Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2013

Double Award Science: Biology

Unit B2

Foundation Tier

[GSD41]

GSD41

WEDNESDAY 5 JUNE, AFTERNOON

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **90**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Questions **6(b)** and **7(c)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

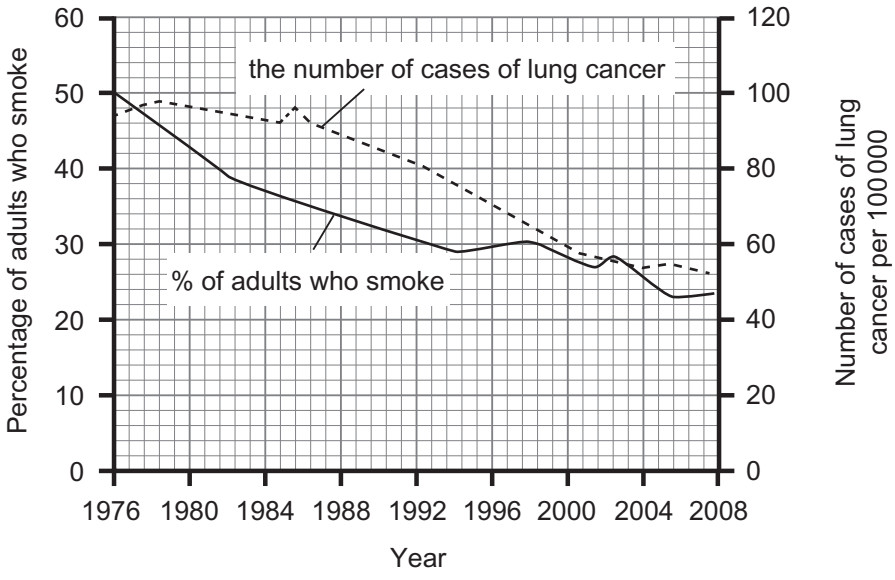
Examiner Only	
Marks	Remark

1 **(a)** Smoking causes harm to individuals and society. Using lines, link each substance in cigarette smoke to its effect on the body.

Substance in cigarette smoke	Effect on the body
nicotine	causes narrowing of the bronchi
tar	reduces the amount of oxygen carried in the red blood cells
carbon monoxide	affects the heart rate

[2]

(b) The graph shows how the percentage of adults who smoke and the number of cases of lung cancer in the UK have changed from 1976 to 2008.



© Source: Cancer Research UK, http://info.cancerresearchuk.org/cancerstats/types/lung/smoking/lung-cancer-and-smoking-statistics, 16 July 2012.

(i) Describe two trends shown in the graph.

1. _____

2. _____ [2]

(ii) Suggest **one** change in legislation (the law) that has helped to bring about the change in the percentage of adults who smoke.

_____

_____ [1]

(iii) Which substance in cigarette smoke causes lung cancer?

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

(c) Doctors are becoming increasingly concerned about the amount of alcohol that young people drink.

Suggest one effect of excess drinking on

an individual's health. _____

society. _____ [2]

(d) Mary does not drink any alcohol on weekdays, but regularly drinks eight small bottles of alcopops on a Saturday night.

- A small bottle of alcopops contains 1.1 units of alcohol.
- The safe daily recommended intake of alcohol for a woman is 2–3 units.
- Mary does not drink more than the safe weekly recommended intake of alcohol for a woman (14–21 units).
- Mary is classified as a binge drinker.

(i) Use the information to explain why Mary is classified as a binge drinker.

