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OCR
RECOGNISING ACHIEVEMENT

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Tuesday 31 January 2012 – Morning

GCSE GATEWAY SCIENCE
BIOLOGY B

B632/02 Unit 2 Modules B4 B5 B6 (Higher Tier)

B620820112

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)

Duration: 1 hour

B 6 3 2 0 2

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

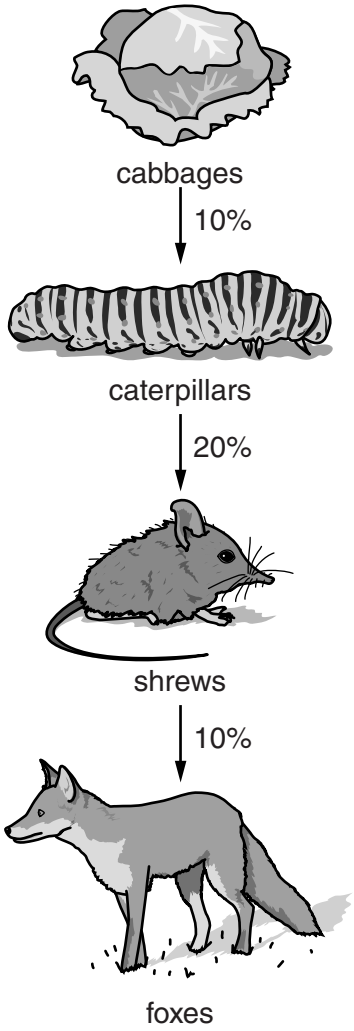
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **20** pages. Any blank pages are indicated.

Answer **all** the questions.

Section A – Module B4

1 Look at the food chain.

The numbers show the percentage of energy at each stage that is transferred to the next stage.



(a) (i) For every 1000 J of energy stored in the cabbages, how many joules of energy are **not** transferred to the caterpillars?

answer ..... J **[1]**

(ii) For every 1000 J of energy stored in the cabbages, how many joules of energy are transferred to the foxes?

Show your working.

answer ..... J **[2]**

(iii) Write down **two** reasons why **not all** the energy in the cabbages is transferred to the foxes.

1 .....

.....

2 .....

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

(b) A farmer has three fields of cabbages.

She wants to kill the caterpillars on her cabbages.

(i) One way to do this is to use chemical pesticides.

Describe **one** disadvantage of using chemical pesticides to kill the caterpillars.

.....

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

(ii) Another way to kill the caterpillars is by using biological control.

Describe **one** disadvantage of using biological control to kill the caterpillars.

.....

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

(c) Cabbages can also be grown using a hydroponics system.

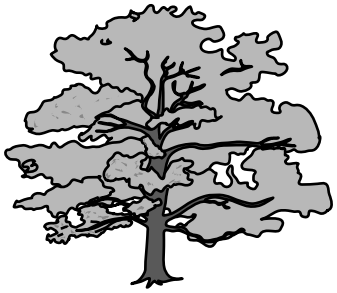
What is a hydroponics system?

.....

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

[Total: 8]

2 Look at the picture of an oak tree.



Water enters an oak tree through its roots and exits through its leaves.

(a) Suggest how oak tree roots are adapted for absorbing water.

.....

.....

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

(b) Write down the name of the type of vessel that carries water up the oak tree's trunk.

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

(c) Water exits an oak tree by transpiration through stomata in the leaves.

(i) Stomata open when the guard cells are turgid.

What is meant by the term **turgid**?

.....

.....

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

(ii) Transpiration happens more rapidly when the temperature is higher.

