

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education



CYD-BWYLLGOR ADDYSG CYMRU

Tystysgrif Gyffredinol Addysg Uwchradd

117/01

SCIENCE: BIOLOGY

FOUNDATION TIER (Grades G-C)

P.M. WEDNESDAY, 7 June 2006

(2 hours)

For Examiner's use only	
Total Marks	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

Question 11 includes a mark for the quality of written communication.

You are reminded of the necessity for good English and orderly presentation in your answers.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

Answer **all** the questions.

1. Read the following and answer the questions below.

Animals may become extinct if the environment changes.

Before it became extinct, the Dodo lived in the forests on the island of Mauritius and survived for many millions of years.

The Dodo was a large, heavy bird and could not fly.

It was hunted by settlers for food.

Pigs, goats, cats and monkeys, introduced by the settlers, destroyed its eggs and chicks.

The settlers also cut down forests.

Use the information above to answer the following questions.

(a) Where did the Dodo live? [1]

.....

(b) Why was the Dodo hunted by the settlers? [1]

.....

(c) (i) State **one** way in which the Dodo was different from most other birds. [1]

.....

(ii) Suggest why this difference was a disadvantage. [1]

.....

(d) (i) Suggest a reason for the settlers bringing goats and pigs to the island. [1]

.....

(ii) How did these animals affect the Dodo? [1]

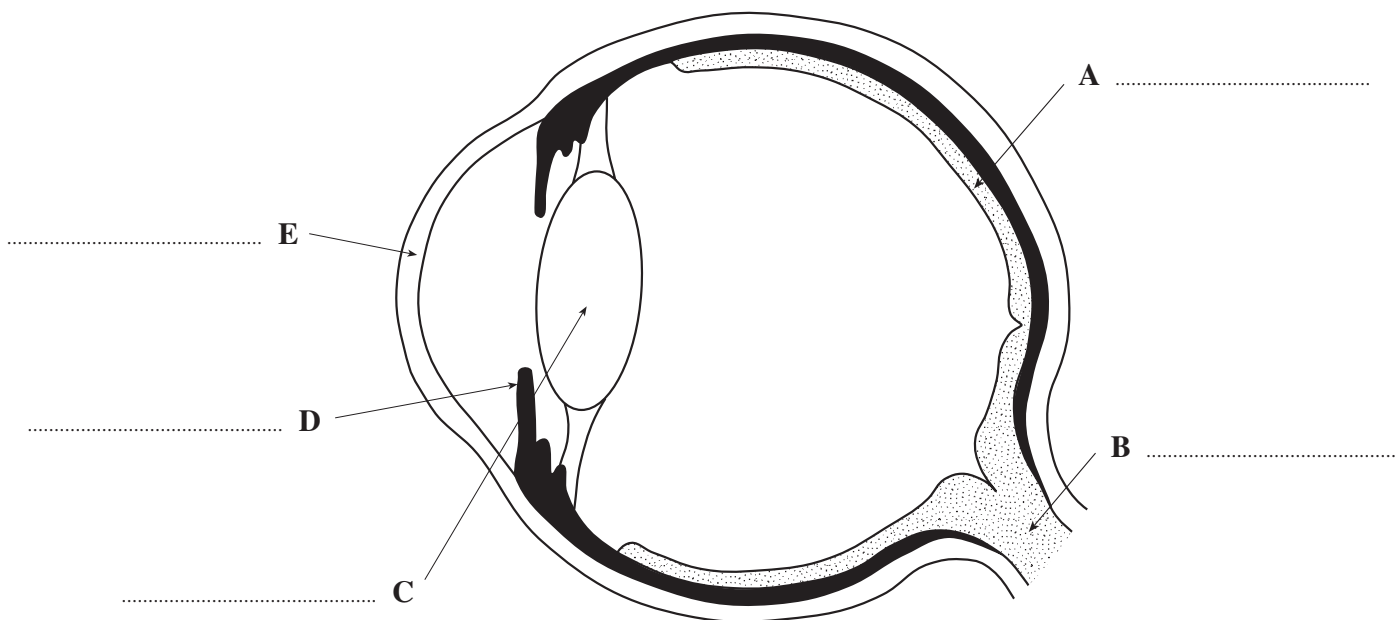
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(e) Suggest **one other** way in which the settlers made it difficult for the Dodo to survive. [1]

.....

2. (a) On the diagram of the eye label **A** to **E** using **some** of the following labels: [5]

retina, sclera, pupil, iris, lens, optic nerve, cornea.



(b) (i) **D** in the diagram controls the amount of light entering the eye. This is called a reflex action.