_____

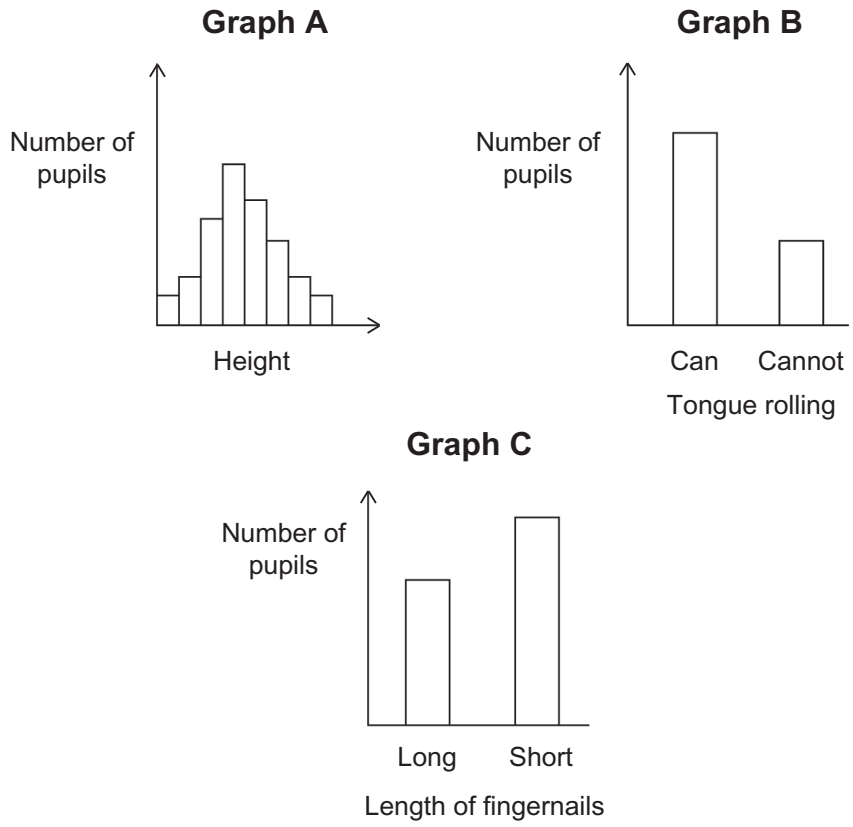
_____ [2]

(ii) Suggest two strategies that could be taken to encourage young people like Mary to reduce their alcohol intake.

1. _____

2._____ [2]

2 The graphs show data relating to three characteristics of pupils in a class.



(a) Some characteristics are controlled by genes. What is a gene?

_____

_____ [2]

(b) Name one characteristic shown in the graphs which is **not** normally controlled by genes.

_____ [1]

(c) Name one characteristic shown in the graphs which is controlled by genes **and** the environment.

_____ [1]

(d) Name the type of variation shown by height.

_____ [1]

Examiner Only

Marks	Remark

3 Cell division takes place by mitosis or meiosis.

Complete the table by placing a tick (✓) if the feature is correct or an (✗) if the feature is not correct.

Feature	Type of cell division	
	Mitosis	Meiosis
Exact copy made of cell		
Used to replace damaged cells		
Produces 4 haploid cells		

[3]

Examiner Only	
Marks	Remark

4 The length of hair in cats is an inherited characteristic controlled by genes.

Examiner Only	
Marks	Remark

© *Fuse / Thinkstock*

The allele for long hair is dominant to the allele for short hair.
Let H represent the allele for long hair.
Let h represent the allele for short hair.

(a) Use a Punnett square to show the possible offspring produced by breeding a heterozygous long haired cat with a short haired cat.

[4]

(b) Give the phenotypes of the offspring and the ratio of the phenotypes.

Phenotypes _____ and _____

Ratio _____ [2]

Examiner Only	
Marks	Remark

5 A group of pupils carried out an investigation into osmosis in carrot tissue.

The pupils cut carrot cylinders of similar size and weighed them.

They placed each cylinder into a different percentage concentration of sugar solution.

They left the cylinders for 24 hours, removed them, dried their surfaces and recorded the final masses in the table below.