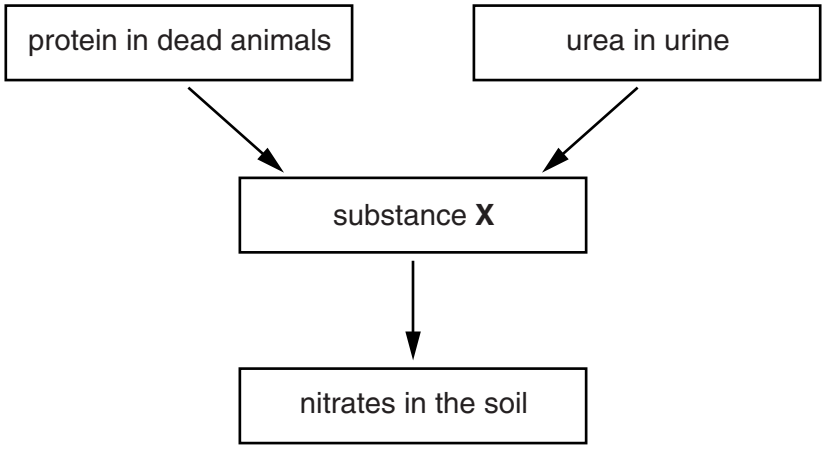
Explain why.

.....

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

[Total: 6]

3 The diagram shows part of the nitrogen cycle.



(a) **(i)** What is substance **X**?

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

(ii) What **type** of bacteria converts substance **X** to nitrates?

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

(b) Complete the following sentences.

Plants absorb nitrogen in the form of nitrates from the soil.

Nitrogen is needed by plants to produce substances such as ..... and proteins.

Some nitrates are formed from nitrogen gas by the action of ..... .

[2]

(c) Plants absorb nitrates by a process called active transport.

(i) How is active transport different from diffusion?

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

(ii) Why do plants need to use active transport to absorb nitrates?

.....

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

[Total: 6]

Section B – Module B5

4 Chronic obstructive pulmonary disease (COPD) is a general term which includes chronic bronchitis and emphysema.

(a) COPD reduces the excretion of a waste gas.

What happens to people with COPD as a result of this reduced excretion?

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

High levels of carbon dioxide build up in the blood. ☐

High levels of carbon dioxide build up in exhaled air. ☐

High levels of oxygen build up in exhaled air. ☐

High levels of oxygen build up in the blood. ☐

[1]

(b) (i) COPD affects the **vital capacity**.

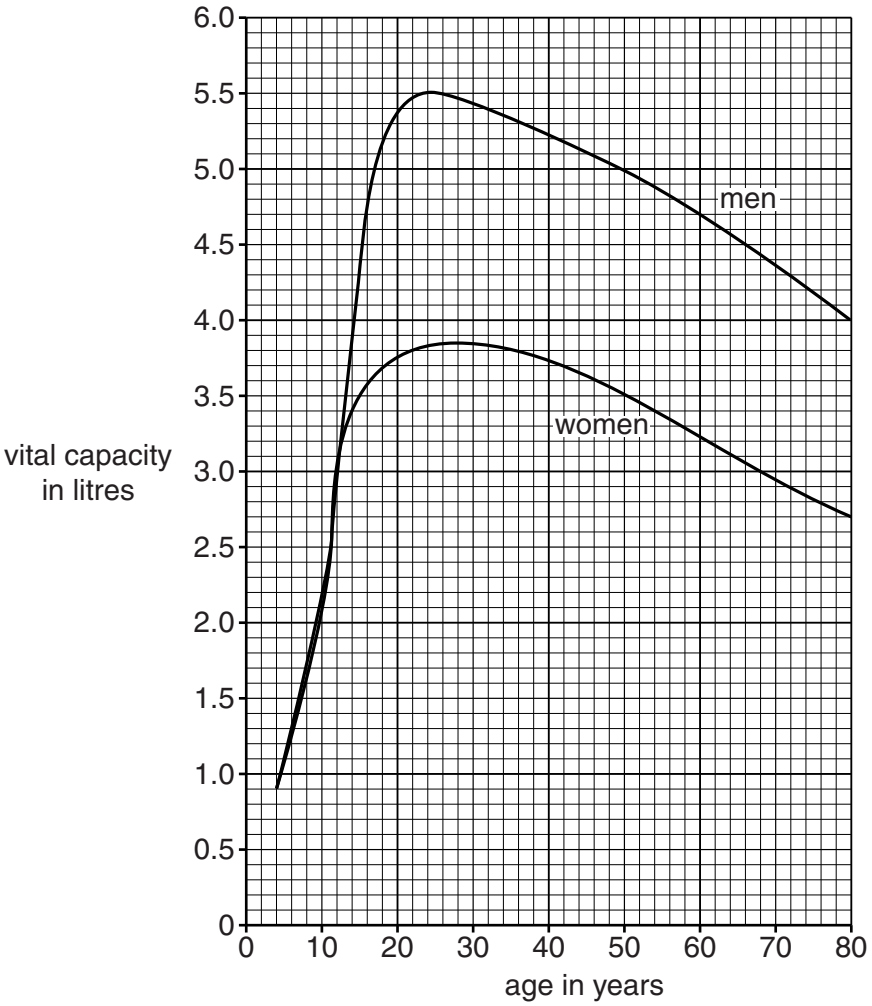
What is vital capacity?

