

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

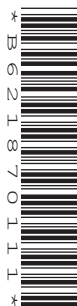
Other materials required:

- Pencil
- Ruler (cm/mm)

Monday 24 January 2011

Afternoon

Duration: 1 hour



Candidate forename		Candidate surname	
Centre number		Candidate number	

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

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.

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3

Answer **all** the questions.**Section A – Module B4**

1 Look at the picture.

It shows a bird standing on a giant water lily leaf.



(a) Leaves are adapted for photosynthesis.

Finish the sentences about how the leaf is adapted by writing **one** word in each space.

Leaves absorb light energy using a chemical called

The leaves of the water lily are very broad. This gives them a large area.

The oxygen made during photosynthesis is lost through pores called

[3]

(b) The water lily needs to take in minerals to provide important elements.

(i) One element is needed to make DNA and cell membranes.

Write down the name of this element.

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

(ii) Minerals are taken in by root hairs.

This process needs oxygen.

Finish the sentences.

Root hairs take in minerals by a process called

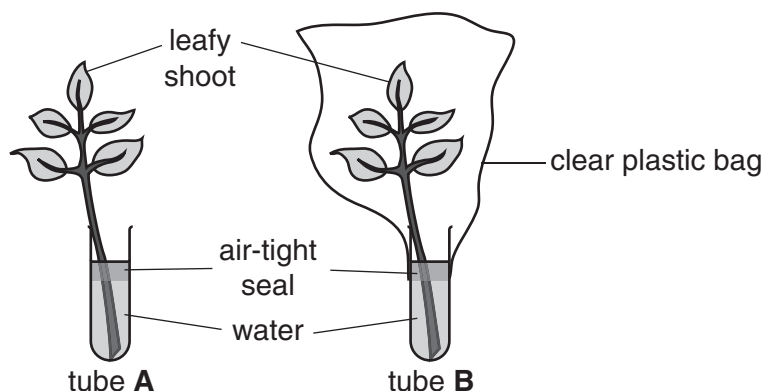
This process needs oxygen because

..... **[2]****[Total: 6]****Turn over**

4

- 2 Carol is investigating the effect of humidity on water loss in plants.

Look at the diagram of the apparatus she uses.



- (a) Carol records the mass of each tube and its contents.

She leaves the apparatus for three days in the same room.

She then records the mass again.

Tube **B** loses less mass because it has a bag on it.

Explain why.

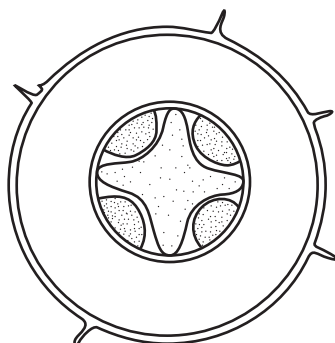
.....
 [1]

- (b) Water moves through plants in xylem vessels.

- (i) Look at the diagram.

It shows a cross-section of a root.

Put an **X** on the diagram to show the position of the xylem.



[1]

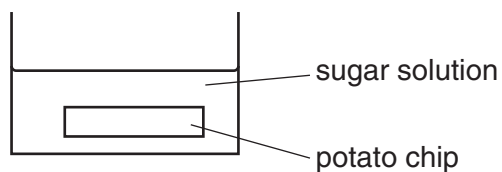
- (ii) Describe **two** ways xylem vessels are adapted to do their job.

1
 2 [2]

5

(c) Carol now investigates the effect of water loss on plant cells.

Look at the diagram of the apparatus she uses.



Carol records the mass of four different potato chips.

She puts potato chip **A** into water.

She puts chips **B**, **C** and **D** into different concentrations of sugar solution.

She leaves them for 24 hours.

Carol records the new mass of each chip.

The table shows some of her results.

potato chip	concentration of solution in g per dm ³	mass in g		
		before	after	difference
A	0	4.0	4.2	
B	30		4.1	+0.1
C	60	4.2	4.1	
D	90	4.1		-0.2

(i) Calculate the missing results.

Write your answers in the table.

[2]

(ii) Potato chip **D** lost mass.

Explain why.

Use ideas about osmosis.

.....

.....

..... [2]

[Total: 8]

3 Ricky is a gardener.

He has a problem with plants called Japanese knotweed.

Japanese knotweed grows very fast and competes with the plants Ricky wants to grow.

The picture shows some Japanese knotweed.



(a) Ricky could use a herbicide to kill the Japanese knotweed.