Percentage concentration of sugar solution	Initial mass of carrot cylinder/g	Final mass of carrot cylinder/g	Change in mass/g	Percentage change in mass
0 (water)	6.5	7.3	+0.8	12.3
2	6.2	6.7	+0.5	8.1
4	6.6	6.8	+0.2	3.0
6	6.6	6.5	−0.1	−1.5
8	6.7	6.3	−0.4	−6.0
10	6.7	6.0		

(a) (i) Complete the table by calculating the change in mass and the percentage change in mass for the cylinder in 10% concentration of sugar solution.

Show your working.

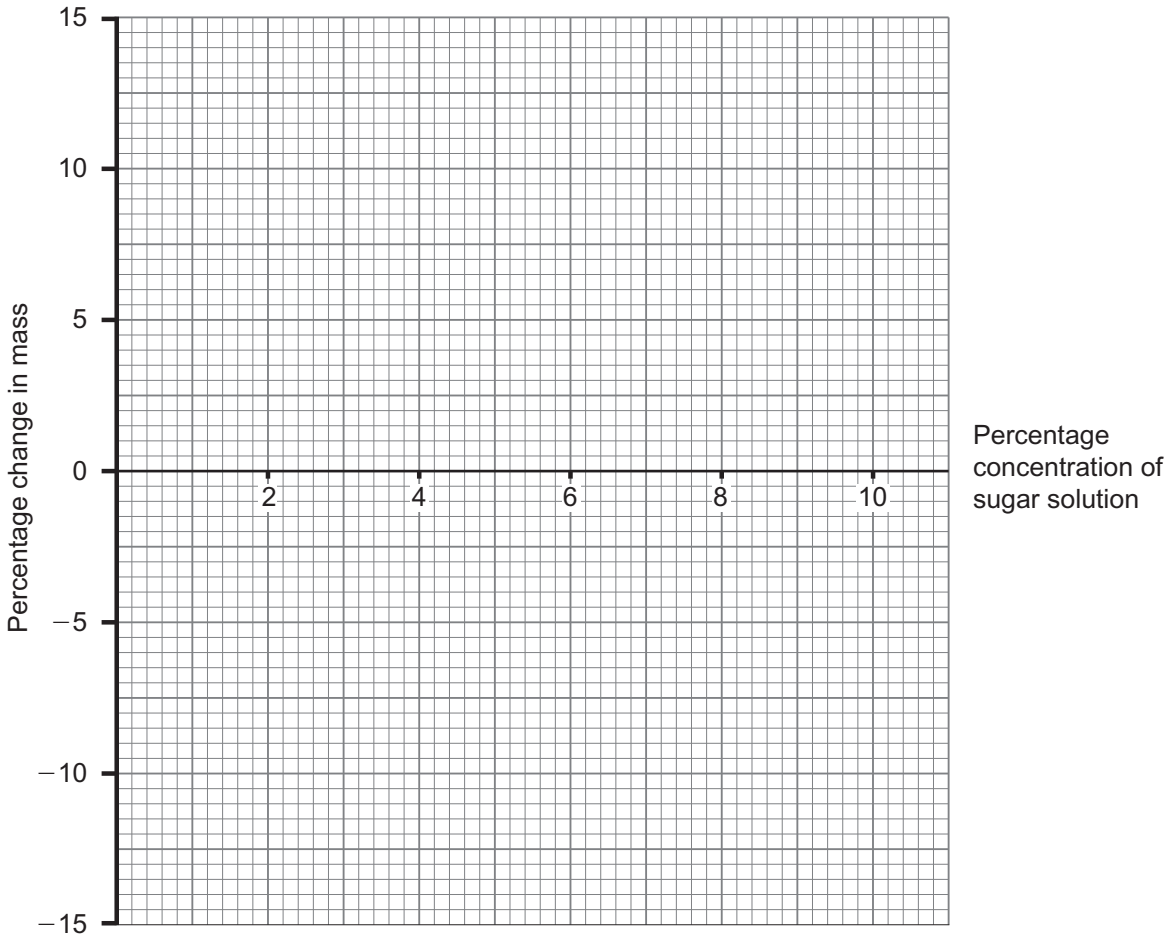
[3]

(ii) Suggest why the pupils calculated the **percentage** change in mass rather than just the change in mass in grams.

