



Centre Number

71	
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Candidate Number

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General Certificate of Secondary Education
2014

Double Award Science: Biology

Unit B2

Foundation Tier

[GSD41]

MV18

FRIDAY 6 JUNE 2014, AFTERNOON

TIME

1 hour 15 minutes, plus your additional time allowance.

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 ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **90**.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in **question 8(b)**.

- 1 Diseases can be caused by three types of microorganism; bacteria, fungi and viruses.

(a) Look at the lists below.

Draw lines to link each type of microorganism to the disease that it causes. [2 marks]

Type of microorganism

Disease

Bacteria

Athlete's foot

Virus

Mumps

Fungus

Salmonella

- (b) Which one of the diseases, in the list above, could be caused by eating undercooked chicken? [1 mark]

- (c) Name the type of microorganism, in the list above, that can be treated by an antibiotic such as penicillin. [1 mark]

- (d) Suggest how the spread of athlete's foot can be prevented. [1 mark]

2 Tobacco smoke contains substances that cause harmful effects on the body.

(a) Name three of these substances. [3 marks]

- 1. _____
- 2. _____
- 3. _____

(b) Choose one of these substances and give **two** harmful effects it has on the body. [2 marks]

Substance _____

Harmful effects on the body _____

Cannabis is an illegal drug.

(c) Suggest **one** harmful effect on the individual and **one** harmful effect on society of using cannabis. [2 marks]

Individual _____

Society _____

- 3 (a) Twenty girls had their height measured on their sixteenth birthday. The number of girls in each height range is given in the table below.

Height range/cm	Number of girls
150–154.9	2
155–159.9	6
160–164.9	8
165–169.9	4

- (i) On the grid opposite, plot a histogram using the data in the table.

Add a label and a scale to the y-axis. [4 marks]

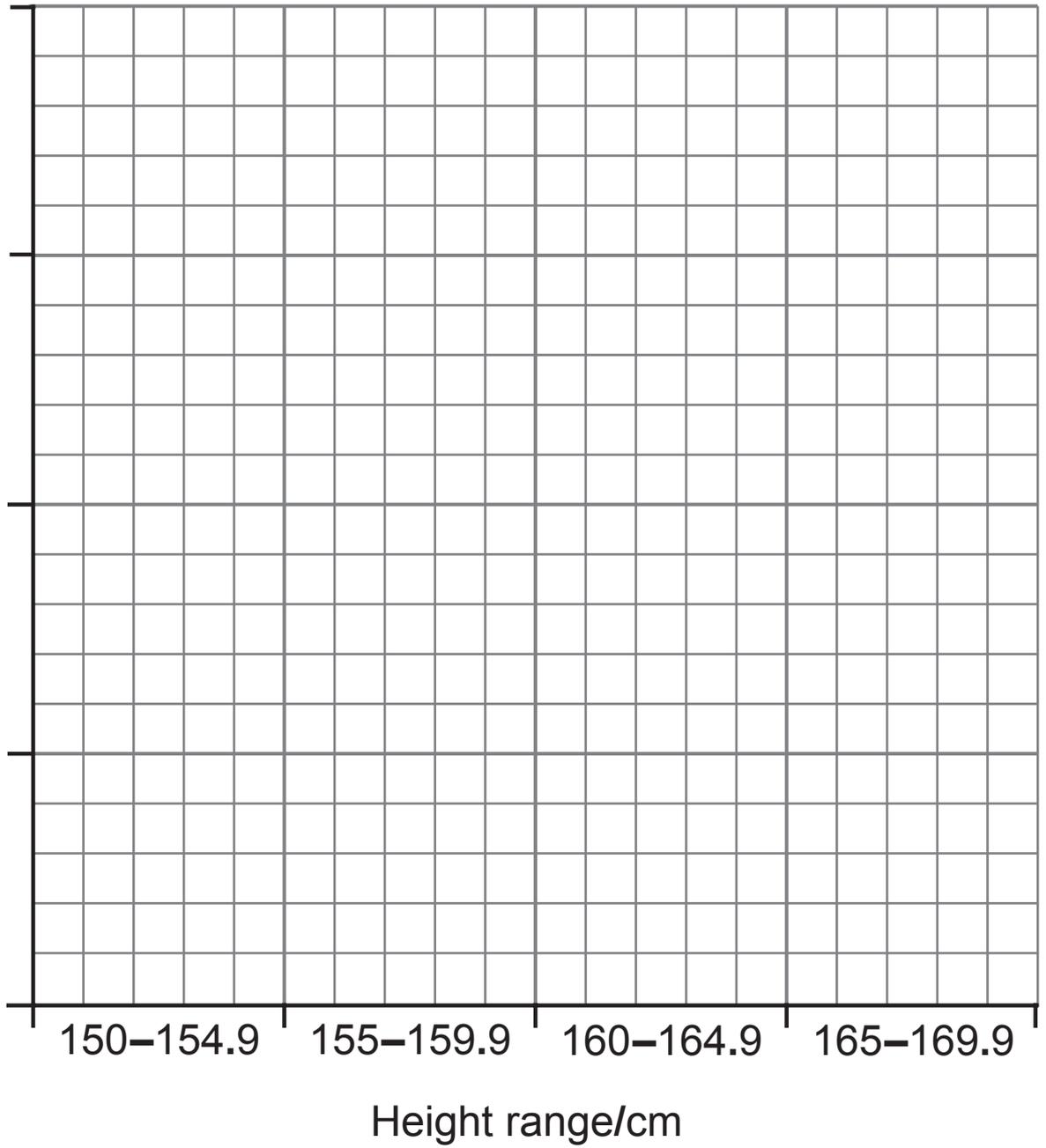
- (ii) Which height range is the most common for these girls? [1 mark]

