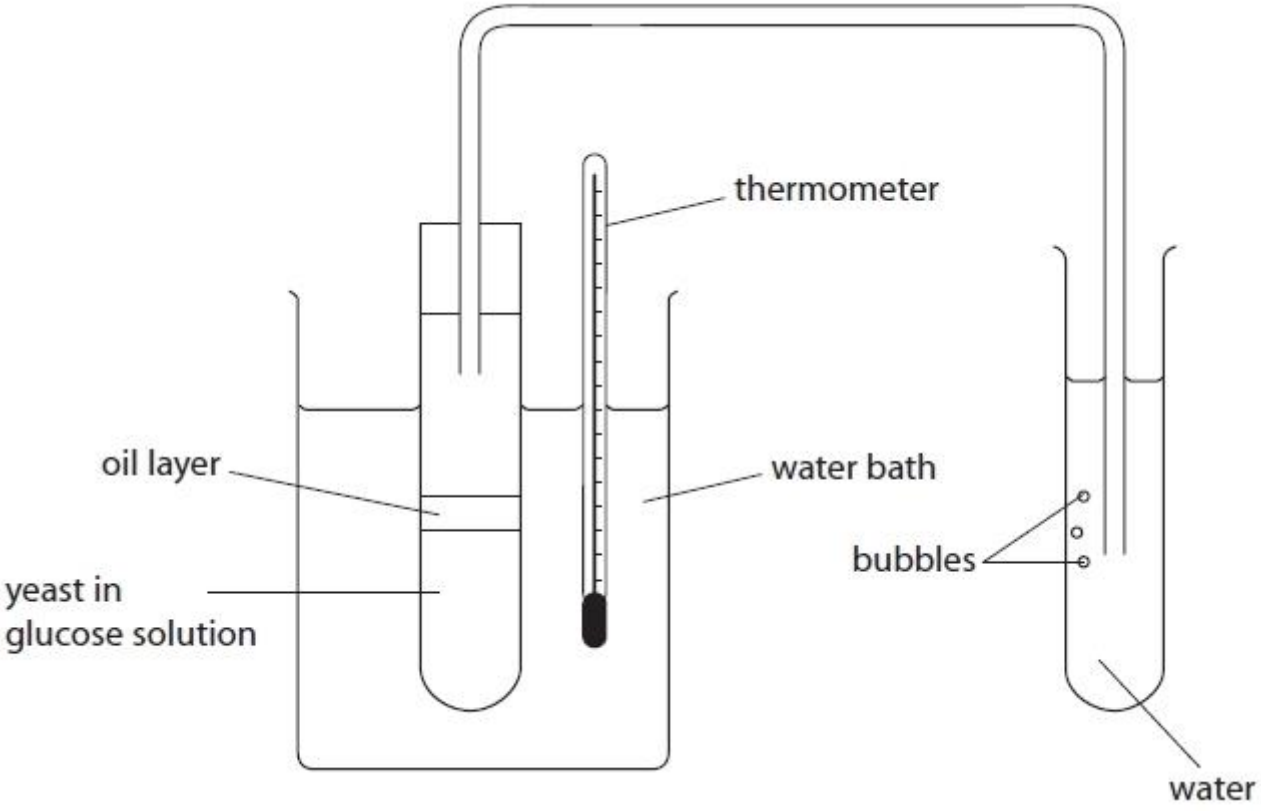
This rise in air temperature may destroy the place where a species lives known as its ..... .

(Total for question = 10 marks)

Q2.

John wanted to investigate the effect of temperature on the rate of carbon dioxide production by yeast.

He set up this apparatus.



(a) The oil layer prevents the entry of air into the glucose solution.
Explain why this is necessary.