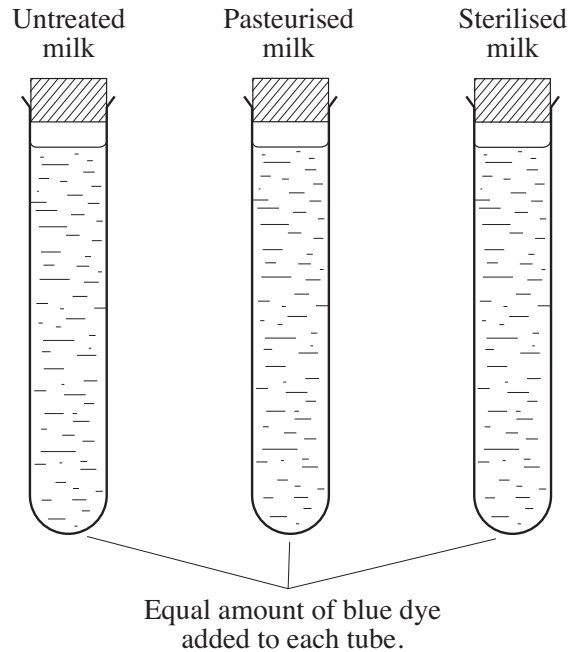
State **two** features of a reflex action. [2]

.....
.....

(ii) Name **one other** reflex action which involves the eye. [1]

.....

3. The experiment below was done to compare the preservation of milk by pasteurisation and sterilisation. The experiment was set up as shown with equal quantities of milk in each of three test tubes. Each test tube also contained equal quantities of a blue dye which turned white when oxygen was absent.



The colour of the tubes was noted over a two hour period. The results are shown in the table below.

<i>Time from start of experiment (hours)</i>	<i>Colour in test tube</i>		
	<i>Untreated Milk</i>	<i>Pasteurised Milk</i>	<i>Sterilised Milk</i>
0	blue	blue	blue
1	white	blue	blue
2	white	white	blue

Use the information in the table to answer the following questions.

- (i) How long did it take for the dye in the untreated milk to turn from blue to white? [1]

.....

- (ii) Why did it take longer for the dye in the pasteurised milk to change from blue to white than in the untreated milk? [1]

.....
.....

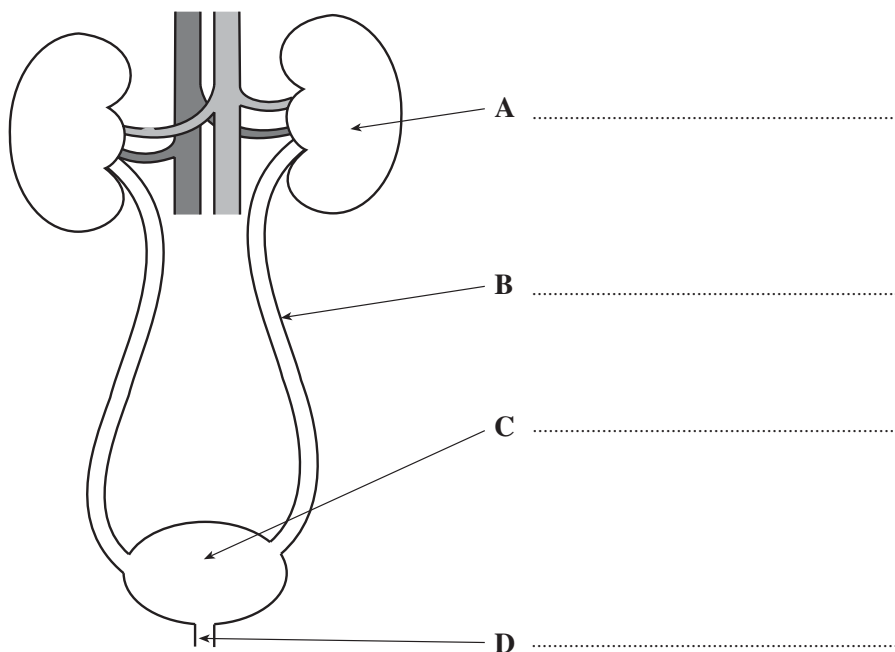
- (iii) Explain why the dye in the sterilised milk remained blue. [1]

.....
.....

4. (a) On the diagram of the excretory system label **A**, **B**, **C** and **D** using some of the following:

[4]

ureter, kidney, bladder, urethra, renal artery.



(b) The table below shows the amounts of substances present in blood entering and leaving part A.

Substance	In blood entering A (a.u.)	In blood leaving A (a.u.)
Urea	35	5
Protein	30	30
Glucose	65	65
Water	120	100
Mineral salts	300	280

Use the information in the table to answer the following questions.

(i) Which substance is removed from the blood in A in the greatest amount? [1]

.....

(ii) Name **two** substances which are not removed from the blood. [1]

I

II

(c) What is stored in C? [1]