_____ cm

- (iii) The difference in height is an example of variation. Give the two factors that cause variation in height. [2 marks]

1. _____

2. _____



- (b) The same twenty girls were tested to see if they could roll their tongues.

The photograph shows a girl who can roll her tongue.



60% of the girls were able to roll their tongues.

- (i) What **percentage** of the girls were **not** able to roll their tongues? [1 mark]

_____ %

- (ii) How **many** of the twenty girls were **not** able to roll their tongues? [2 marks]

Show your working.

(c) What type of variation is shown by the girls being able or not able to roll their tongues? [1 mark]

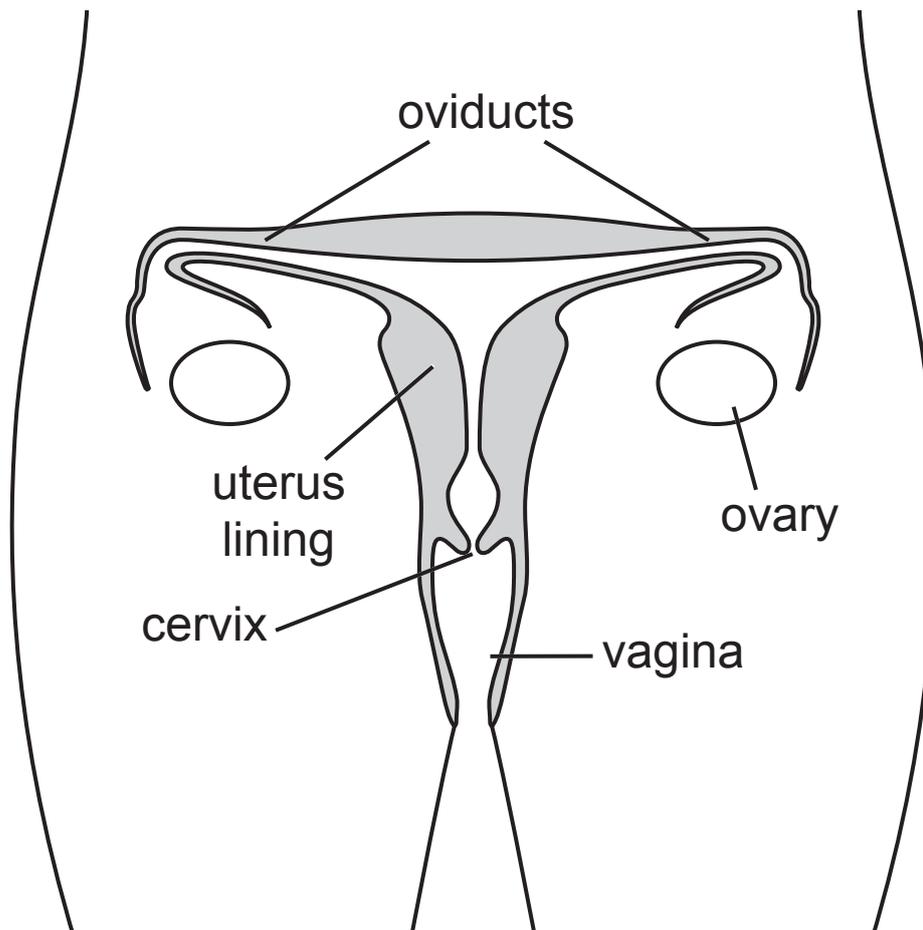
Underline the correct answer from the list below.

continuous

normal

discontinuous

- 4 (a) The diagram below shows part of the female reproductive system.