(2)

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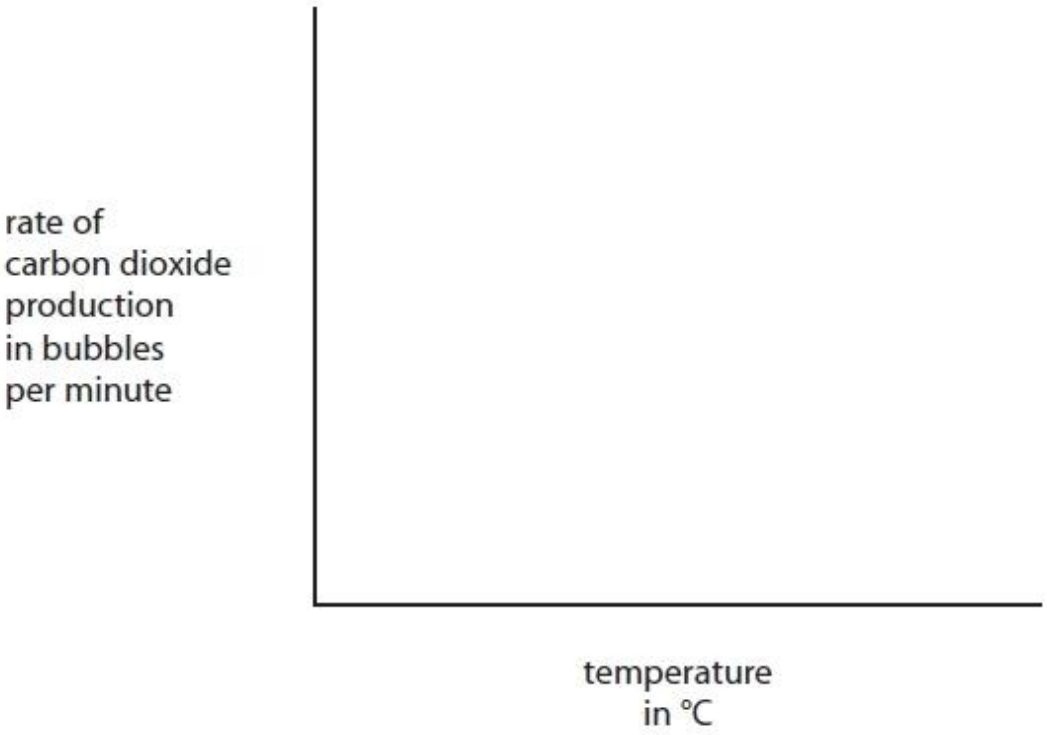
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(b) John varied the temperature of the water bath between 15 °C and 65 °C. He measured the rate of carbon dioxide production by counting the number of bubbles per minute.

(i) Sketch the shape of the graph that John would obtain on the axes below.

(3)



(ii) Give the dependent variable in this experiment.

(1)

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(iii) Give the independent variable in this experiment.

(1)

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(c) Give **two** variables that John would need to keep the same in his experiment.

(2)

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(d) Suggest **one** way that John could improve the reliability of his experiment.

(1)

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(e) Suggest how John could improve the accuracy of his measurement of the rate of carbon dioxide production.

(1)

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(f) Yeast is used to produce beer.

Write the word equation for the respiration of yeast that occurs during the production of beer.

(3)

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(Total for question = 14 marks)

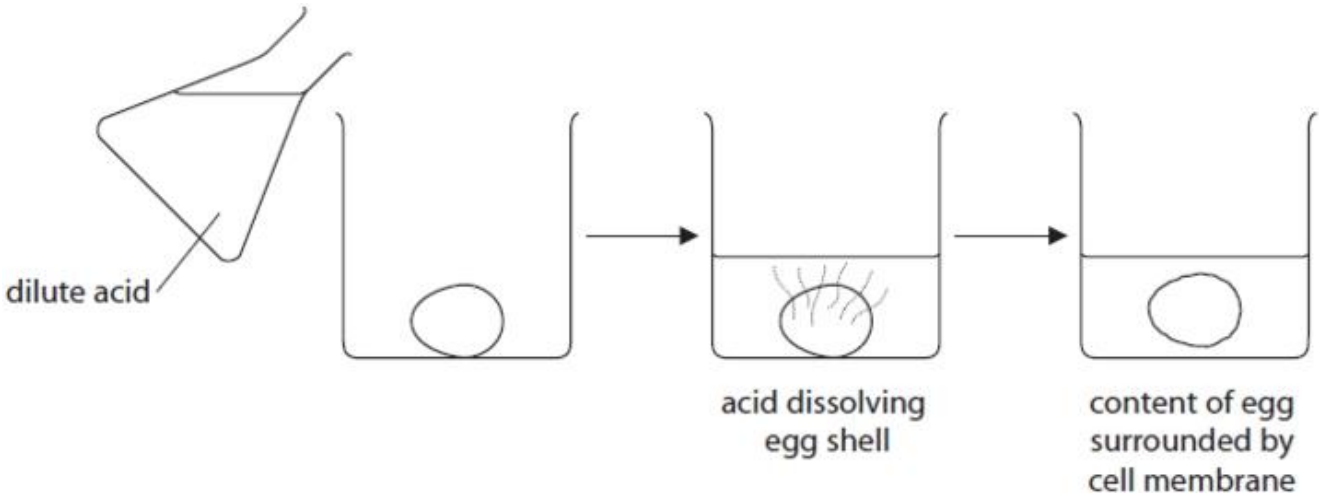
Q3.