The herbicide he needs is very expensive.

Suggest **one other** possible problem with using herbicides.

..... [1]

(b) Ricky decides to use biological control instead.

He finds out that he can buy insects from Japan which eat Japanese knotweed.

Ricky decides to use insects to get rid of his Japanese knotweed.

Suggest **one** possible problem with using insects.

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

7

- (c) Japanese knotweed can be dug up and left to decay in plastic bags.

The decayed Japanese knotweed can then be put into a compost bin.

Ricky has two compost bins.

- (i) One compost bin contains air holes, the other does not.

Decay is faster in the bin with air holes.

Explain why.

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

- (ii) Bacteria in compost recycle the nitrogen.

There are different types of bacteria.

Nitrogen-fixing bacteria fix nitrogen.

Finish the sentence about **another** type of bacteria by writing **one** word in each space.

The bacteria that convert to nitrates

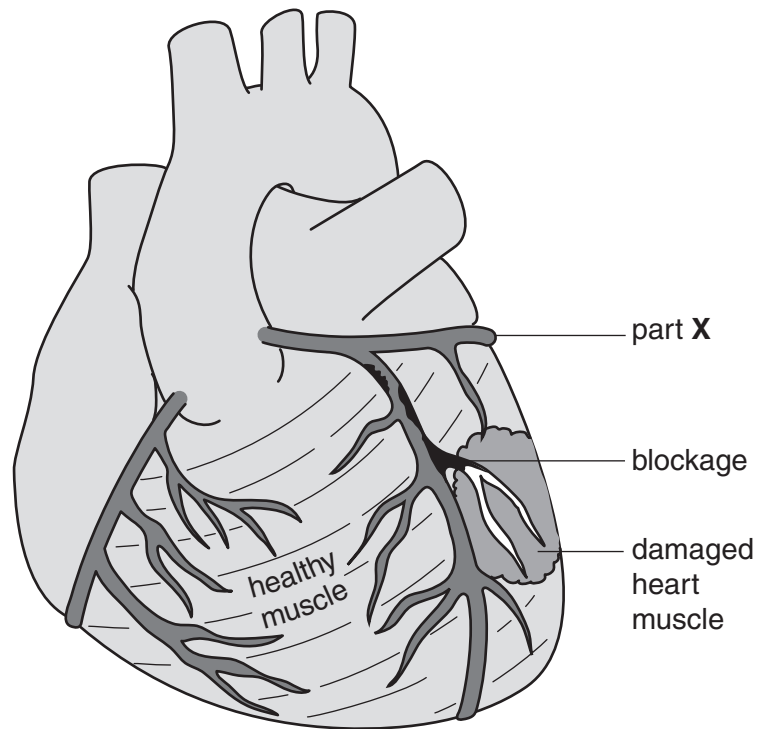
are called bacteria. [2]

[Total: 6]

Section B – Module B5

- 4 This question is about circulation.

Look at the diagram. It shows the heart of a patient with heart disease.



- (a) (i) There are four main blood vessels linked to the heart.

One of these four blood vessels takes blood away from the left ventricle.

What is the name of this blood vessel?

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

aorta

☐

pulmonary artery

☐

pulmonary vein

☐

vena cava

☐

[1]

- (ii) In this heart, part **X** has a **blockage**.

The heart muscle has been damaged by this blockage.

Write down **two** reasons why the blockage causes damage.

- 1
-
- 2
- [2]

- (iii) One treatment for a blockage in part **X** is a heart transplant.

Write down **one other** treatment for a blockage in part **X**.

..... [1]

- (b) Hearts used in transplants come from donors.

There is a long waiting list for donor hearts.

Write down **two** reasons why there is a long waiting list.

- 1
-
- 2
- [2]