- (i) On the diagram, draw an X to show where a sperm nucleus fuses with an egg nucleus. [1 mark]
- (ii) Name the process that occurs when a sperm nucleus fuses with an egg nucleus. [1 mark]
-

After a sperm nucleus fuses with an egg nucleus, a zygote is formed. This divides to form a ball of cells.

(iii) Name the type of cell division which occurs to form a ball of cells. [1 mark]

Development of a ball of cells is followed by implantation.

(iv) Name the structure, labelled on the diagram, where implantation occurs. [1 mark]

After implantation, the placenta develops. The placenta allows substances to pass across from the mother to the foetus and from the foetus to the mother.

(v) Name two substances, needed by the foetus, that pass across the placenta **from the mother** to the foetus. [2 marks]

1. _____
2. _____

Harmful substances like alcohol can also pass across the placenta from the mother to the foetus.

(vi) Suggest **one** harmful effect of alcohol on the development of the foetus. [1 mark]

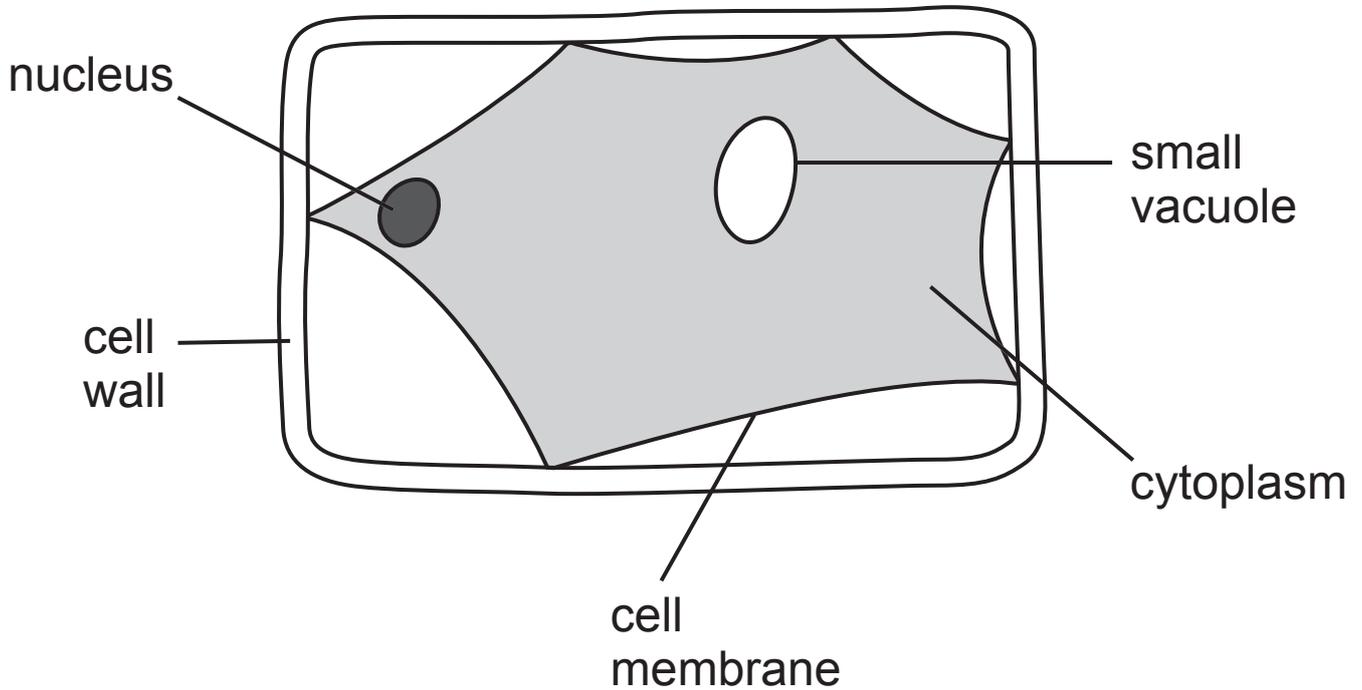
(vii) Suggest **one** way that the government could encourage pregnant women not to drink alcohol. [1 mark]

(b) A sex hormone in females causes secondary sexual characteristics to develop.

