

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**GATEWAY SCIENCE**

**B632/02**

**BIOLOGY B**

Unit 2 Modules B4 B5 B6  
(Higher Tier)

Candidates answer on the question paper  
A calculator may be used for this paper

**OCR Supplied Materials:**  
None

**Other Materials Required:**

- Pencil
- Ruler (cm/mm)

**Friday 12 June 2009**  
**Morning**

**Duration: 1 hour**



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

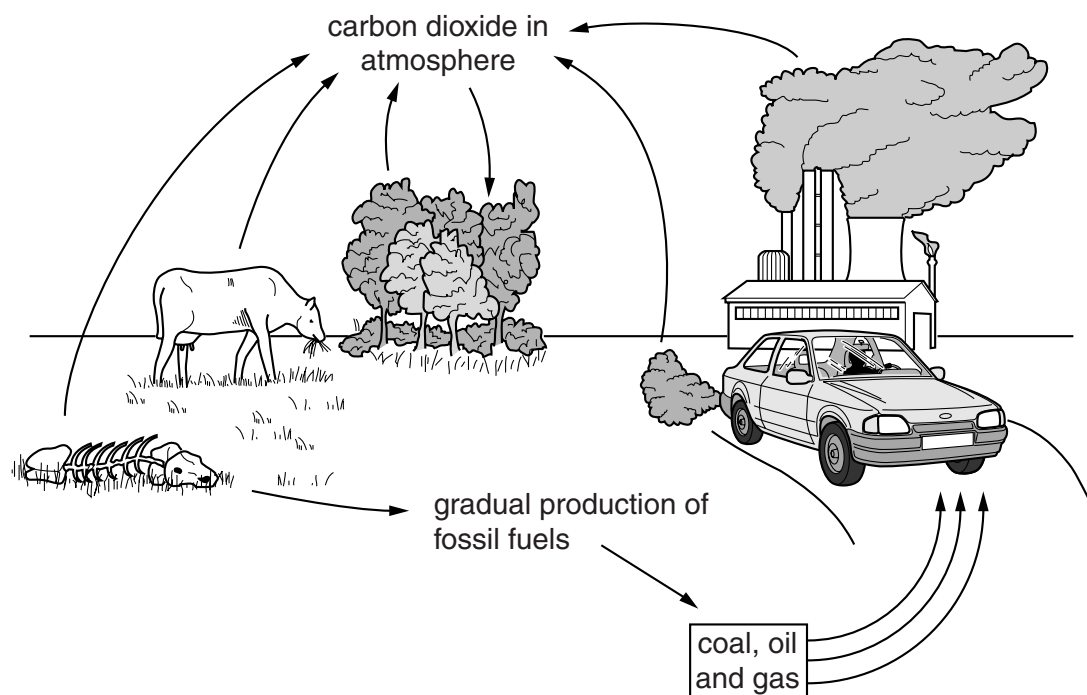
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

Answer **all** the questions.

**Section A – Module B4**

- 1 This question is about recycling elements.

Look at the diagram. It shows how carbon is recycled in nature.



- (a) Combustion of fossil fuels returns carbon to the air as carbon dioxide.

- (i) Write down the name of **one other** process that returns carbon to the air.

..... [1]

- (ii) Write down the name of **one** process that **removes** carbon dioxide from the air.

..... [1]

- (b) Nitrogen is also recycled.

Which **group** of bacteria return nitrogen to the air when they convert nitrates to nitrogen?

..... [1]

3

- (c) Many gardeners recycle dead plants by turning them into compost.

The plant material is left to decay on the compost heap.

To speed up the rate of decay the compost needs to be kept moist.

Describe **one other** way of speeding up decay.

.....  
..... [1]

[Total: 4]

2 This question is about plants and water.

Plants lose water by transpiration.

(a) Transpiration is important to plants because it provides water for photosynthesis.