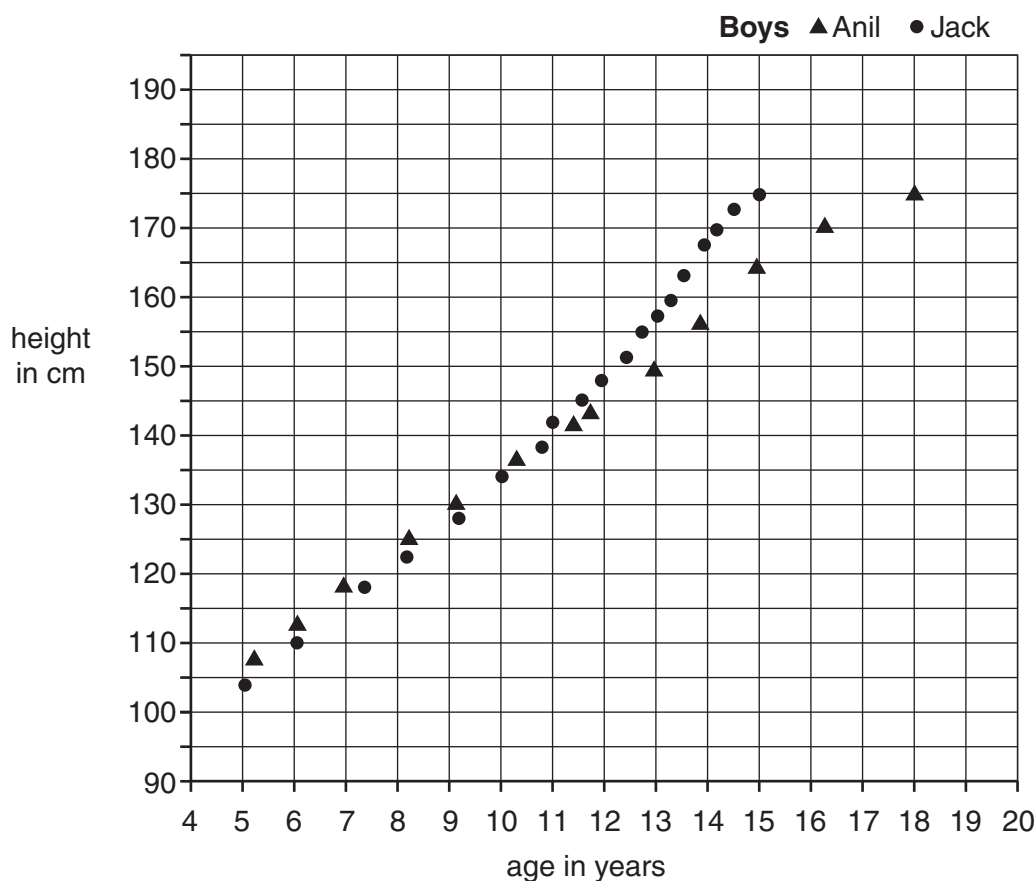
[Total: 6]

- 5 Anil and Jack were born on the same day.

They had their heights measured.

Measurements were taken until each boy reached 175 cm.

The chart shows how their heights changed during these years.



- (a) At what age did Jack become taller than Anil?

..... [1]

- (b) The steepest part of the graph for Jack is between the ages of 11 and 15.

Calculate Jack's average height increase per year between the ages of 11 and 15.

.....

.....

.....

answer cm per year [2]

- (c) Growth is stimulated by human growth hormone.

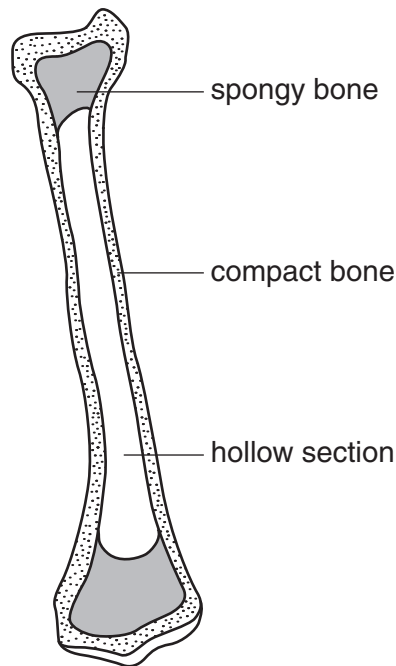
Where in the body is human growth hormone made?

..... [1]

11

- (d) The long bones in the body grow rapidly during growth spurts.

Look at the diagram of a long bone.



- (i) Long bones are hollow. Other bones are solid.

Write down **one** advantage of hollow bones compared to solid bones.

..... [1]

- (ii) Bones in the hip sometimes become damaged.

They can be repaired using a replacement hip joint.

Most replacement hip joints are made with a metal ball and a plastic socket.

The replacement hip joint only lasts for about 20 years.