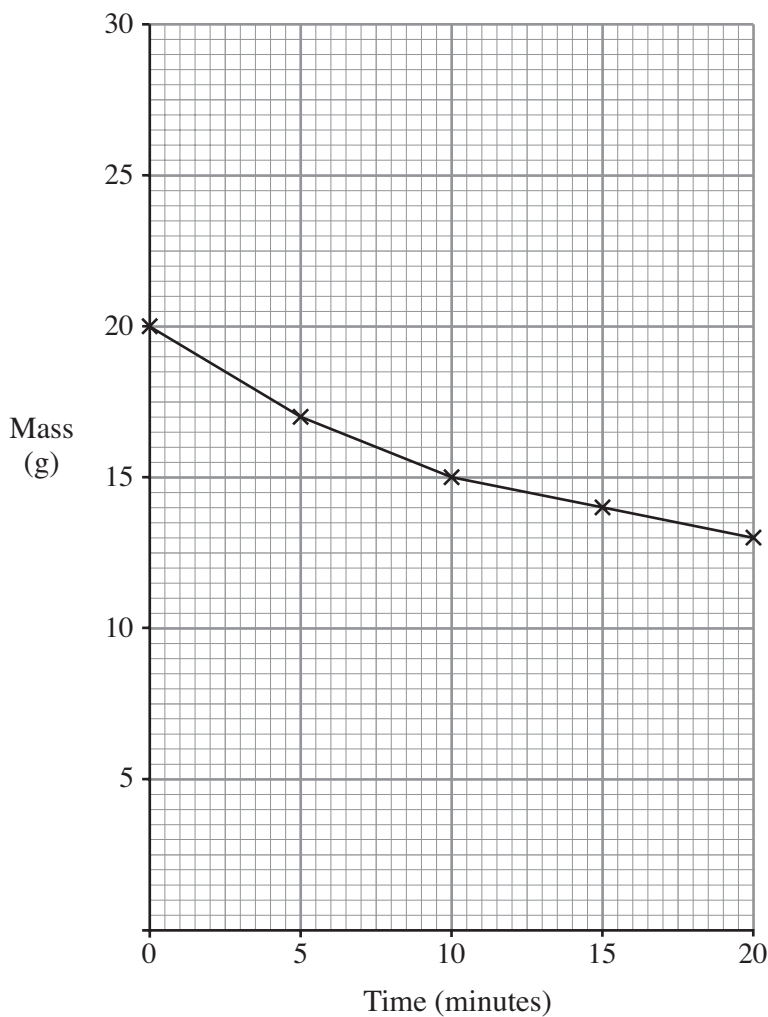
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5. Two potato chips of equal mass (20g) were cut and dried. One was placed in liquid **A** and the other in liquid **B**. Each chip was removed, dried and weighed then replaced in the liquid. This was done every 5 minutes for 20 minutes. The results are shown in the table below.

<i>Time (mins)</i>	<i>Mass of chip in liquid A (g)</i>	<i>Mass of chip in liquid B (g)</i>
0	20	20
5	17	23
10	15	24
15	14	25
20	13	26

- (a) (i) Plot the results for the chip in liquid **B** onto the grid below. [2]
(ii) Join the plots using a ruler. [1]

The plots of the chip in liquid **A** has been done for you.



(b) Using the graph and the table answer the following questions.

(i) Between which **two** times was the greatest gain in mass in **B**? [1]

..... minutes and minutes

(ii) What was the mass of the chips after 12.5 minutes? [1]

Chip in **A** g

Chip in **B** g

(iii) Which liquid was a strong sugar solution? [1]

Liquid

(c) Complete the definition of osmosis by using some of the following: [4]

water, solution, cell wall, cell membrane, high, low.

Osmosis is the movement of through a selectively permeable
..... from a region of water content to a
region of water content.

6. (a) Fill in the blanks in the sentences below by using some of the following: [3]

antibiotics, enzymes, bacteria, hormones, moulds.

In 1928 Sir Alexander Fleming discovered that a substance produced by

..... destroyed

This substance belongs to a group of substances called

- (b) Name the substance which Fleming discovered. [1]

.....

- (c) State **one** reason why his discovery was important. [1]

.....

7. The diagram below shows the front of a packet of washing powder.

RINSOWASH

Biological Washing Powder

Instructions for use

Add to water at 40°C
Do not use very hot water
Suitable for use with all delicate textiles