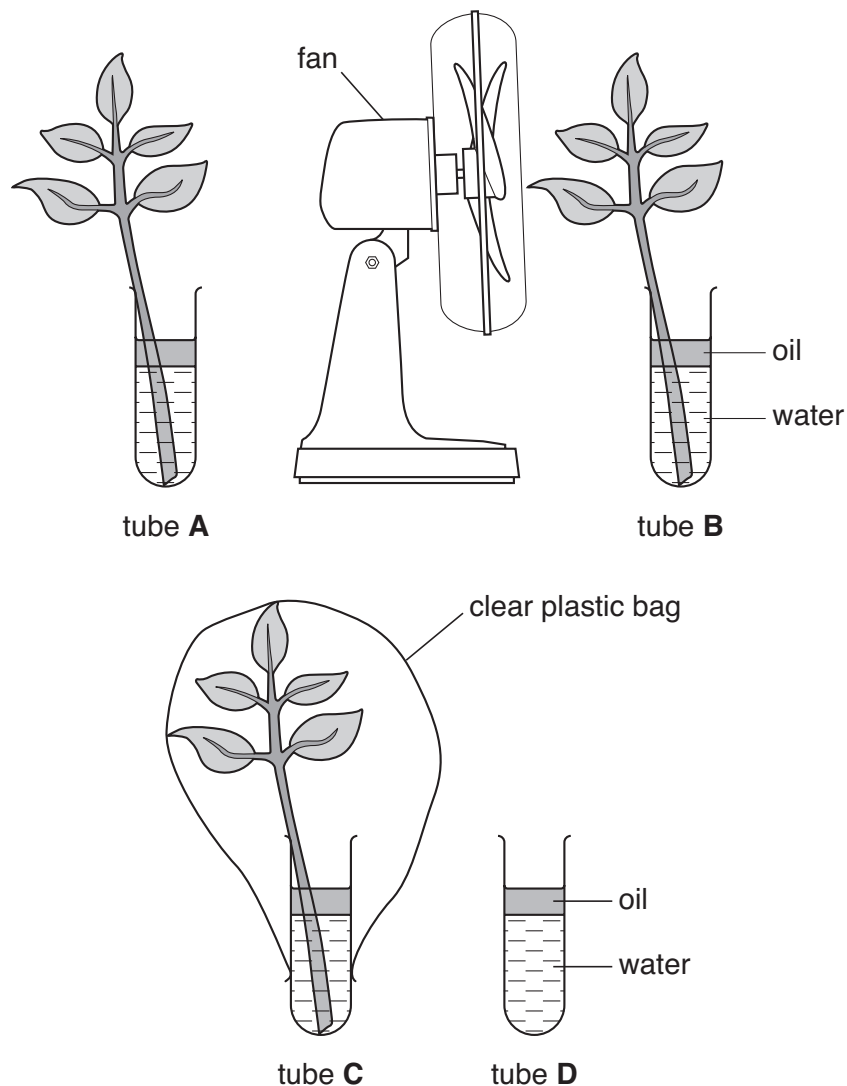
Write down **two other** things transpiration provides water for.

1 .....

2 ..... [2]

(b) Jamie is investigating the effect of different factors on transpiration in plants.

Look at the diagram. It shows the apparatus he uses.



5

Jamie records the mass of each tube and its contents.

He leaves the apparatus for 5 days in the same room.

Tubes **B** and **C** are given **different** conditions. He then records the mass again.

The table shows Jamie's results.

tube	A – left at room temperature	B – left in room with a moving fan next to it	C – left in room with a clear plastic bag over it	D – left at room temperature
mass at start in g	42.4	43.3	41.2	31.9
mass at end in g	35.3	32.7	40.4	31.9
mass lost in g	7.1	10.6	0.8	0.0
percentage loss in mass	16.7		1.9	0.0

- (i) Calculate the percentage loss in mass for tube **B**.

You are advised to show your working.

percentage loss in mass = ..... % [2]

- (ii) Describe the effect increasing air movement has on transpiration in plants.

..... [1]

- (c) It is better to compare the percentage loss in mass than just the mass lost.

Explain why.

.....  
 ..... [1]

- (d) The water in the plants moves up through hollow vessels.

Write down the name of these vessels.

..... [1]

[Total: 7]

3 Australia produces a lot of sugar cane.

(a) Insects eating the sugar cane affect the production of the crop.

(i) Farmers use pesticides to kill the insects.