.....

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

(ii) Look at the graph.

It shows the vital capacity for men and women at different ages.



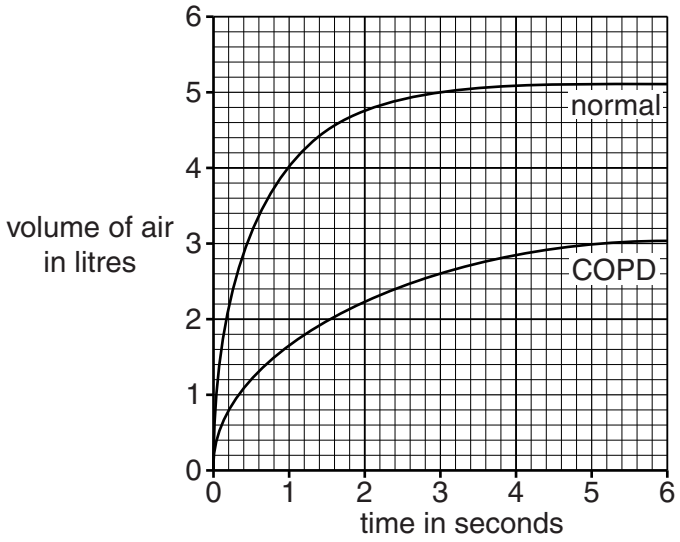
What is the difference in vital capacity between men and women at the age of thirty?

answer ..... litres **[1]**

(iii) People who have COPD have difficulty breathing normally.

The graph shows the volume of air breathed out in six seconds by two forty-year-old men.

One has COPD.



Calculate the percentage **reduction** in air breathed out after three seconds for the man with COPD.

answer ..... % **[2]**

(c) Someone with a severe case of COPD may need a lung transplant.

Write down **one** problem in supplying a suitable donor organ for a transplant.

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

A transplant patient is given a new lung.

(d) New cells in this lung are produced for the transplant to work successfully.

Complete the following sentences to explain why new cells produced in the donated lung may be rejected and how this can be prevented.

Choose your words from this list.

anti-coagulant

anti-diuretic

diffusion

immuno-suppressant

mitosis

respiration

New cells in the transplanted lung are produced by ..... and are genetically identical to the cells in the original donor.

The donor cells are different from the patient's cells.

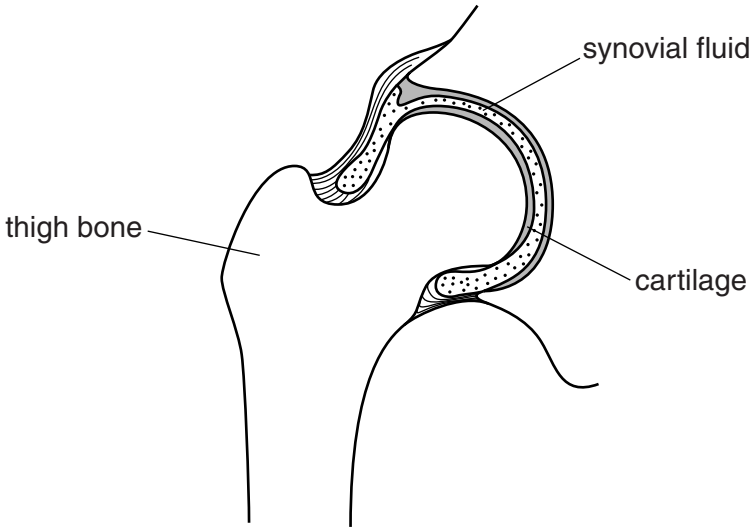
This can cause the patient's white blood cells to attack the new cells in the donated lung.