Complete the table by naming this hormone, naming the organ where it is produced and describing two secondary sexual characteristics that it causes to develop. [4 marks]

Name of female sex hormone	Organ where produced	Secondary sexual characteristics developed
		1.
		2.

- 5 The diagram below shows a plant cell as seen under a microscope.
The cell had been left in strong sugar solution for 30 minutes.



- (a) What term describes the cell as it appears in the diagram? [1 mark]
-

(b) Redraw the cell, **to the same scale**, as it would appear after being left in water for 30 minutes.
Label the **cell wall**, **cell membrane** and **vacuole** on your drawing. [4 marks]

- 6 (a) Immunity to disease is produced by raised antibody levels in the blood.

The four types of immunity are listed below.

- **Natural innate**
- **Natural acquired**
- **Artificial active**
- **Artificial passive.**

- (i) Which type of immunity, in the list above, best describes catching a disease and then recovering from the disease? [1 mark]
-

- (ii) Which type of immunity, in the list above, best describes a person receiving ready-made antibodies against a disease such as tetanus? [1 mark]
-

(b) The photograph below shows the type of mosquito which can carry the virus that causes the disease yellow fever. When a person is bitten by this type of mosquito, the virus can be passed to that person. Approximately 7% of people who catch yellow fever die from it within three weeks.



Paul is planning to visit Africa and has been advised to be vaccinated against yellow fever before he travels.

Suggest two reasons why Paul should be vaccinated before he travels. [2 marks]

1. _____
2. _____

- (c) The MMR vaccine gives immunity against measles, mumps and rubella.

The table below shows the percentage of the population who received the MMR vaccine in 2011, in the different regions of the United Kingdom.

Region of United Kingdom	Percentage of the population who received the MMR vaccine
England	89.1
Wales	91.5
Scotland	93.2
Northern Ireland	92.9

- (i) Calculate the difference in the percentage of the population who received the MMR vaccine in Northern Ireland compared to England. [1 mark]

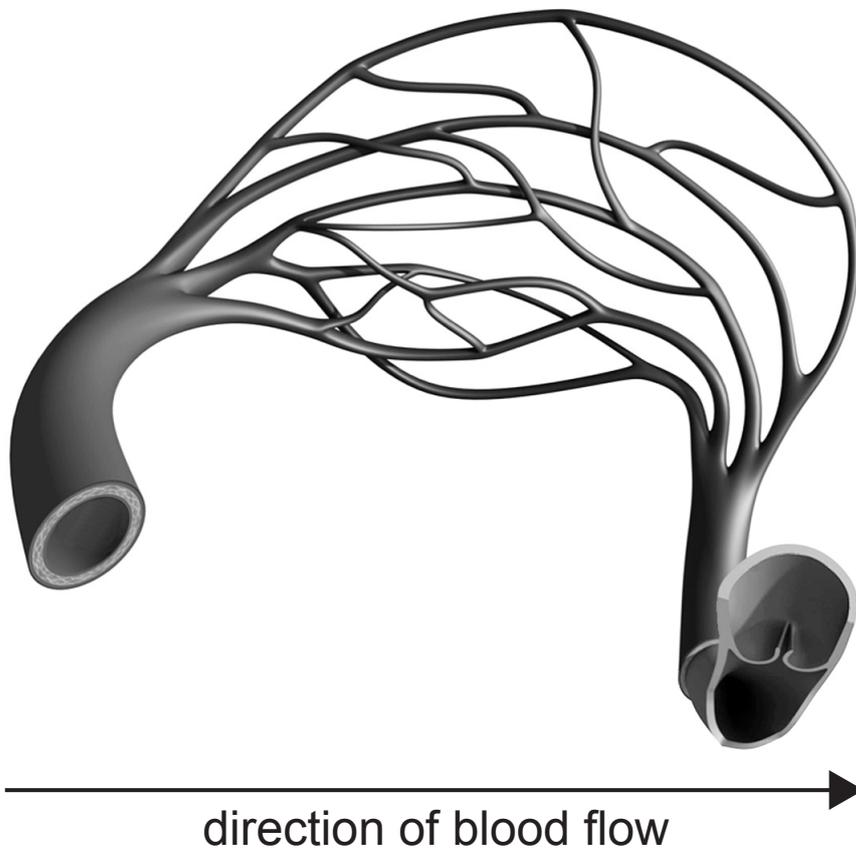
_____ %

In 2011, there were fewer cases of measles in Northern Ireland than in England.