The pesticides cause the death of some animals higher in the food chain.

Explain why this happens.

.....  
.....  
..... [2]

(ii) Cane toads were introduced to feed on the insects.

Suggest **one** disadvantage of this type of biological control.

.....  
..... [1]

(b) Sugar cane can be used as a fuel.

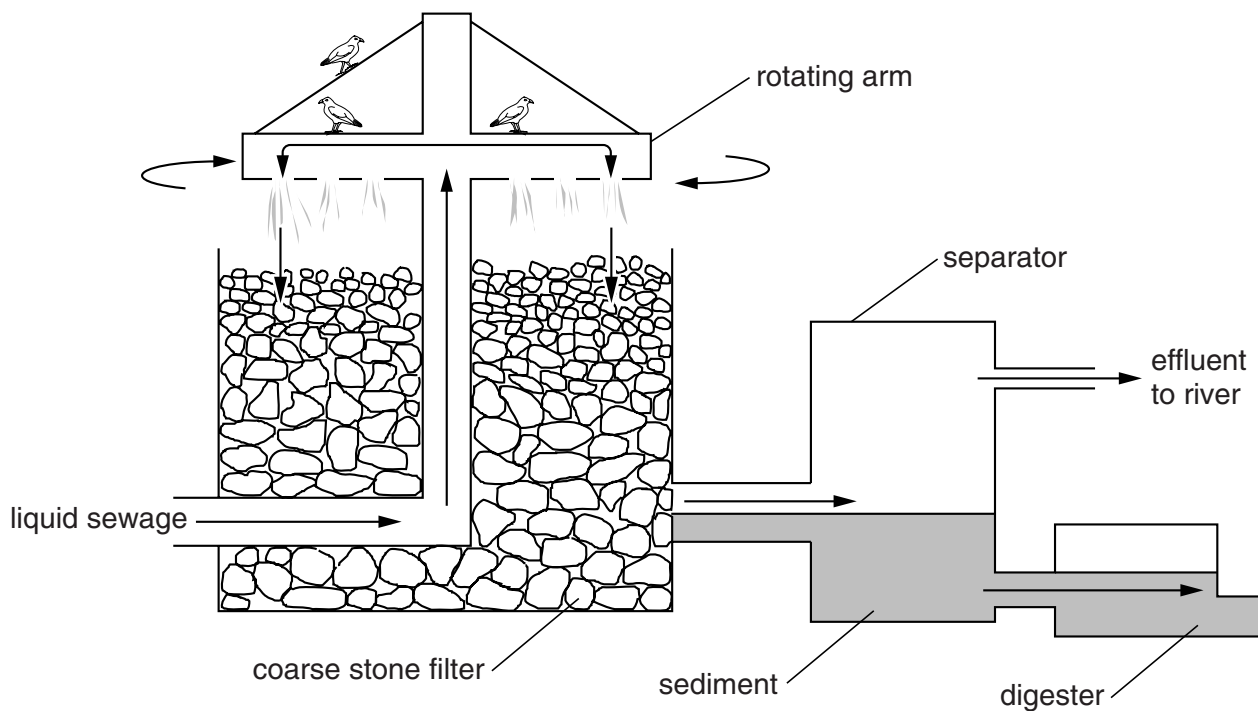
This is an example of using biomass.

Write down **one other** way farmers can use biomass.

.....  
..... [1]

[Total: 4]

4 Look at the diagram. It shows part of a sewage works.



(a) Bacteria are used to break down substances in the sewage into ammonia.

Write down the names of **two** substances that are broken down into ammonia.

..... and ..... [1]

(b) After sewage has been treated it can be used as a fertiliser.

(i) Fertilisers contain minerals, such as nitrate, needed for healthy plant growth.

One sign of nitrate deficiency is poor growth.

Write down **one other** sign of nitrate deficiency in plants.

..... [1]

(ii) Plants also need other minerals in fertilisers.

Write down the name of **one other** mineral in fertilisers needed for **photosynthesis**.

..... [1]

(c) Describe how minerals are taken into root hairs of plants.