A chicken egg is a single cell protected by a shell on the outside.

A student puts three chicken eggs into dilute acid and leaves them for three days.

The acid dissolves the egg shells, leaving the contents of the eggs surrounded by the cell membrane.

The diagram shows the student's method.

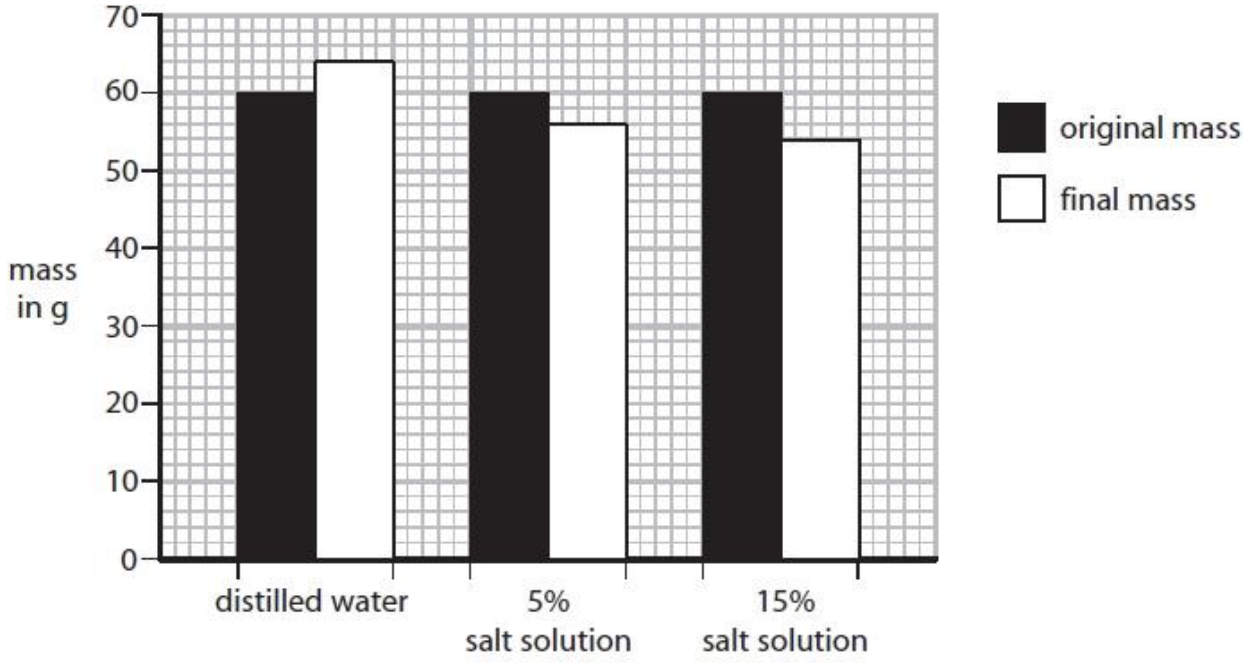


The student removes the eggs from the dilute acid and uses water to wash the surface acid away.

The student then uses the eggs for this osmosis experiment.

- he measures the mass of each egg
- he then puts one egg into a beaker containing distilled water
- he puts another egg into a beaker containing 5% salt solution
- he puts a third egg into a beaker containing 15% salt solution
- after 15 minutes he removes each egg from its beaker and measures its mass again

(a) The bar graph shows the results obtained by the student from the osmosis experiment.



Bar graph 1

(i) Name the dependent variable in this experiment.

(1)

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(ii) Explain the result for the egg placed in distilled water.

(2)

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(b) The student calculates the percentage change in mass for the eggs placed in distilled water and in 5% salt solution.