(ii) Suggest **one** reason why there were fewer cases of measles in Northern Ireland than in England, in 2011. [1 mark]

(iii) Name the scientist who developed the first vaccine. [1 mark]

- 7 (a) The diagram below shows an artery and a vein connected by capillaries. Veins have valves. Arteries and capillaries do not have valves.



- (i) Using the information given and your knowledge, label the vein on the diagram. [1 mark]

- (ii) What is the function of valves in a vein? [1 mark]

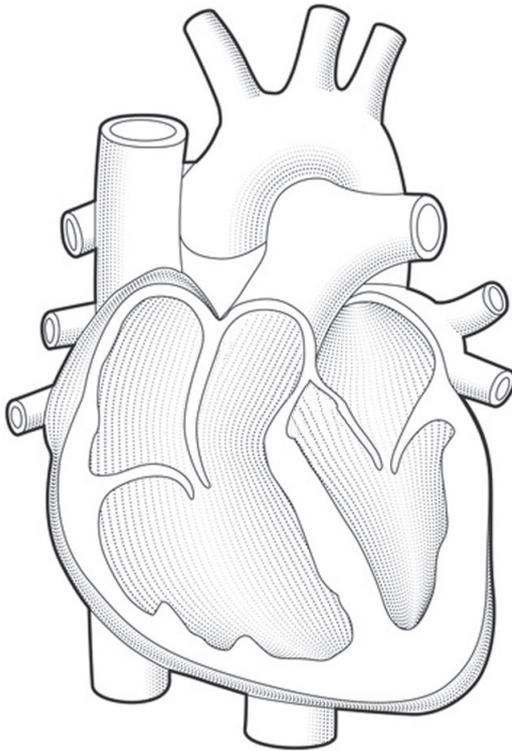
(iii) Give two differences between blood flowing in an artery and a vein. [2 marks]

1. _____

2. _____

(b) The heart pumps blood around the body.

The diagram below shows a section through the heart.



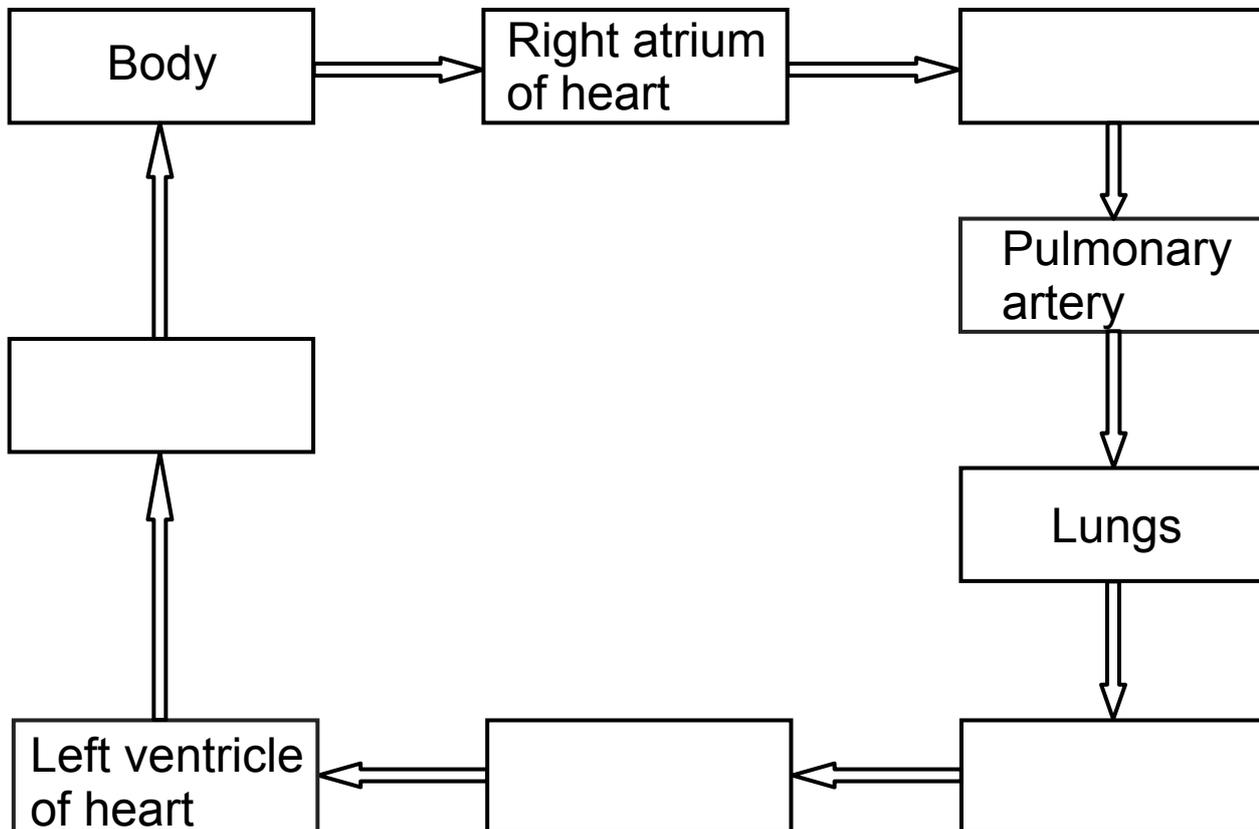
(i) On the diagram, label the left ventricle and the pulmonary artery. [2 marks]