.....  
 .....  
 ..... [2]

[Total: 5]

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## Section B – Module B5

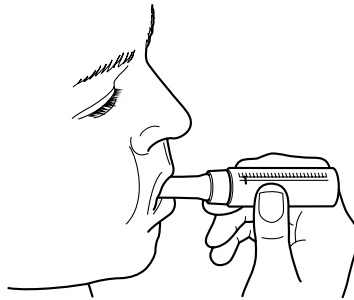
- 5 This question is about the respiratory system.

The respiratory system can be damaged by a number of different medical conditions.

One condition is asthma.

- (a) John has asthma.

He tests himself using a peak flow meter.



John blows into the meter.

It measures how quickly he blows air out of his lungs.

Explain how this can help to tell John how bad his asthma is.

.....  
..... [1]

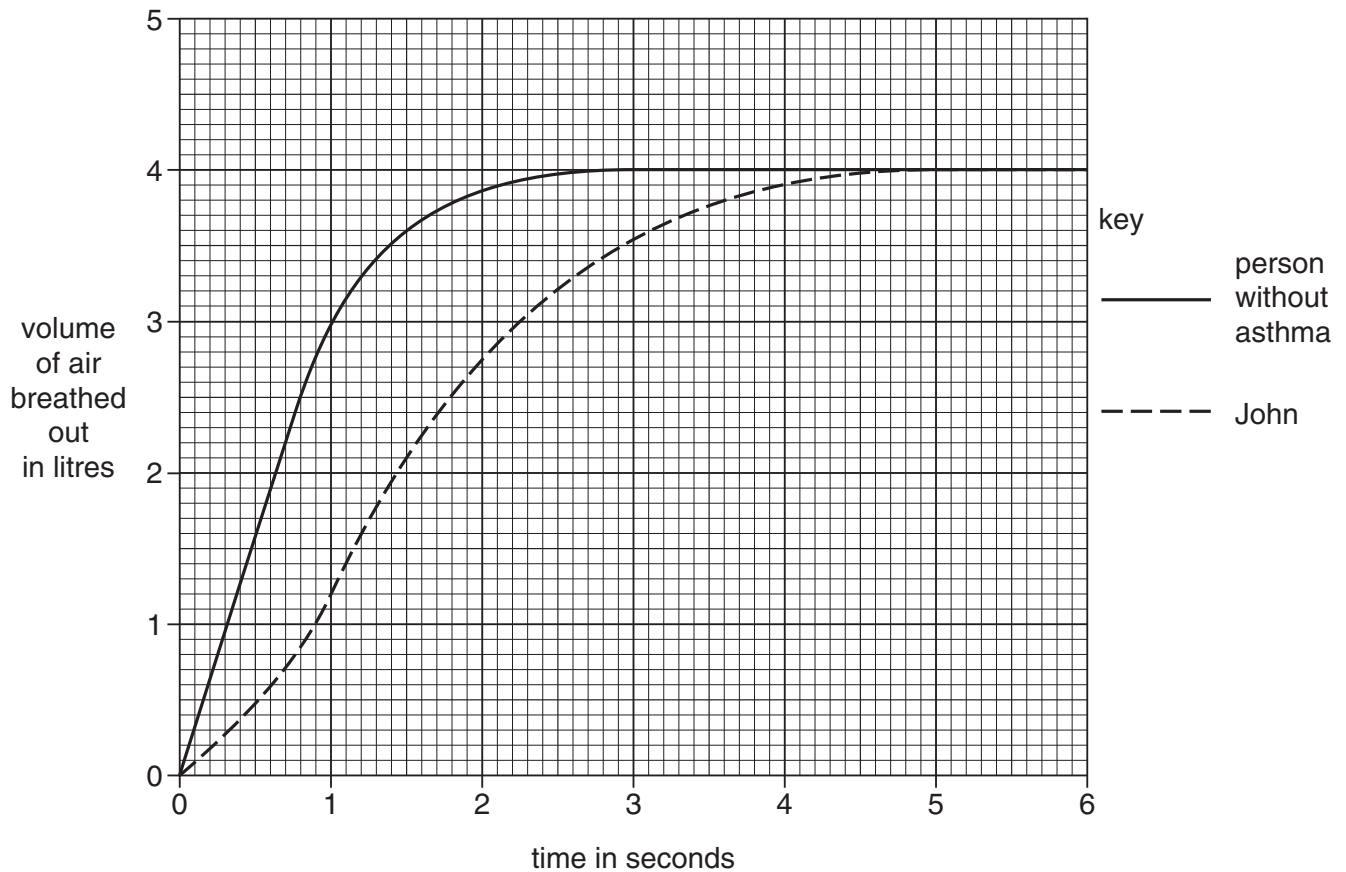
10

- (b) John goes to the doctor to find out more about his asthma.