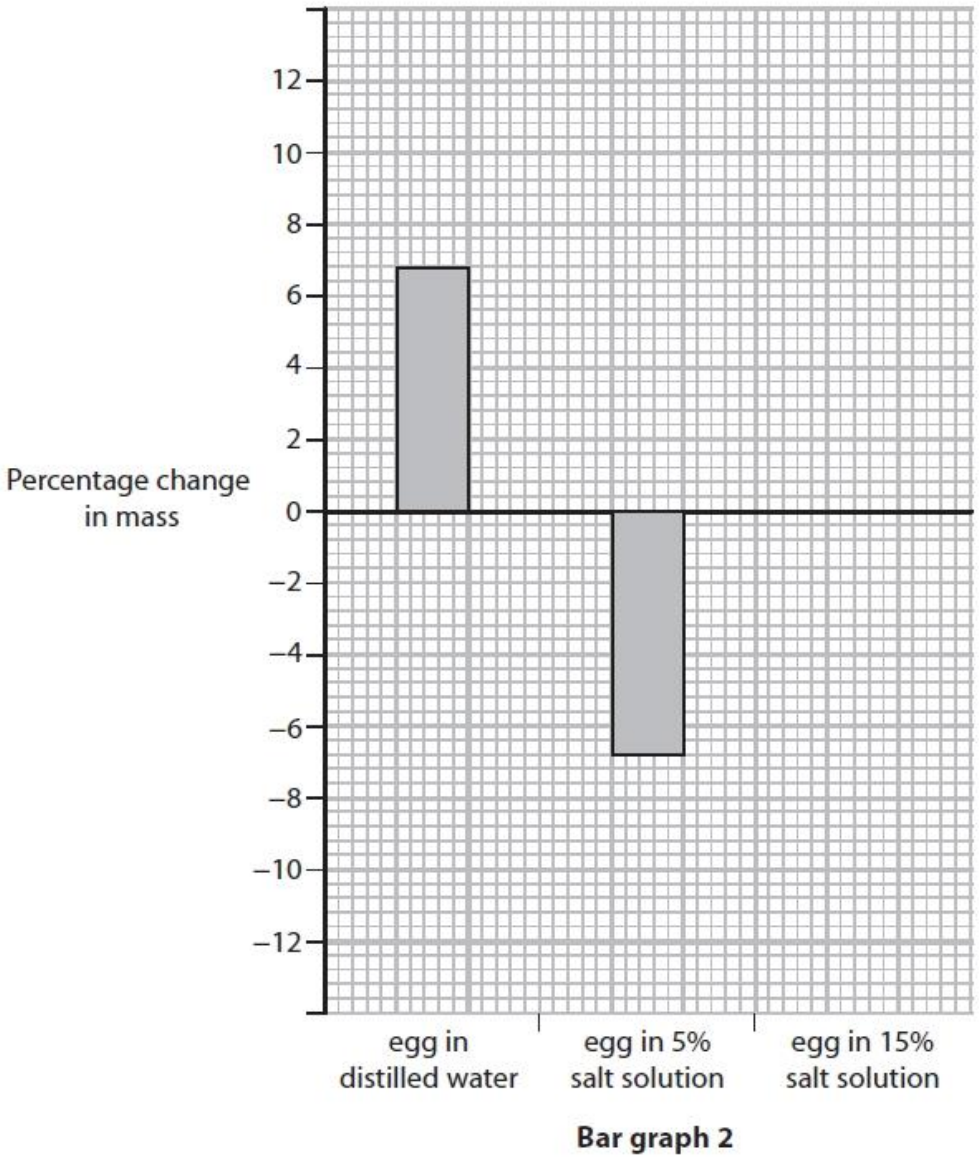
(i) Use the data from graph 1 to calculate the percentage change in mass for the egg placed in 15% salt solution. Show your working.

(2)

Percentage change in mass = ... %

(ii) The student plots the percentage change in mass on graph 2.
Complete the bar graph to show the percentage change in mass for the egg placed in 15% salt solution.

(1)



Bar graph 2

(c) Give one way in which osmosis differs from diffusion.

(1)

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(Total for question = 7 marks)

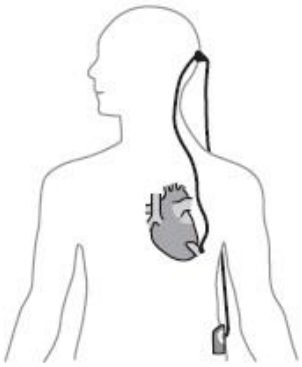
Q4.

Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Artificial heart pump gives life to dying patients

In June 2000, a 61-year-old man in the United Kingdom became the first person to have a permanent artificial heart pump fitted. Before the pump was fitted, the man was told that he had only a few weeks left to live. However, the pump has taken on the work of his heart: taking blood from the heart and delivering it to the rest of the body. Pumps like these could be a possible alternative to heart transplants, which are usually performed on patients whose heart has begun to fail.

The operation to insert the pump took several hours but the surgeons were very pleased with the speed of the man's recovery. During the operation, the pump was fitted into the left ventricle of the man's heart. This heart chamber provides much of the pumping power of the heart when it contracts.



The pump is powered by batteries, which are usually carried around the patient's waist. The batteries are connected to the pump by wires which enter the body at the back of the skull. The wires then pass down through the neck, into the chest cavity and connect to the pump in the heart. The batteries are rechargeable and need changing every eight hours.

The surgeon who performed this operation wrote about it in a medical journal. He said that the pump had helped to lower the patient's blood pressure and had done no damage to his red blood cells. He also reported that, six weeks after the operation, the patient's heart and liver were working much better than before the procedure and that the man was able to take exercise. As the patient takes exercise, he can change the speed of the pump.

The important medical advance with this pump is that it is fitted permanently. Previous artificial heart pumps had to be replaced every few months and were also much larger and noisier. The new pumps give doctors hope that this treatment could solve the problem of a shortage of hearts available for transplants. The heart surgeon said, 'Currently, the outlook for patients who are not able to have a transplant is poor. Our laboratory experience and the result from this first operation with a small, silent intraventricular device suggests a potential alternative for many patients.'

(a) Name **two** of the blood vessels that carry blood away from the heart.

(2)

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(b) Suggest why the batteries for the heart pump are placed outside the body (lines 12 and 13).

(1)

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(c) Describe how the blood in the left side of the heart differs from the blood in the right side of the heart.

(2)

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(d) Explain why the patient might need to change the speed of the pump (line 22).

(2)

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(e) Explain why some patients are 'not able to have a transplant' (line 28).

(1)

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(f) Suggest what is meant by the term **intraventricular** (line 29).

(1)

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(g) Suggest **two** advantages of using the new artificial heart pump compared to previous artificial heart pumps.

(2)

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(Total for question = 11 marks)

Q5.

Plants and animals can reproduce asexually and sexually.

(a) Give an example of a way that plants can reproduce asexually.

(1)

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(b) Complete the table showing features of sexual reproduction in plants and animals.

(3)

Feature	Sexual reproduction in plants	Sexual reproduction in animals
male gametes	pollen nucleus	
site of fertilisation		

(c) Suggest why the number and size of human male gametes differs from the number and size of human female gametes.

(2)

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(Total for question = 6 marks)

Q6.

Complex carbohydrates are broken down in the human digestive system.

(a) Name the elements present in a carbohydrate molecule.

(1)

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(b) Starch and glucose are carbohydrates found in living organisms.

Complete the table to show some of the properties of starch and glucose.

Insert a tick (✓) if the property applies or a cross (✗) if it does not.

(5)

Carbohydrate	Soluble in water	Found in animal cells	Broken down by amylase	Small molecule	Absorbed in the stomach
starch					
glucose					

(c) (i) Describe how you could test for the presence of glucose in a substance.

(3)

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(ii) Give **two** safety precautions you would take when carrying out the test.

(2)