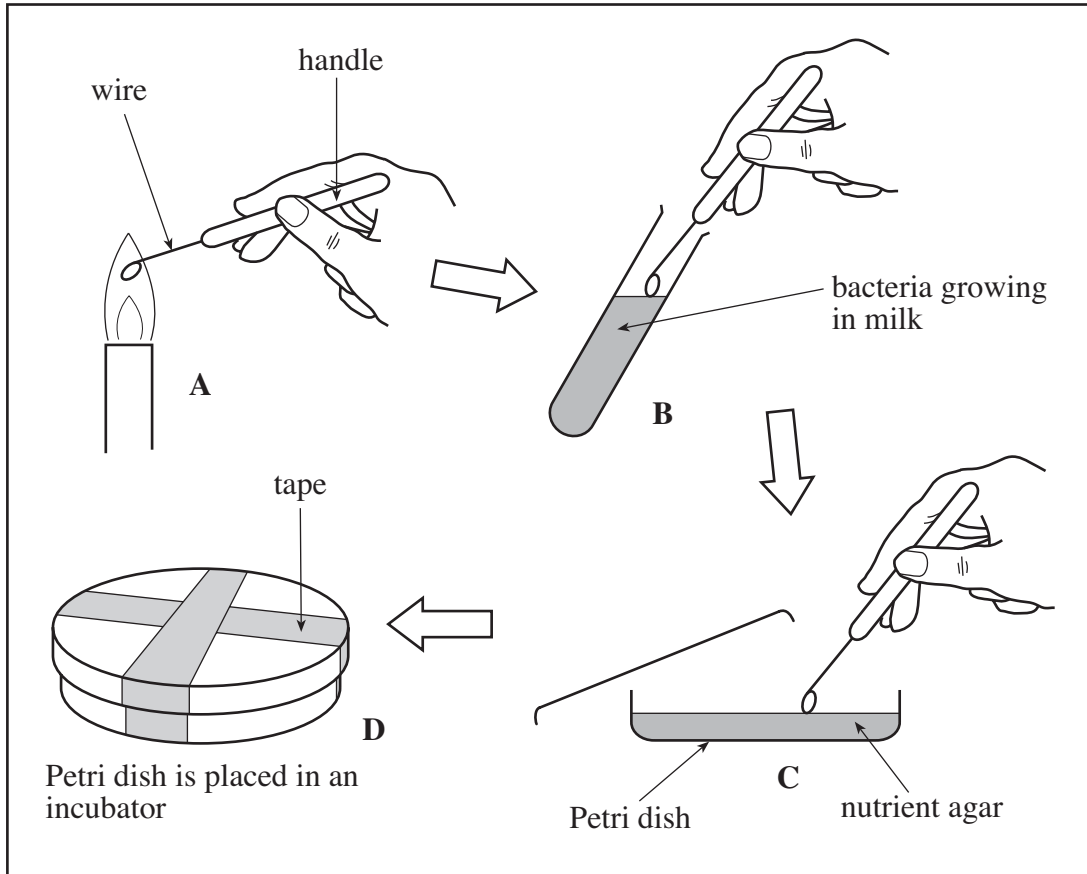
Warning

Contain enzymes which digest food stains
Can cause skin problems

Use the information above to answer all the following questions.

- (a) (i) Suggest a type of enzyme found in this washing powder. [1]
.....
- (ii) State **two** advantages of using biological powders. [2]
(I)
(II)
- (iii) State **one** disadvantage of using biological powders. [1]
.....
- (b) State why enzymes will not work in very hot water. [1]
.....

8. The diagrams below show how bacteria can be grown on ‘nutrient’ agar in the laboratory.



(a) Look at the diagrams and answer the questions below.

(i) Why is the wire loop placed in the flame in **A**? [1]

.....

(ii) Why is the loop placed in the test tube in **B**? [1]

.....

(iii) Why is the lid of the Petri dish never completely removed in **C**? [1]

.....

(iv) What is the meaning of the term ‘nutrient’ agar? [1]

.....

(v) What must be done with the agar before it is put in the petri dish in **C**? [1]

.....

(vi) Why is the lid of the Petri dish taped in **D**? [1]

.....

(vii) Why is the Petri dish incubated in **D**? [1]

.....

(viii) Why must the temperature of incubation be kept below 25°C? [1]

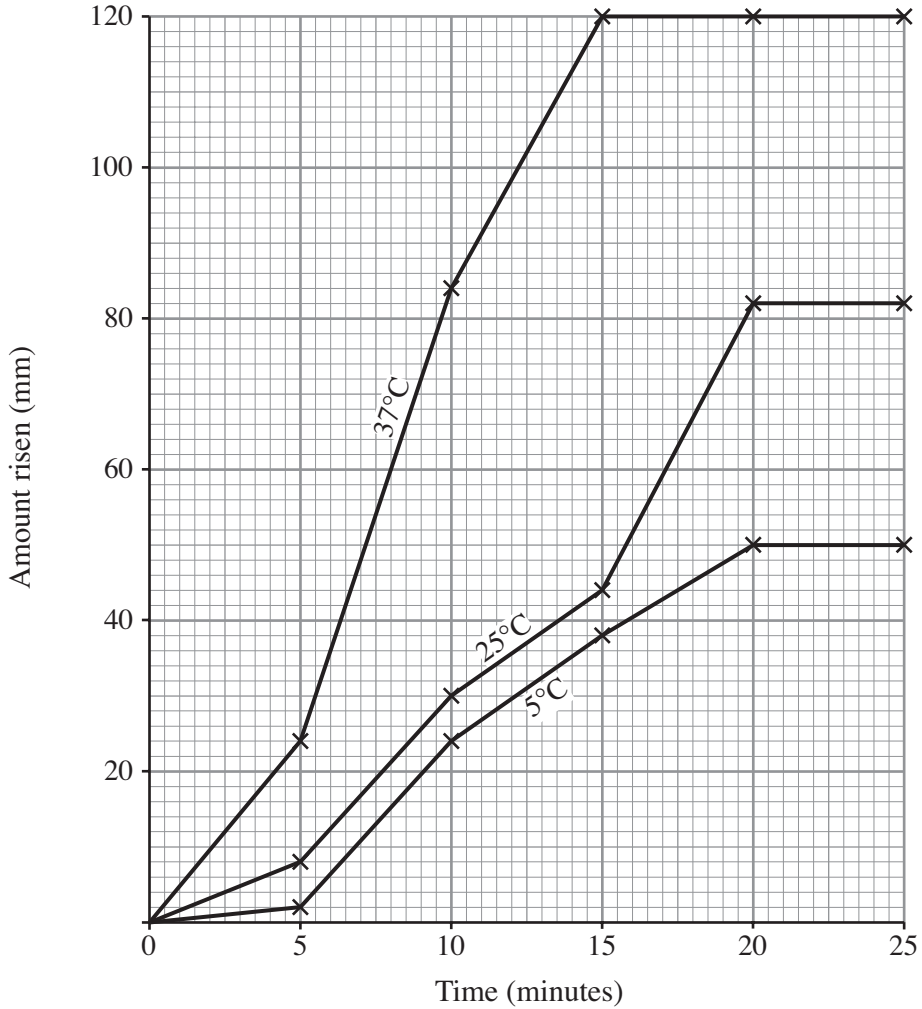
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(b) Name the **two other** major groups of microbes. [2]