The doctor asks John to breathe into a machine called a spirometer.

This measures the volume of air John breathes out in a single deep breath.

The graph shows the results for John and a person of John's size and age who does **not** have asthma.



- (i) John and the other person have the same vital capacity.

Look at the graph.

What is their **vital capacity**?

answer ..... litres

[1]

11

(ii) The doctor can decide how severe John's asthma is from the graph.

He reads off the volumes of air breathed out **after one second** and does this calculation.

$$\text{asthma value} = \frac{\text{volume of air breathed out after one second by John}}{\text{volume of air breathed out after one second by person without asthma}}$$

He looks up John's level of asthma in this table.

asthma value	level of asthma
more than 0.80	none
0.80 – 0.55	mild
0.55 – 0.30	moderate
less than 0.30	severe

Use the graph to calculate John's asthma value.

answer .....

Write down what level of asthma John has.

level of asthma ..... [2]

(iii) John uses an inhaler to treat his symptoms of asthma.

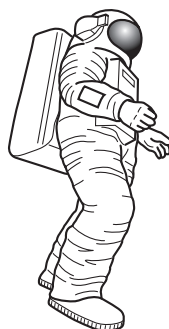
What effect do the drugs inside the inhaler have on John's respiratory system?

.....

..... [1]

[Total: 5]

- 6 Astronauts sometimes spend long periods of time in space.



When astronauts return to Earth a number of changes may have happened to their bodies.

These include:

- weakening of their muscles
- increased risk of blood clots
- decreased amount of haemoglobin
- weaker bones
- lower heart rate and blood pressure

- (a) (i) Which **one** of these changes could be treated with heparin?

..... [1]

- (ii) Describe the function of haemoglobin.

..... [1]

- (b) Scientists have used studies on astronauts to learn more about the disease osteoporosis.

How can studying astronauts help scientists learn more about osteoporosis?

.....

..... [1]

- (c) Returning astronauts may develop kidney problems.

This is caused by their glomeruli **not** operating properly.

Explain why the information supports the idea that this might happen.

.....

.....

..... [2]

[Total: 5]

- 7 Tony decides to donate blood.

The nurse in charge of the donation is talking to him.



I am glad that you have decided to give blood.

There is nothing to worry about. You have about six litres of blood. The amount that we will take does not cause you any harm.

We have tested your blood. You are O negative and we have not found any problems in your blood.

- (a) (i) The nurse tells Tony that he has about six litres of blood.

How much is usually removed when blood is donated?

Put a ring around the correct amount in this list.

0.02 litres

0.5 litres

2 litres

4 litres

[1]

- (ii) Tony's blood is tested for problems.

Suggest **one** problem that the blood might be tested for.

[1]

- (b) The nurse tells Tony that he is blood group O negative (O–).

The table gives information about who can successfully receive blood.

		blood group of donor							
blood group of receiver	type	O–	O+	B–	B+	A–	A+	AB–	AB+
	AB+								
	AB–								
	A+								
	A–								
	B+								
	B–								
	O+								
	O–								

= successful transfusion

- (i) Why is Tony's blood so useful to the donation service?

[1]

14

- (ii) Explain what would happen if Tony **received** a transfusion from a person who was blood group **O** positive (O+).

.....

.....

.....

..... [3]

[Total: 6]

- 8 There are many reasons why some couples have difficulties conceiving babies.