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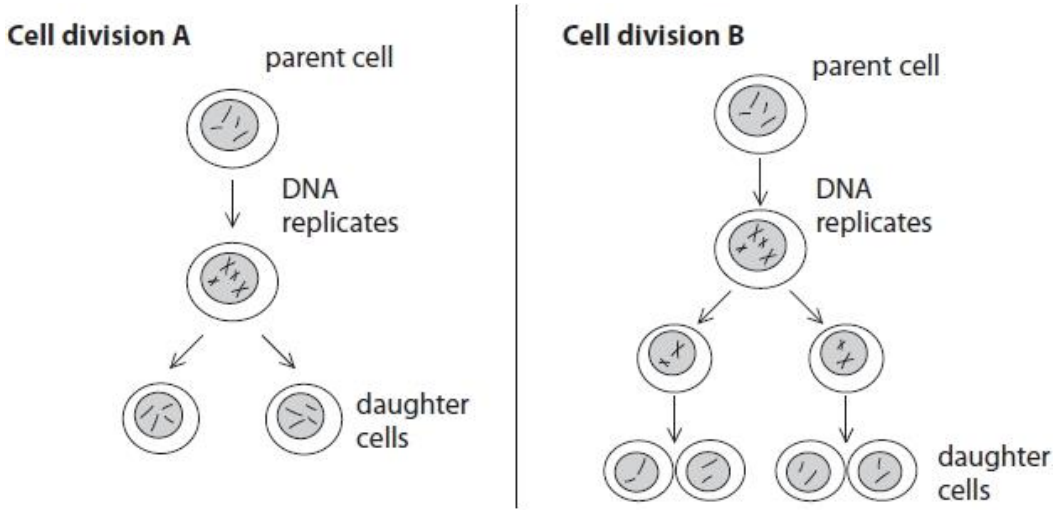
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(Total for question = 11 marks)

Q7.

The diagram shows two types of cell division.



(a) Give the name of cell division A.

(1)

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(b) Using the information in the diagram, give two differences between cell division A and cell division B.

(2)

1 .....

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2 .....

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(c) Name a part of a flowering plant where cell division A occurs and a part where cell division B occurs.

(2)

A .....

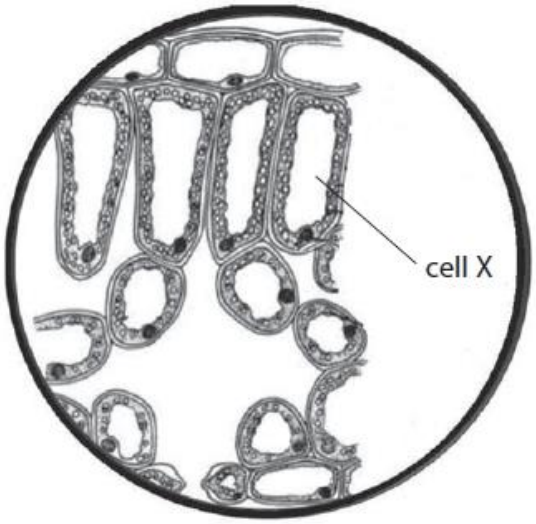
B .....

(Total for question = 5 marks)

Q8.

A student uses a microscope to look at some cells from an organ found in a plant.

The diagram shows what the student observes through the microscope. One cell has been labelled X.



(a) Name the organ that the student observes.

(1)

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(b) What is meant by the term **organ**?

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(1)

(c) Draw a labelled diagram of cell X.

(3)

(Total for question = 5 marks)

Q9.

Coat colour in horses is controlled by a gene that has two alleles.

The C^W allele codes for the production of white hairs and the C^R allele codes for the production of red hairs.

When a red-coated horse is crossed with a white-coated horse, the foal (offspring) has a roan colour coat.

This colour is seen because each hair is either white or red. It is the mixture of these hairs that produces the roan colour.

(a) (i) Use the symbols C^W and C^R to show how the red-coated parent and the white-coated parent can produce a roan-coated foal.

(3)

Parents

Gametes

Offspring genotype

(ii) The roan-coated foal is later mated with another roan-coated horse.
Give the possible genotypes and phenotypes of their offspring.

(2)

(iii) A roan-coated horse is mated with a white-coated horse.
What is the probability of producing a white-coated offspring?

(1)

probability = ...

(b) The height of pea plants is also controlled by a gene that has two alleles.

The height can either be tall or dwarf.
Explain how the control of height in pea plants differs from the control of coat colour in horses.

(2)

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(c) Horses usually produce one offspring from each pregnancy.

Scientists often study genetics using organisms such as mice.
Suggest an advantage of using mice rather than horses to study genetics.

(1)

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(Total for question = 9 marks)

Q10.

The photograph shows the logs left behind after an area of forest has been cut down.



© Calibas

These logs are decomposed by fungi.

(a) Describe how fungi decompose tree logs.