_____

_____ [1]

(b) (i) Plot a line graph of percentage change in mass against the percentage concentration of sugar solution.



[3]

(ii) Use your graph to determine the percentage concentration of sugar solution in the cells of the carrot cylinders.
Explain your answer.

Concentration _____ %

Explanation _____

_____

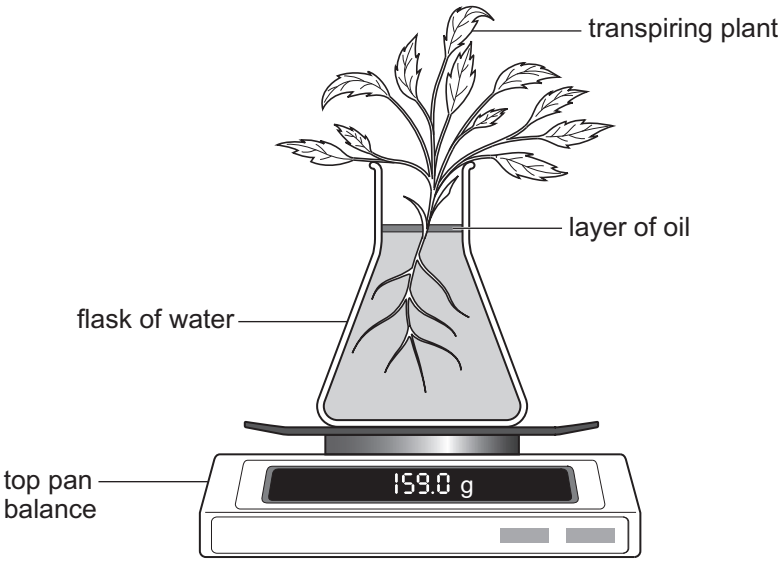
_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 The diagram shows apparatus which may be used to measure the rate of water uptake in plants.



(a) What is the function of the layer of oil?

_____ [1]

(b) Describe how you would use this apparatus to investigate the effect of the surface area of leaves on the **rate** of water uptake.

Name at least one variable that you should control during your investigation.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

Examiner Only	
Marks	Remark

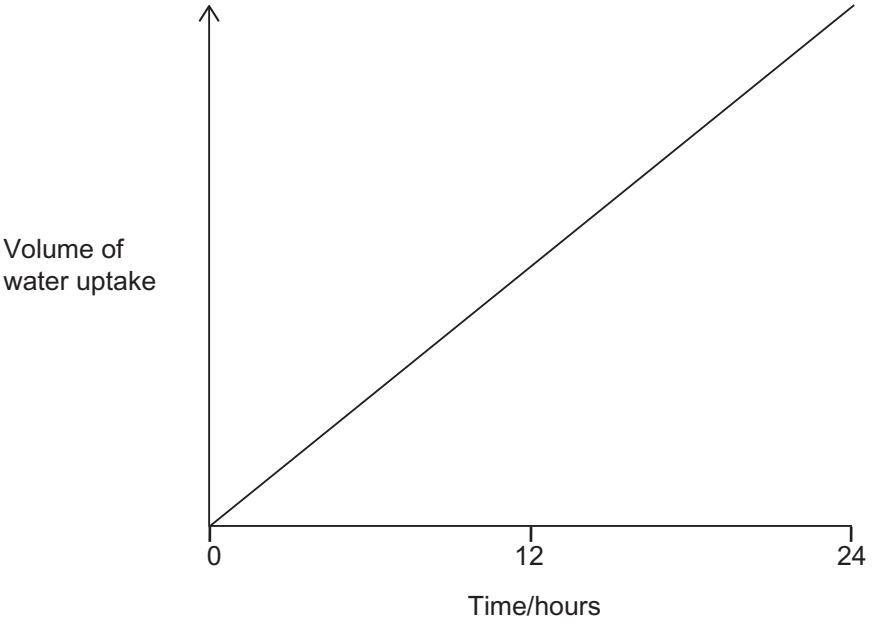
(c) How would you expect the rate of water uptake to change in this investigation? Explain your answer.