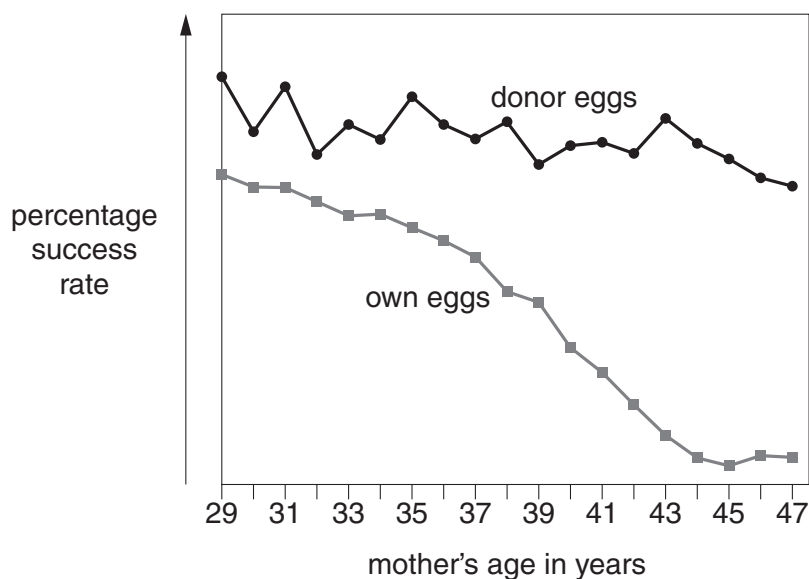
One possible treatment for infertility is IVF.

- (a) How does fertilisation in IVF differ from normal fertilisation?

..... [1]

- (b) The graph shows the percentage success rate of IVF for women of different ages.

It shows the success rate using their own eggs or eggs from a donor.



- (i) The success rate for IVF using donor eggs is different from the success rate using the mother's own eggs.

What differences are shown by the graph?

.....

.....

.....

..... [2]

- (ii) Write down **one** reason why a couple might be reluctant to have a baby using egg donation.

.....

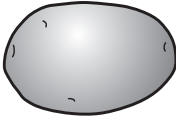
..... [1]

[Total: 4]

## Section C – Module B6

- 9 Read the article from a recent newspaper.

**Fighting cholera with potatoes!**



Cholera can spread very quickly from person to person.  
It is a disease caused by bacteria.  
It kills 200 000 people a year.

Scientists have used potato plants to make a new medicine.  
They hope that this new medicine might stop people getting cholera.

The scientists put a gene into potato plants to make them produce the medicine.  
They hope that just eating the potatoes will protect people from the disease.

- (a) How are the bacteria which cause cholera spread?

.....  
 ..... [1]

- (b) What circumstances might make diseases such as cholera spread really quickly?

.....  
 ..... [1]

- (c) The scientists have put a gene from another species into the potato plant.

- (i) What name is given to an organism that has received a gene from another species?

Put a ring around the correct answer in this list.

clone            pathogen            plasmid            transgenic

[1]

- (ii) The scientists use enzymes to cut genes out of DNA.

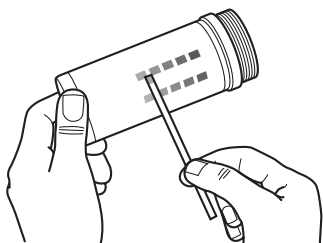
What is the name of the type of enzyme they use?

..... [1]

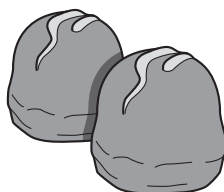
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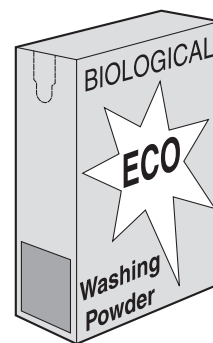
10 The diagrams show some products made using enzymes.



reagent testing strips  
for people with  
diabetes



chocolates low in  
sucrose



biological washing  
powder

(a) The chocolates have been made using an enzyme that breaks down sucrose to glucose and fructose.

(i) Write down the name of this enzyme.

..... [1]

(ii) Write down **one** advantage of treating foods in this way.

.....

..... [1]

(b) (i) On the packet of biological washing powder there is a warning.