(i)

(ii)

9. The graph below shows the results of three experiments to find the effect of temperature (5°C, 25°C and 37°C) on the raising of dough containing flour, yeast, sugar and water.



(a) State **two** conclusions you can make from the graph. [2]

(i)

(ii)

(b) (i) What gas does the yeast produce which causes the dough to rise? [1]

.....

(ii) Name the energy source for the yeast. [1]

.....

(c) Explain why the dough would not rise if heated to 100°C. [1]

.....

10. Use YES or NO to complete the following table, to show the structures present in animal and plant cells.

The first one has been done for you.

[5]

<i>Structure</i>	<i>Plant cell</i>	<i>Animal cell</i>
Nucleus	YES	YES
Cell wall		
Cytoplasm		
Cell membrane		
Chloroplast		
Vacuole containing cell sap		

11. The following article appeared in the February 2005 issue of BBC Wildlife Magazine.

The Po’o-uli is a small brown bird first identified in 1973 on the island of Hawaii. Then there were fewer than 200 left. By 1997 this was down to 3. One was caught in 2004 for a captive breeding programme. It died from bird malaria. The Po’o-uli belongs to a group of birds called honeycreepers. They are threatened by habitat loss, predators introduced by man and mosquitos which spread bird malaria.

Po’o-uli



(US Fish and Wildlife Service)

(a) Explain what is meant by a captive breeding programme. [2 + 1]

.....
.....
.....

(b) Give **one** natural cause of the decreased numbers of Po’o-uli mentioned in the article. [1]

.....

(c) Suggest the name of **one** predator introduced by man into Hawaii. [1]

.....

(d) The habitat loss that has occurred on the Hawaiian Islands is due to the action of man. State **two** reasons why man destroys habitats. [2]

(i)

(ii)

(e) Apart from captive breeding programmes state **three** ways in which endangered species can be protected. [3]

(i)

(ii)

(iii)

12. The English Elm, introduced into Britain by the Romans, can only reproduce asexually. This means that all English Elms are genetically identical. They reproduce from shoots that sprout from the roots. Cuttings can be taken from these shoots.

English Elm



© Oxford University Press

- (a) What name is given to a group of genetically identical organisms. [1]

.....

- (b) Genetically identical organisms are often produced on a commercial basis by tissue culture. Briefly explain how tissue culture is carried out and give an example of a plant that is produced by this method.

Explanation

.....

.....

[2]

Example

[1]

- (c) Give **two** advantages of producing plants by tissue culture. [2]

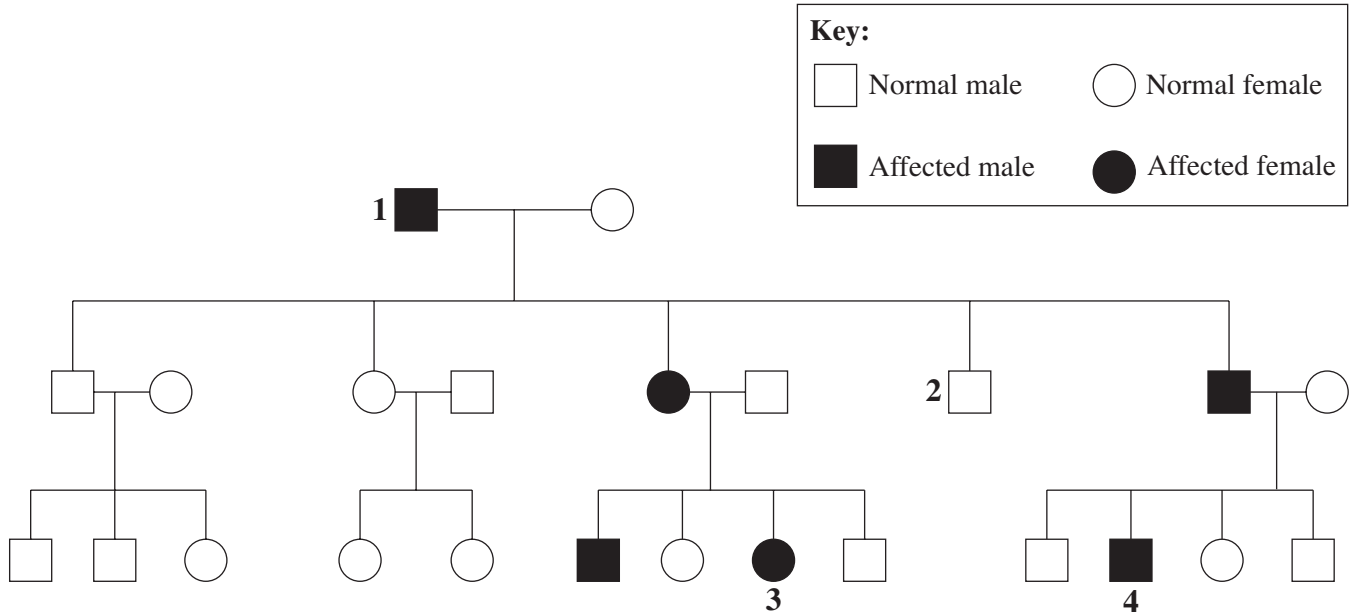
(i)