Change in water uptake _____ [1]

Explanation _____

_____ [1]

Another type of apparatus used to measure the rate of water uptake in a plant shoot is a bubble potometer. The graph shows the volume of water uptake in a plant shoot placed in a bubble potometer at 20 °C over a 24 hour period.



(d) On the graph, draw the line that you would expect if the investigation was repeated at 30 °C. [2]

(e) Give two uses of water in plants.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

7 **(a)** The table shows some secondary sexual characteristics that develop during puberty.

Some of these characteristics develop in males, some in females and some in both males and females.

(i) Complete the table by placing a tick (✓) to show if the characteristic develops in males only, females only or both.

Secondary sexual characteristics	Males only	Females only	Both
Growth of breasts			
Growth of pubic hair			
Voice deepens			
Hips widen			

[4]

Secondary sexual characteristics are controlled by sex hormones.

(ii) Name the sex hormone produced by the

testes. _____

ovaries. _____ [2]

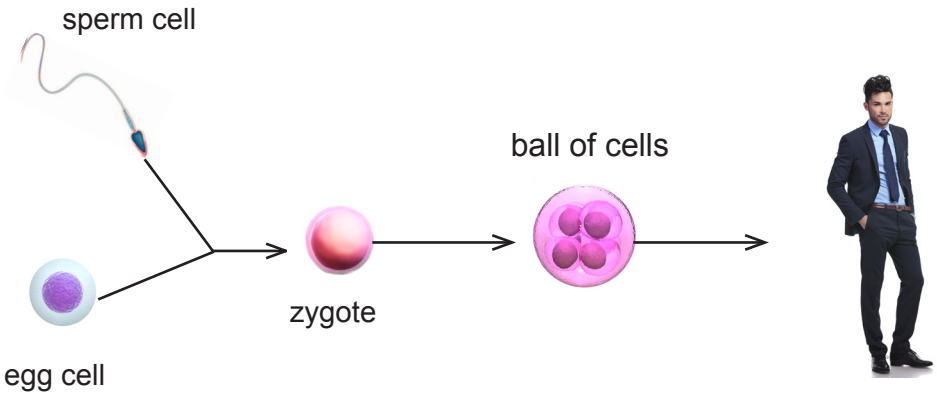
(iii) Sperm cells are produced in the testes.

Describe and explain **one** way in which a sperm cell is adapted for its function.

Adaptation _____

Explanation _____ [2]

The diagram shows the role of a sperm cell in human reproduction.



Images 1, 2, 4 & 5 (c) iStock / Thinkstock and Image 4 (c) Sciepro / Science Photo Library

(b) Complete the passage below about reproduction, using the most appropriate terms from the following list.

mitosis	**placenta**	**foetus**	**vagina**	**amniotic fluid**
haploid	**uterus**	**female**	**oviduct**	**meiosis**

Fertilisation takes place in the _____ . In this process a sperm and egg fuse to form a zygote. The zygote divides by _____ and grows into a ball of cells as it travels to the _____ where it implants and develops into a _____. As this grows, it is cushioned by the _____ and receives dissolved nutrients across the _____. [6]

Examiner Only	
Marks	Remark

(c) Name three methods of contraception and describe how each prevents pregnancy.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