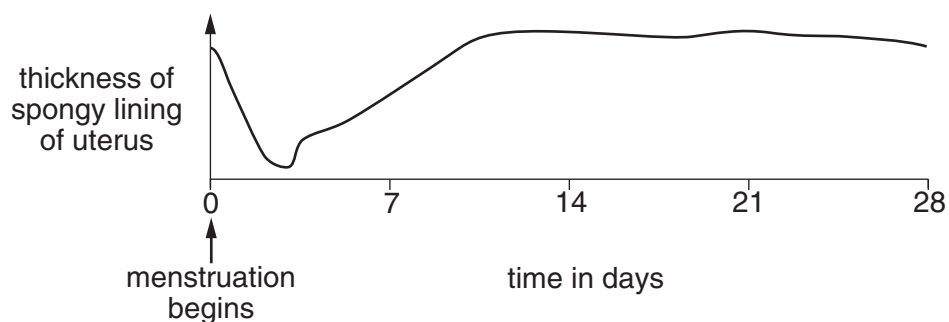
Suggest why.

.....
 [1]

[Total: 6]

12

- 6 Look at the graph. It shows changes that occur during the menstrual cycle.



- (a) The uterus lining changes in thickness during the menstrual cycle.

Write down the names of the **two** hormones which act on the uterus lining to control this change.

1

2 [2]

- (b) FSH is another hormone that affects the menstrual cycle.

This hormone can be used during infertility treatment.

Treatment with FSH can stimulate the release of several eggs at the same time.

Write down **two** reasons why some people are against the use of FSH to treat infertility.

1

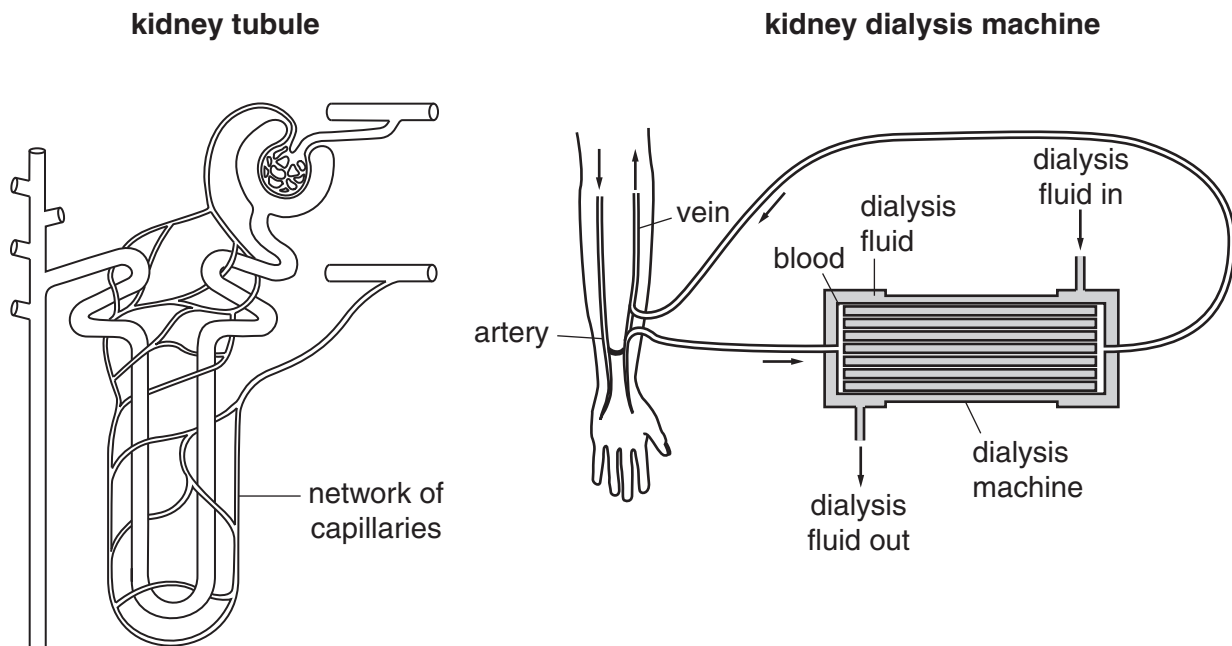
.....

2

..... [2]

[Total: 4]

- 7 The diagrams show a human kidney tubule and a kidney dialysis machine.



- (a) The kidney tubule and the dialysis machine work in similar ways.

Write down **two** similarities in the way they work.

- 1
- 2
- [2]

- (b) In the dialysis fluid, both glucose and salt are at the same concentration as in the blood.

Explain why this is important.

-
-
-
- [2]

[Total: 4]

Section C – Module B6

- 8 (a) Growing tea plants is very important to farmers in India.