(4)

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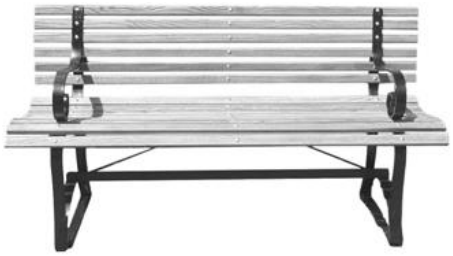
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(b) Some of the logs removed from the forest are used to make garden benches.

The photograph shows a garden bench.



© James F. Perry

The garden bench is painted with a fungicide solution.

This prevents the wood being decomposed because fungicide kills fungi.

There are different fungicides that can be used.

Design an investigation to find out which fungicide is best at preventing the decomposition of wooden logs.

Your answer should include experimental details and be written in full sentences.

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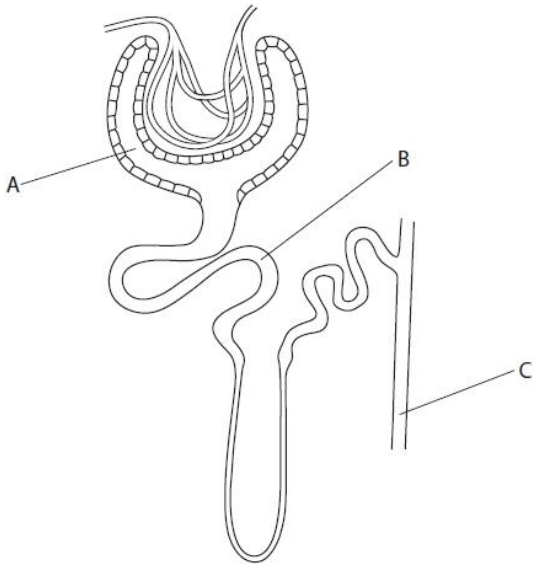
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(Total for question = 10 marks)

Q11.

(a) The diagram shows a kidney nephron with parts labelled A, B and C.



The table lists events that take place in the nephron.
Complete the table by giving the letter of the part where each event takes place.

(2)

Event	Letter
ultrafiltration	
glucose reabsorption	

(b) The photograph shows a flower called a dandelion.



If a person picks this flower and then licks their fingers, they will want to urinate.
This is because the plant produces a chemical called a diuretic that affects the regulation of the water content of the blood.
Suggest how this diuretic causes more urine to be produced.

(5)

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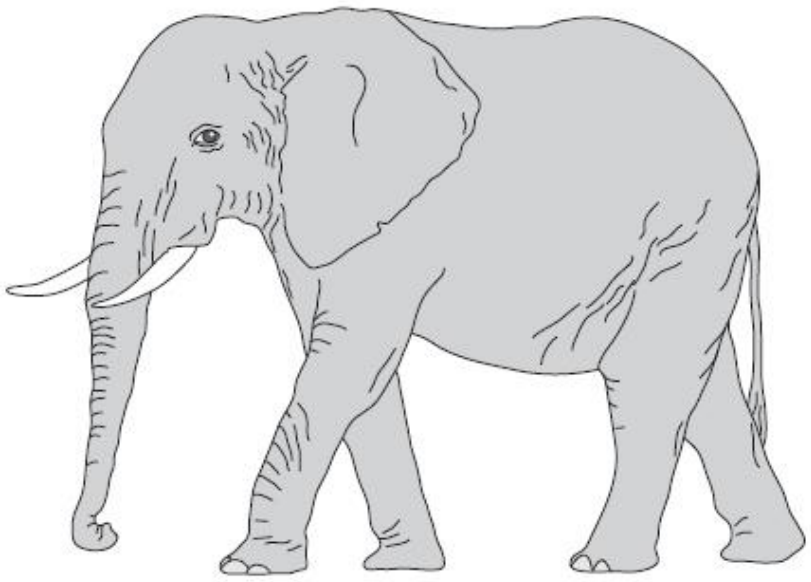
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(Total for question = 7 marks)

Q12.

The drawing shows an elephant. Elephants live in Africa where it is hot.



(a) The elephant is adapted to live in a hot environment by having large ears.

Suggest how having large ears helps prevent the body temperature of the elephant from rising too high.

(3)

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(b) Explain why the elephant may die if its body temperature rises too high.

(2)

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(Total for question = 5 marks)

Total Marks = 100