It says that the powder will not clean clothes very well if used in areas where the tap water is very acidic.

Explain why this is.

.....

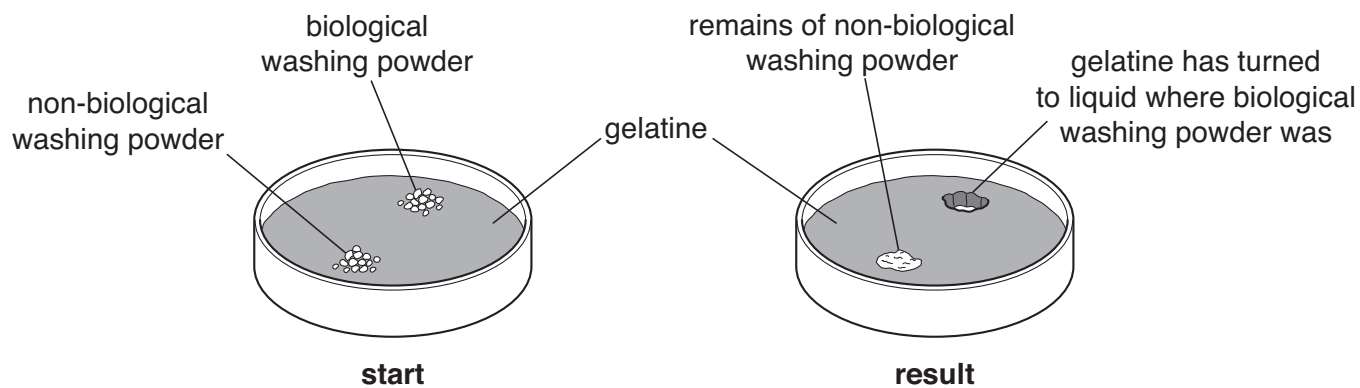
..... [1]

18

- (ii) Gerant decides to do an experiment to compare a biological washing powder with a non-biological powder.

He puts a small amount of each powder in a dish containing a jelly called gelatine.

Gelatine is a protein.



Explain the results of Gerant's experiment.

.....

.....

..... [2]

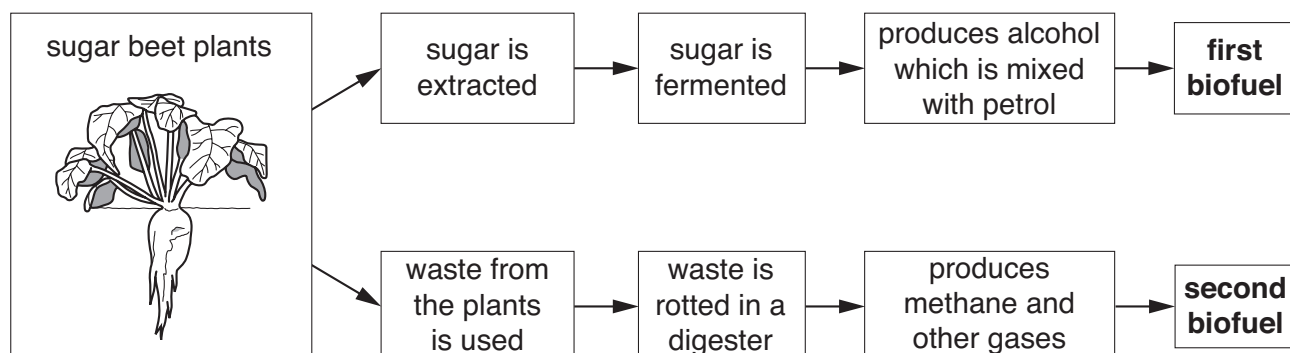
[Total: 5]

- 11 Sugar beet is a plant that is grown throughout Europe.

It is grown because it contains a high concentration of sugar.

Now a new factory is being built in Hungary.

It will use the plants to produce two different biofuels.



- (a) The first biofuel is a mixture of alcohol and petrol. It is called gasohol.

What name is given to the second biofuel that contains methane?

..... [1]

- (b) The factory will produce large volumes of this second biofuel which contains 55% methane.

This biofuel will be used instead of natural gas to provide the energy to run the factory.