(ii)

- (d) Give **one** difference between asexual reproduction and sexual reproduction. [1]

.....

13. The family tree below shows the inheritance of webbed toes in a human family. The presence of webbed toes is due to a dominant allele **R**. The recessive allele, **r**, gives normal toes.



- (a) Write down the possible genotypes which could exist. [1]

.....

- (b) (i) Write down the genotype of the affected male, number 1. [1]

.....

- (ii) Give a reason for your answer [1]

.....

.....

- (c) (i) Write down the genotype of male number 2. [1]

.....

- (ii) Give a reason for your answer. [1]

.....

.....

- (d) (i) In the space below construct a Punnett square to show a cross between woman **3** and man **4**. [2]

- (ii) What is the probability of the appearance of webbed toes in the children from the above cross? [1]

.....

14. The following **Waste Factfile** gives some information about the amount of household waste produced in the UK.



- Each household produces about 1.39 tonnes of waste each year.
- Up to 80% ($\frac{4}{5}$) of our waste can be reused, recovered or recycled.
- Every tonne of glass recycled saves 1.2 tonnes of raw materials and the equivalent of 150 litres of fuel oil.
- One tonne of paper made from recycled paper saves:
 - 17 trees;
 - 3 cubic metres of landfill space;
 - 7000 gallons of water;
 - 4200 kWh of electricity;
 - 2000 litres of fuel oil;
 - 28 kg of air pollutants.
- The collection of recyclable materials is financially high.
- The collection of recyclable materials from households involves the use of more transport.

(a) Using the information in the **Waste Factfile**:

- (i) State **two** ways in which recycling of household waste can help to conserve fossil fuels. [2]

(I)

(II)

- (ii) State **one** way in which the recycling of household waste increases the consumption of fossil fuels. [1]

.....

- (iii) Apart from the saving on fossil fuels, state **two** other environmental benefits of recycling household waste. [2]

(I)

(II)

- (iv) What is the mass of waste that a household could reuse, recover or recycle per year?
Show your working. [2]

Answer tonnes

- (b) Suggest how manufacturers could reduce the amount of household waste produced. [1]

.....

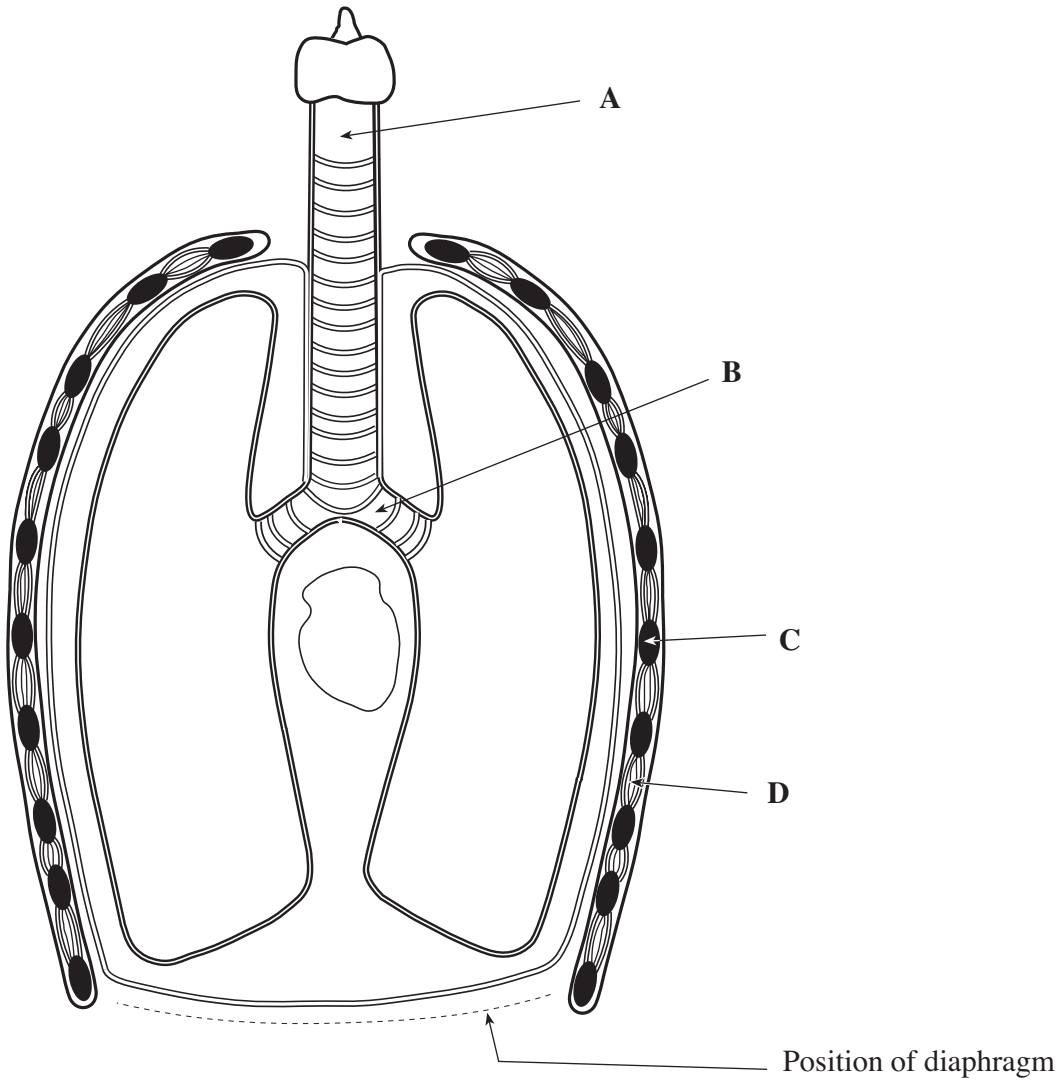
- (c) Some supermarkets run recycling schemes in their car parks. Suggest how using this type of scheme is an environmental advantage over doorstep collections. [2]