Examiner Only	
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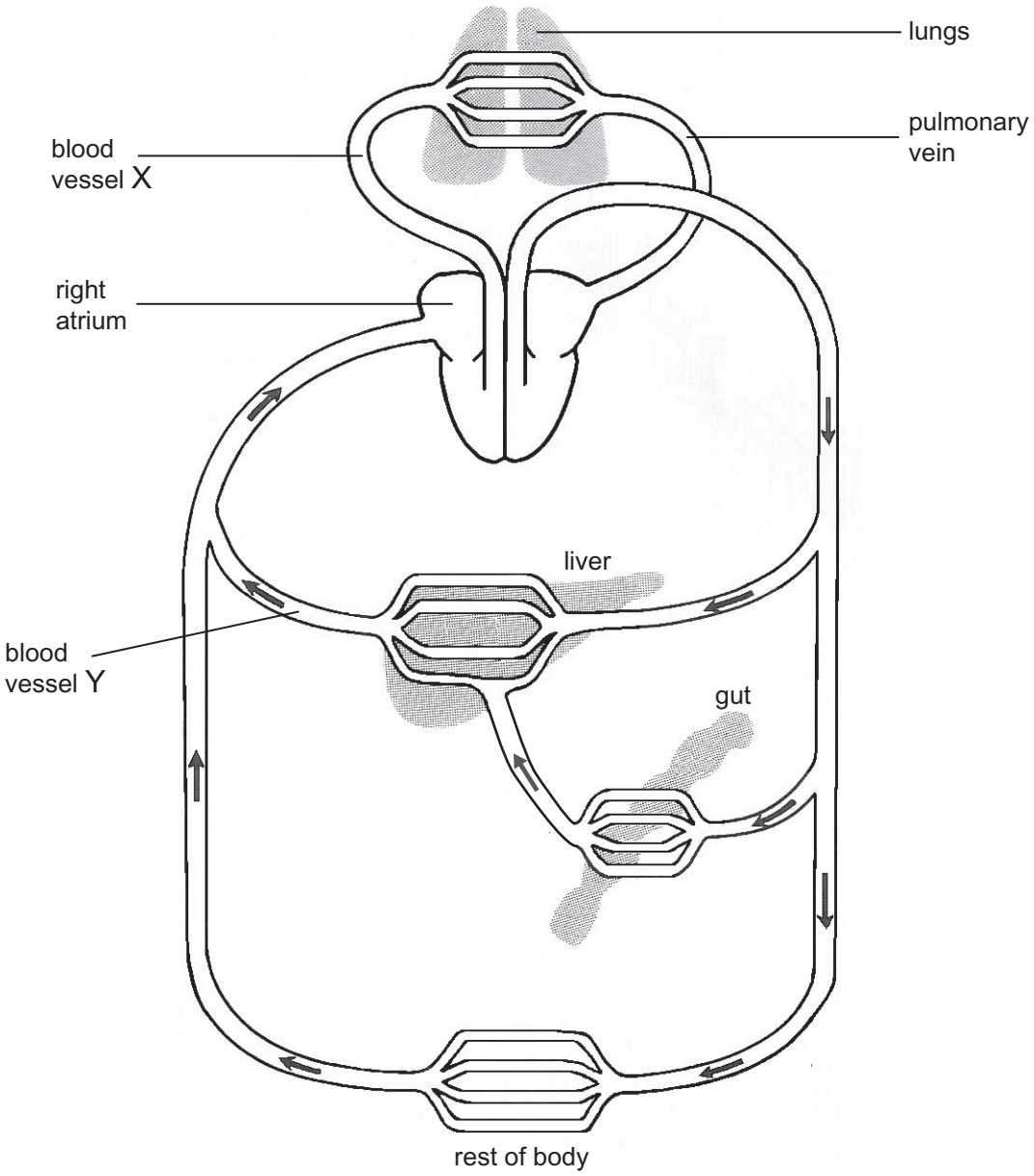
(Questions continue overleaf)

Examiner Only	
Marks	Remark

8 **(a)** The diagram shows some of the blood vessels in the body.