Scientists are trying to find ways to increase the yield of the tea plants.

They treat the soil in four fields in four different ways.

They then measure the yield of the tea plants.

The results are shown in the table.

treatment	A digging the soil	B digging the soil and adding compost	C digging the soil and adding worms	D digging the soil and adding compost and adding worms
yield in kg per field per year	3000	5200	5500	6500

- (i) Adding compost increases the yield of the tea plants.

Write down **one** reason why.

..... [1]

15

- (ii) Treatment **D** increases the yield more than treatment **B**.

Calculate the percentage increase in yield of treatment **D** compared with treatment **B**.

.....

answer % [1]

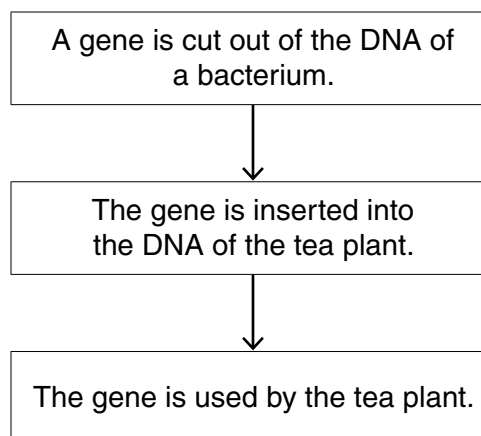
- (iii) Adding compost and worms increases the yield more than just adding compost.

Suggest **one** reason why adding worms increases the yield.

.....
 [1]

- (b) Scientists are now trying to produce genetically engineered tea plants.

This involves three main steps.



- (i) An enzyme is used to cut the gene out of the DNA of a bacterium.

Write down the name of this type of enzyme.

..... [1]

- (ii) Scientists would like to insert a gene into the tea plants that would let them convert nitrogen gas into compounds of nitrogen.

They obtain the gene from nitrogen-fixing bacteria.

Write down the name of **one** type of nitrogen-fixing bacteria.

..... [1]

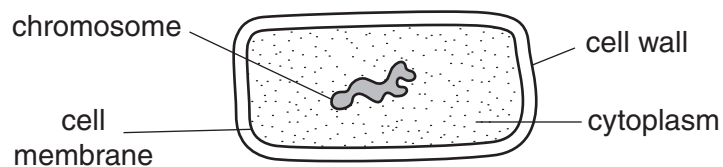
[Total: 5]

Turn over

- 9 (a) Bacteria are used in the production of yoghurt.

One of the bacteria used is *Lactobacillus*.

One of these bacteria is shown in the diagram.



- (i) Bacteria are smaller than plant and animal cells.

Write down **one other** way that bacteria are different from plant and animal cells.

..... [1]

- (ii) The boxes contain features of *Lactobacillus*.

They also show reasons for these features.

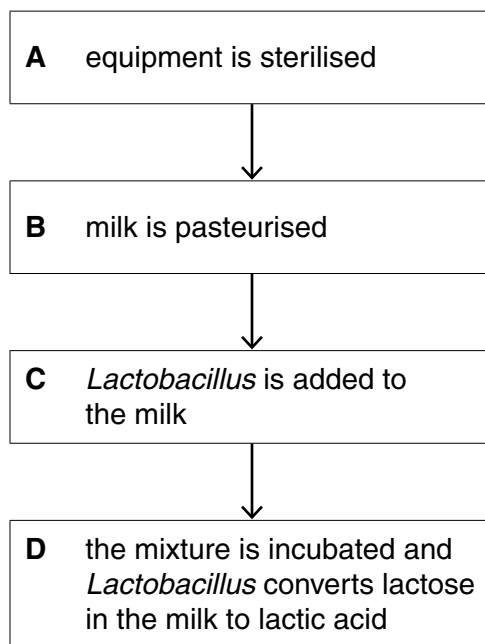
Draw straight lines to join each **feature** to the correct **reason**.

feature	reason
<i>Lactobacillus</i> can increase in numbers rapidly.	It has a cell wall.
<i>Lactobacillus</i> cannot move itself around.	It does not have a flagellum.
<i>Lactobacillus</i> does not burst easily.	It can undergo binary fission.

[1]

17

(b) Making yoghurt involves a number of stages.



(i) Which stage shown in the flow diagram occurs at 78 °C?