.....

.....

.....

15. The diagram shows a section through the human thorax during breathing in (inspiration).



(a) (i) Name the structures labelled **A**, **B**, **C** and **D**. [4]

A

B

C

D

(ii) State **one** difference that you would see if the diagram had been drawn after breathing out (expiration). [1]

.....

(b) The table below shows some differences between inspired and expired air.

<i>Gas</i>	<i>% in inspired air</i>	<i>% in expired air</i>
Oxygen	20.7	14.69
Water vapour	1.25	6.27
Carbon dioxide	0.04	3.88

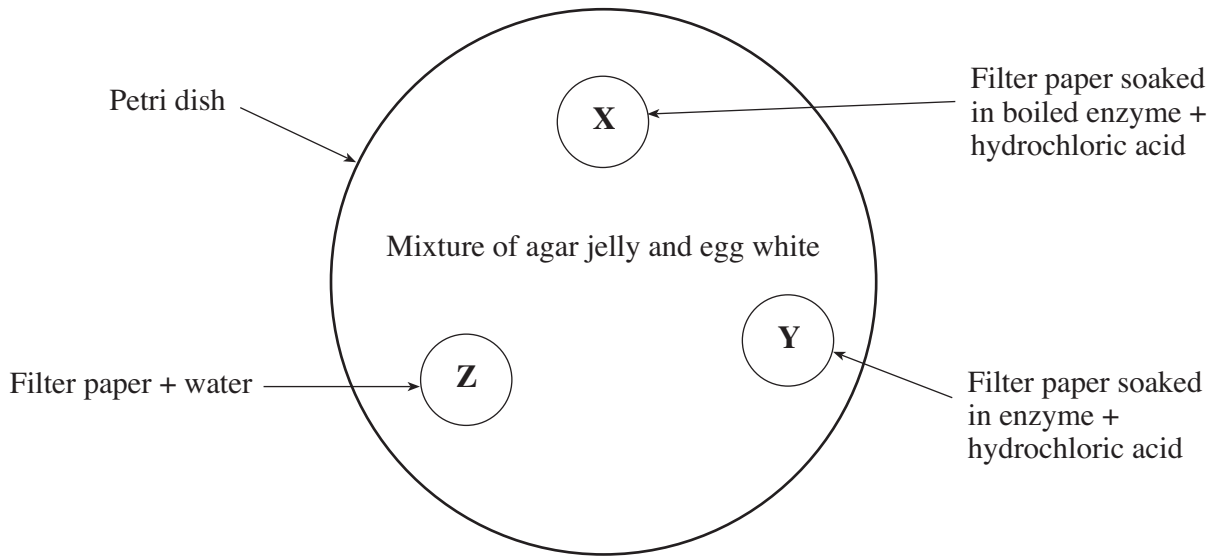
Explain the decrease of oxygen in the expired air.

[1]

.....

.....

16. Three discs of filter paper, treated as shown below, were placed on agar jelly containing egg white.



After 30 minutes the area under each disc was tested for amino acids, glucose and fatty acids. The results are shown in the table below.