(i) Explain why this circulation is called a double circulation.

_____

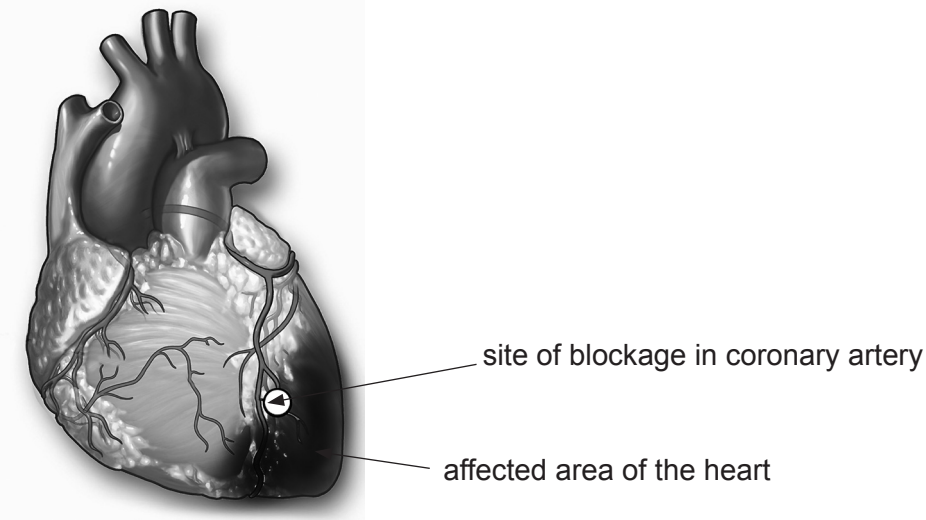
_____ [2]

(ii) Name blood vessels X and Y.

X _____

Y _____ [2]

(b) The diagram shows the site of a blockage in the coronary artery of the heart which can cause a heart attack.



(i) Name the substance that blocks the coronary artery.

_____ [1]

(ii) Explain why this blockage can cause a heart attack.

_____

_____

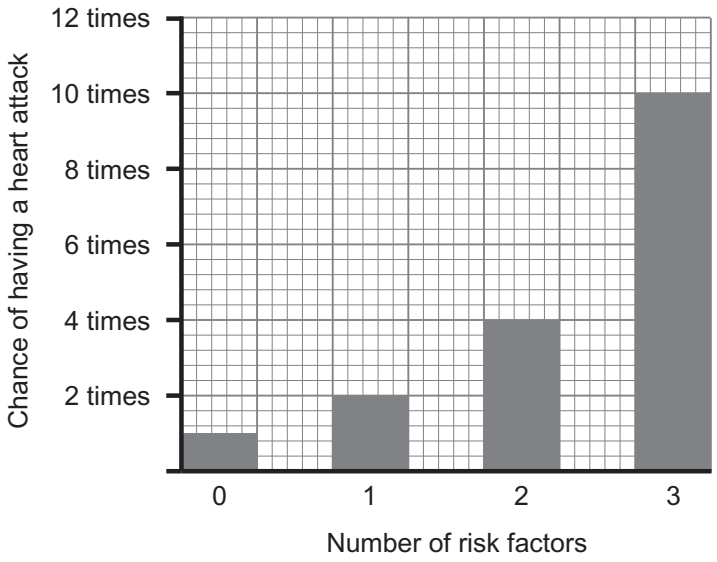
_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

Certain risk factors increase your chance of having a heart attack. The graph shows how the number of risk factors affect the chance of someone having a heart attack.



Source: National Heart, Lung and Blood Institute; National Institutes of Health; U.S. Department of Health and Human Services.

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

(iii) Eddie is a smoker who is obese and doesn't exercise.
By how many times has he increased his chance of having a heart attack?

_____ [1]

(iv) Amy's lifestyle has two risk factors that increase her chance of having a heart attack. Her doctor advises her to make one change in her lifestyle.
Give the decrease in chance of Amy having a heart attack if she follows her doctor's advice.