Blood passes through the heart twice during one complete circuit of the body.

(ii) What term is used to describe the passage of blood twice through the heart during one complete circuit of the body? [1 mark]

(iii) In the diagram below, fill in the empty boxes to show the passage of blood through the heart and around the body.

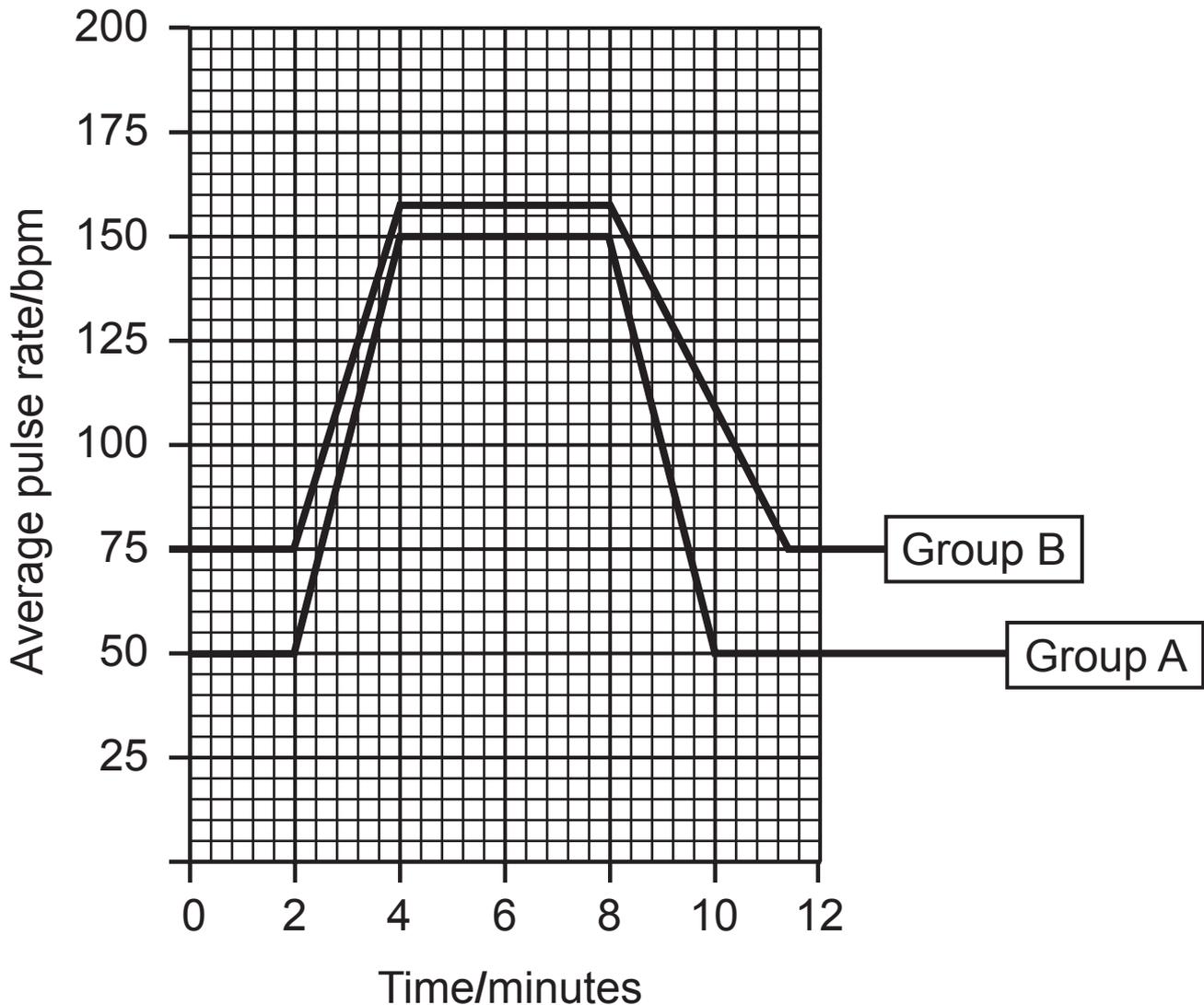
The empty boxes represent heart chambers or blood vessels. [4 marks]