<i>Filter paper disc</i>	<i>Amino acids</i>	<i>Glucose</i>	<i>Fatty acids</i>
X	-	-	-
Y	+	-	-
Z	-	-	-

<p>Key:</p> <p>+ = present</p> <p>- = absent</p>
--

(a) Suggest, with a reason, the name of the enzyme. [2]

Name

Reason

.....

(b) On which class of food is the enzyme acting? [1]

.....

(c) Why is disc Z included in the experiment? [1]

.....

.....

(d) In which part of the alimentary canal does this enzyme normally work? [1]

.....

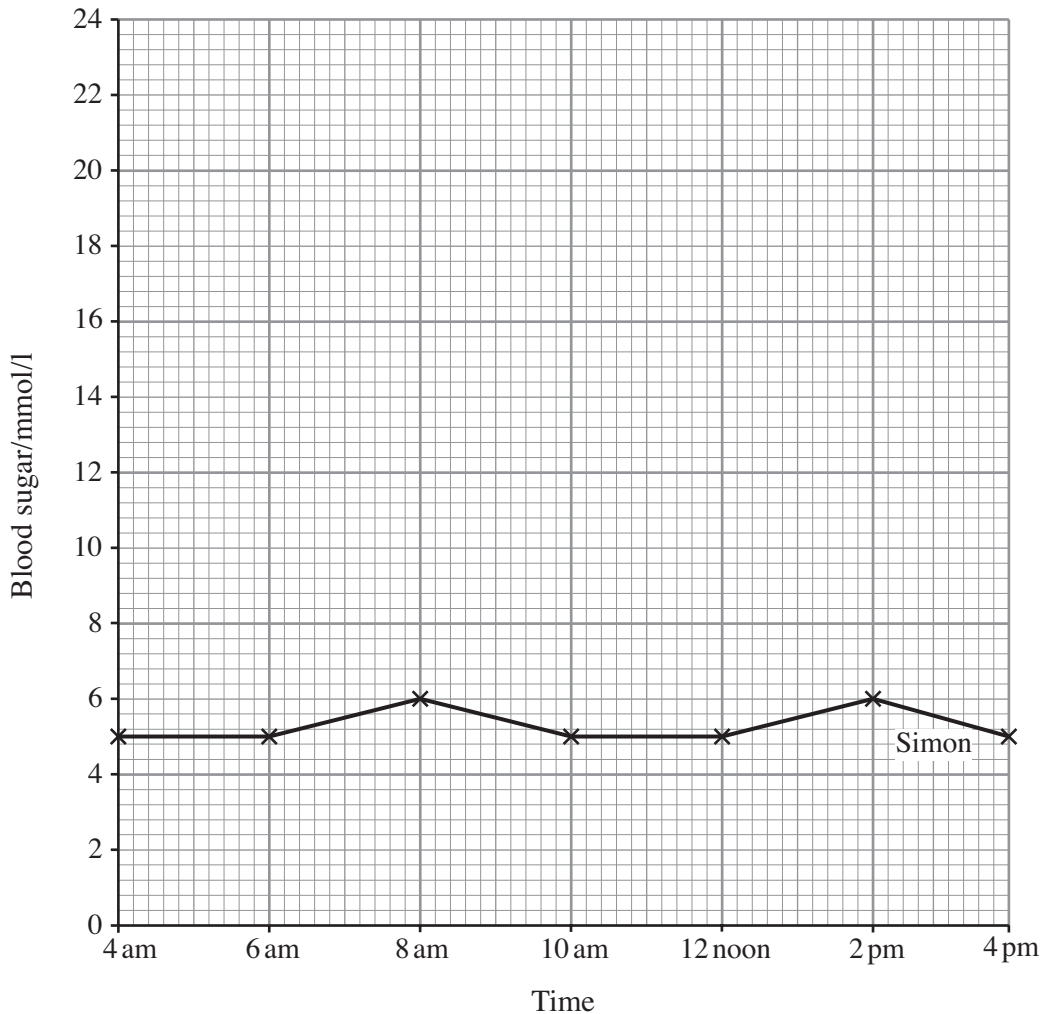
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17. The table below shows the blood sugar readings of two school pupils, John and Simon, over a 12 hour period.

<i>Time</i>	<i>Blood sugar / mmol / l</i>	
	<i>John</i>	<i>Simon</i>
4 am	7	5
6 am	6	5
8 am	18	6
10 am	2	5
12 noon	9	5
2 pm	22	6
4 pm	20	5

- (a) (i) Complete the chart below by plotting the data for John.
The data for Simon has been plotted for you.
Join the plots with ruler and label the line John.

[2]
[1]



(ii) John is a diabetic, the blood sugar control mechanism doesn't work.
Suggest what could have caused John's blood sugar level to rise at 8 am and 12 noon. [1]

.....

(iii) If a persons blood sugar level falls below 4 mmol/l then they may suffer a "hypo" (they become hypoglycaemic). This can be very dangerous.

(I) At what time did John suffer a "hypo"? [1]

.....

(II) Suggest what could have caused his blood sugar level to drop so low that a "hypo" occurred. [1]

.....

(III) What should John do to quickly recover from this "hypo"? [1]

.....

(b) State **two** possible ways by which John could control his diabetes. [2]

(i)

(ii)