Choose **A**, **B**, **C** or **D**.

answer

[1]

(ii) Adult cats are more likely to be ill after drinking milk than after eating yoghurt.

Explain why.

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

[Total: 5]

18

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- 10 (a) Cholera is a disease that is caused by a microorganism.

Which **type** of microorganism causes cholera?

..... [1]

- (b) Outbreaks of cholera can spread rapidly from country to country.

Scientists first thought that cholera could only be spread by people travelling.

Some scientists now think that it can be spread by plankton living in the oceans.

- (i) The number of plankton living in the oceans can vary through the year.

This may be due to pollution or changes in temperature.

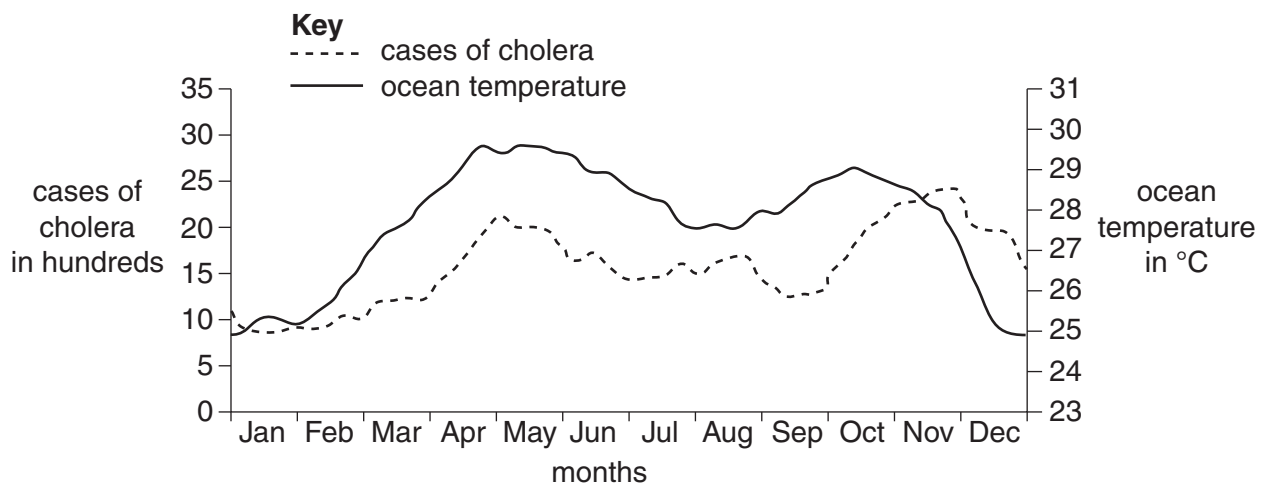
Write down **one other** reason.

..... [1]

- (ii) Bangladesh is a country next to the Indian Ocean.

Scientists plotted a graph to show how the temperature of the Indian Ocean changed over one year.

They also plotted the number of cholera cases in Bangladesh.



Some scientists think that cholera is spread by plankton living in the oceans.

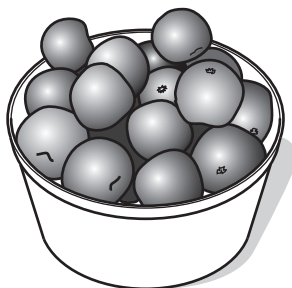
Explain how the graph helps to support this idea.

.....

 [2]

[Total: 4]

- 11 Lucinda collects lots of apples from her apple tree.



She crushes them to get out the apple juice.

- (a) Lucinda wants to make cider from the apple juice.

She buys a packet of yeast from a shop.

Read the label from the packet of yeast.

Turbo Yeast

This is a new type of yeast.

It has an optimum temperature
20 °C higher than other yeasts.

It will also produce cider that
has 18% alcohol compared to
the normal maximum of 13%.

- (i) Cider is produced by the fermentation of apple juice.

Write down the **word** equation for fermentation.

..... [2]

- (ii) Lucinda makes one batch of cider at 20 °C.

She then makes another batch of cider at 40 °C.

How many times faster will the yeast grow at 40 °C?

..... times faster [1]

- (iii) Normal yeast can only produce cider that contains 13% alcohol, even if more sugar is added.

Explain why.

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

21

(b) A friend has told Lucinda that she could turn her cider into a spirit.

(i) What process is used to turn cider into a spirit?

..... [1]

(ii) Lucinda should **not** turn her cider into a spirit.

Why is this?

.....

..... [1]

[Total: 6]

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