_____ [1]

(c) A blockage in the blood vessels of which organ leads to a stroke?

_____ [1]

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(Questions continue overleaf)

9 **(a)** Complete the table which gives information on some diseases caused by microorganisms.

Disease	Type of disease-causing microorganism	How the disease is spread	Prevention
AIDS	virus	exchange of infected body fluids	
	fungi	direct contact with microorganism e.g. often in swimming pool changing rooms	wear flip flops or keep changing rooms clean and dry
Salmonella		contaminated food	cook food thoroughly and do not mix raw and cooked food
Measles	virus		MMR vaccine

[4]

Examiner Only

Marks	Remark

(b) The body has a number of natural defence systems. They help prevent us from getting disease caused by microorganisms. Complete the table by suggesting how each of the following defence mechanisms helps to prevent disease.

Defence mechanism	How it helps to prevent disease
Blood clotting	
Mucous membranes	
Production of phagocytes	

[1]

[1]

[2]

Examiner Only	
Marks	Remark

Examiner Only	
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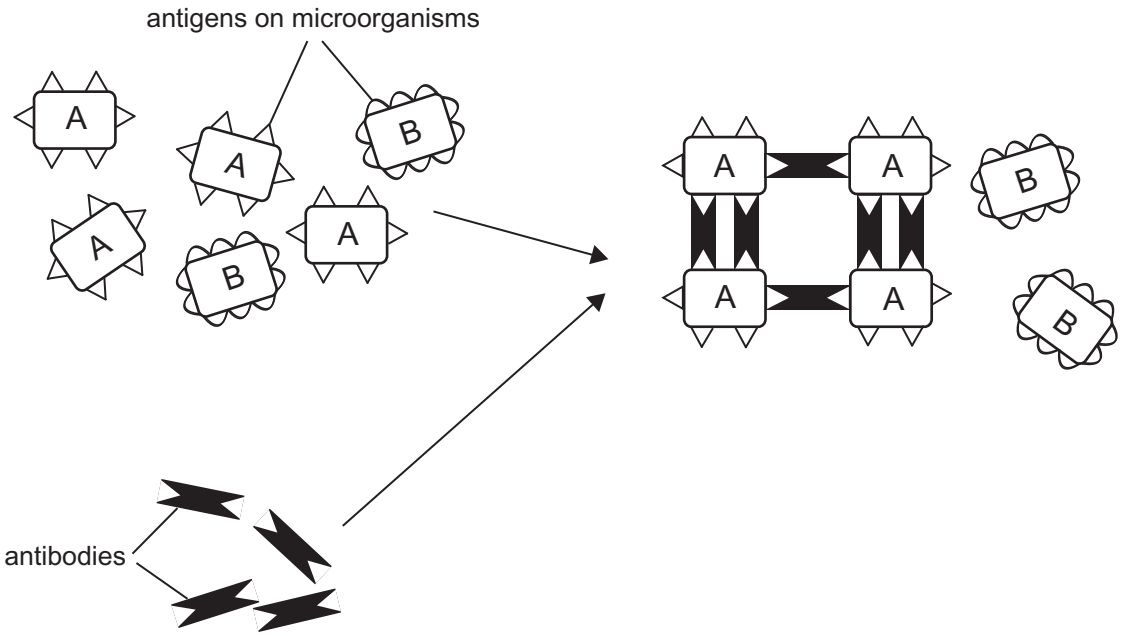
(c) One type of white blood cell produces antibodies to help fight disease caused by some microorganisms.

The diagram shows the effect of antibodies on some microorganisms.



Use the diagram to describe how the antibodies help the body defend against microorganism A.
Explain why these antibodies have no effect on microorganism B.

_____

_____

_____

_____

_____

_____ [4]

THIS IS THE END OF THE QUESTION PAPER

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