Treatment with ..... drugs can reduce this problem.

[2]

[Total: 8]

5 Look at the diagram of a hip joint.



(a) (i) In some parts of the body cartilage changes to bone.

How does this process happen?

.....

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

(ii) The hip joint is a synovial joint.

Write down the name of this type of synovial joint and describe the range of movement it provides.

type of joint .....

range of movement .....

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

(b) Elderly people are more likely to get fractures when they fall.

Explain why.

.....

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

(c) Esther is 80 years old.

Esther is recovering from a fractured hip.

Bone came through her skin and damaged blood vessels causing bleeding.

She required a blood transfusion.

Esther is blood group **B**.

Her doctor checked that the blood for the transfusion was a correct match.

Explain why.

In your answer write about

- what is present to cause a reaction between certain blood groups
- what would happen if specific blood groups react with Esther's blood group
- all the blood groups the doctor could use for Esther's transfusion.

.....

.....

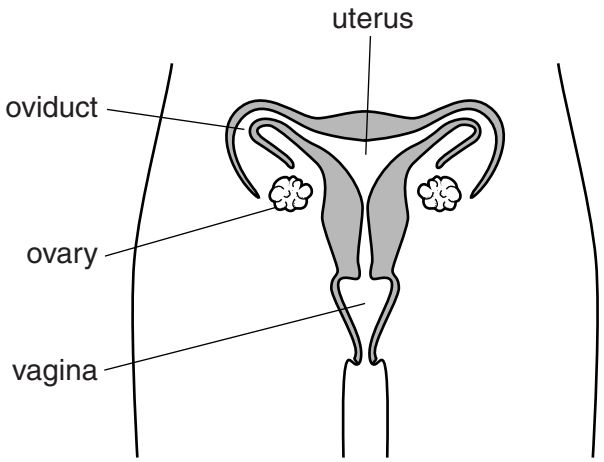
.....

.....

..... **[3]**

[Total: 7]

6 **(a)** The diagram shows the female reproductive system.



female

The female hormone FSH affects an organ in this system during the menstrual cycle.

Put a tick (✓) in the box next to the organ affected.

ovary	☐
oviduct	☐
uterus	☐
vagina	☐

[1]

(b) David and Sue want to have children.

FSH and oestrogen are two hormones controlling Sue's menstrual cycle.

Write down **one other** hormone that controls the menstrual cycle.

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

(c) Sue becomes pregnant.

The midwife checks the heart rate of the developing foetus.

When Sue is anxious her heart beats faster.

The midwife notices that the heart rate of the foetus also increases when Sue is anxious.

Explain why.

.....

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

(d) When Sue is anxious, levels of carbon dioxide in her blood increase.

How does Sue's body detect and respond to this?

detection .....

.....

response .....

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

[Total: 5]

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Section C – Module B6

7 Read the information about the Blue Mountain cider kit.

Blue Mountain cider kit

Blue Mountain cider kits contain fruit grown in the best British orchards. This kit also contains high quality yeast needed to make the alcohol. All you need to do is add sugar and water then leave in a warm place.

The kit should be stored in a dry place until needed.

(a) To make the cider, sugar and water are added.

The mixture is then left in a warm place.

(i) Explain why the sugar is added.

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

(ii) Explain why the mixture needs to be warm.

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

(b) Yeast makes alcohol by a process called fermentation.

Write down the balanced equation for fermentation.

..... → ..... + ... **[2]**

(c) Yeast is a fungus.

Alexander Fleming discovered that a substance made by a fungus could kill some microorganisms.

(i) Write down the name of the substance.

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

(ii) This substance cannot be used to treat an infection of *Entamoeba*.

Explain why.