- (i) Explain why the percentage methane in this biofuel must be about 55%.

..... [2]

- (ii) Write down **one** advantage of using this biofuel instead of natural gas.

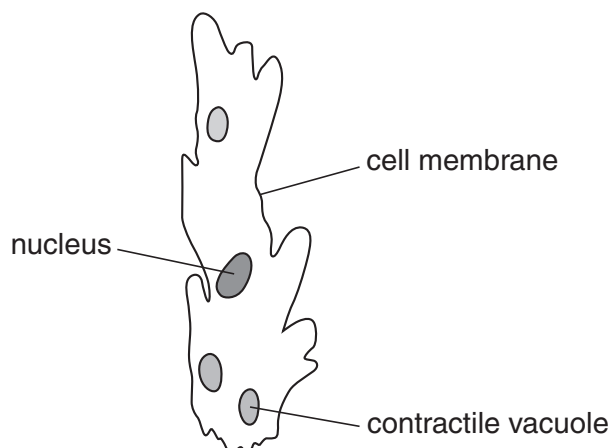
..... [1]

- (iii) Write down **one** disadvantage of using this biofuel rather than natural gas.

..... [1]

[Total: 5]

- 12 Amoeba is the name of a group of single-celled organisms. Look at the diagram. It shows an example of an amoeba.



Different types of amoeba live in different habitats.

*Amoeba lacerata*

is an amoeba that lives in rivers.

*Entamoeba histolytica*

is an amoeba that lives in the human body and causes disease.

- (a) (i) What disease is caused by *Entamoeba histolytica*?

..... [1]

- (ii) What is the function of a contractile vacuole in *Amoeba lacerata*?

Put a tick (✓) in the box next to the correct function.

It contains a store of glucose that the amoeba uses in respiration.

☐

It collects and removes excess water that has entered the amoeba by osmosis.

☐

It contains microscopic organisms that are being digested by the amoeba.

☐

It stores water so that it is not lost to the river by osmosis.

☐

[1]

- (iii) Suggest why *Entamoeba histolytica* does **not** have any contractile vacuoles.

.....  
 ..... [1]

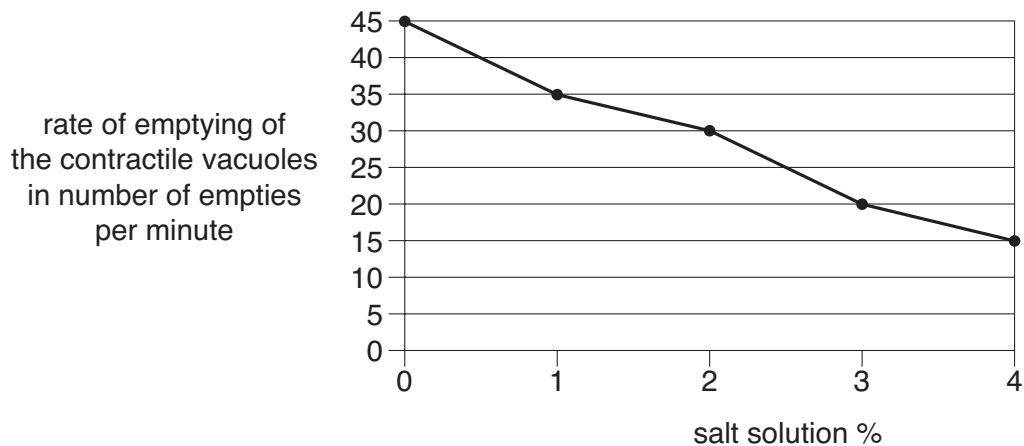
21

(b) An experiment was performed on *Amoeba lacerata*.

The amoeba was placed in salt solutions of different concentrations.

The rate of emptying of its contractile vacuoles was then measured.

The graph shows the results.



(i) The contractile vacuoles empty at a different rate in different salt solutions.

What is the difference between the number of empties per minute in 0% salt solution and 4% salt solution?

answer .....

[1]

(ii) Explain this difference in the rate of emptying of the contractile vacuoles.

.....  
 .....  
 ..... [2]

[Total: 6]

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