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

[Total: 6]

8 Look at the picture.

It shows banana plants.

(a) The banana plants have a disease caused by a fungus.

Scientists want to genetically engineer banana plants to protect them from the fungus.

They want to use a gene from onions that are resistant to the fungus.

To move the gene from the onion to the banana plant the scientists use enzymes.

(i) Which **type** of enzyme is used to remove the gene from the onion DNA?

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

(ii) Which **type** of enzyme is used to join the gene from the onion with DNA from the banana plant?

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

(b) Making the banana plants resistant to the fungus is an advantage to the banana growers.

Suggest **one disadvantage** of producing genetically engineered banana plants.

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

(c) Banana plants grow in soil.

Soil contains detritivores, such as earthworms.

(i) Put a tick (✓) in the box next to **one other** type of detritivore found in soil.

humus	☐
centipede	☐
slug	☐
springtail	☐

[1]

(ii) Earthworms improve the structure and fertility of soil.

One way they do this is by burying organic matter.

Write down **two other** ways that earthworms improve the soil.

1 .....

.....

2 .....

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

(d) After the bananas have been harvested, the stalk of the banana plant is chopped down.

The stalk can then be used in a digester to make biogas.

(i) Biogas is a mixture of gases.

Write down the name of the **main** gas found in biogas.

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

(ii) Explain the advantages of producing and using biofuels instead of fossil fuels.

.....

.....

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

[Total: 9]

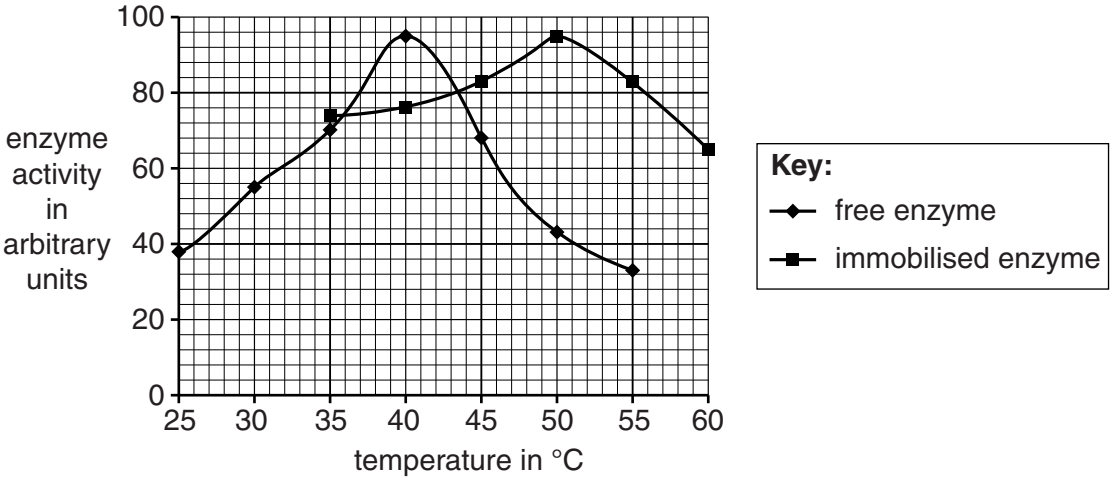
9 Lawrence and Waseem are investigating an enzyme.

They measure the activity of the enzyme over a range of temperatures.

First they use the enzyme immobilised inside beads.

Then they repeat the experiment with the enzyme free in solution.

The graph shows their results.



(a) Use data from the graph to answer these questions.

(i) The immobilised enzyme and free enzyme have the same activity at two temperatures.

Write down the **two** temperatures.

answer ..... °C and ..... °C **[1]**

(ii) Immobilising the enzyme affects its activity.

What difference does this make to its activity at the temperatures shown in the graph?

.....

.....

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

(b) Lawrence and Waseem use the enzyme invertase in their experiment.

(i) Write down the **name** of the sugar they used in their experiment.

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

(ii) To measure the activity of the enzyme, they tested for the presence of another sugar.

Suggest the name of this sugar.

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

[Total: 5]

END OF QUESTION PAPER

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