(iv) Name the blood vessel which brings oxygenated blood to the liver. [1 mark]

- 8 (a) The graph below shows the average pulse (heart) rates of two groups of students before, during and after exercise.

The pulse rates are measured in beats per minute (bpm).



- (i) Using the graph, give the time when the exercise started. [1 mark]

_____ min

(ii) Using the graph, give three differences in the average pulse rates between Group A and Group B. [3 marks]

1. _____
2. _____
3. _____

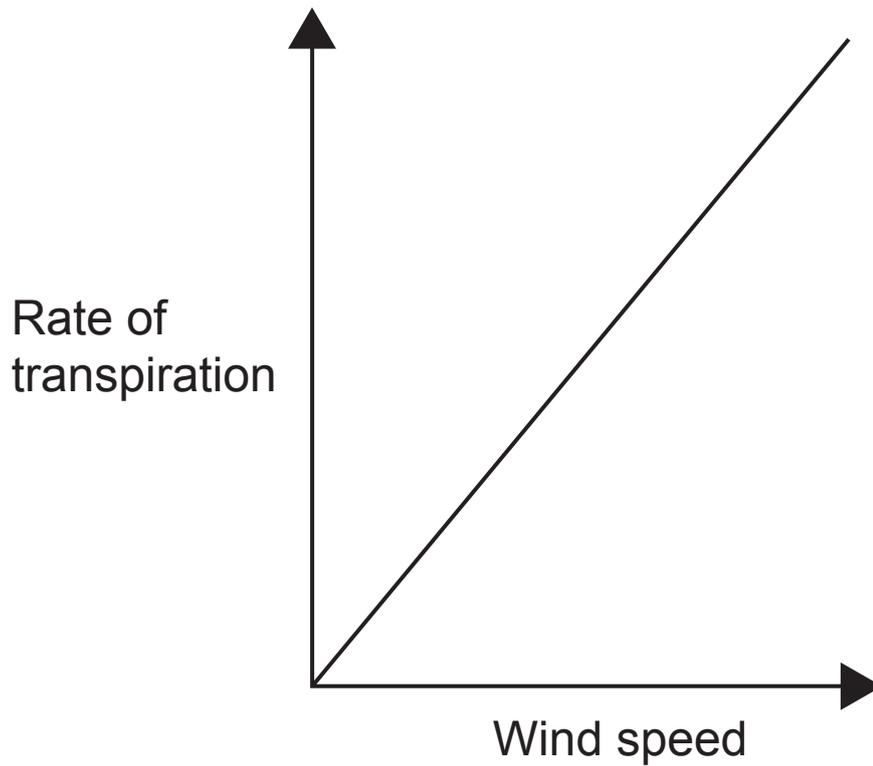
(iii) Students in Group A take regular exercise. Give two ways that the **circulatory system** benefits from regular exercise. [2 marks]

1. _____
2. _____

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(Questions continue overleaf)

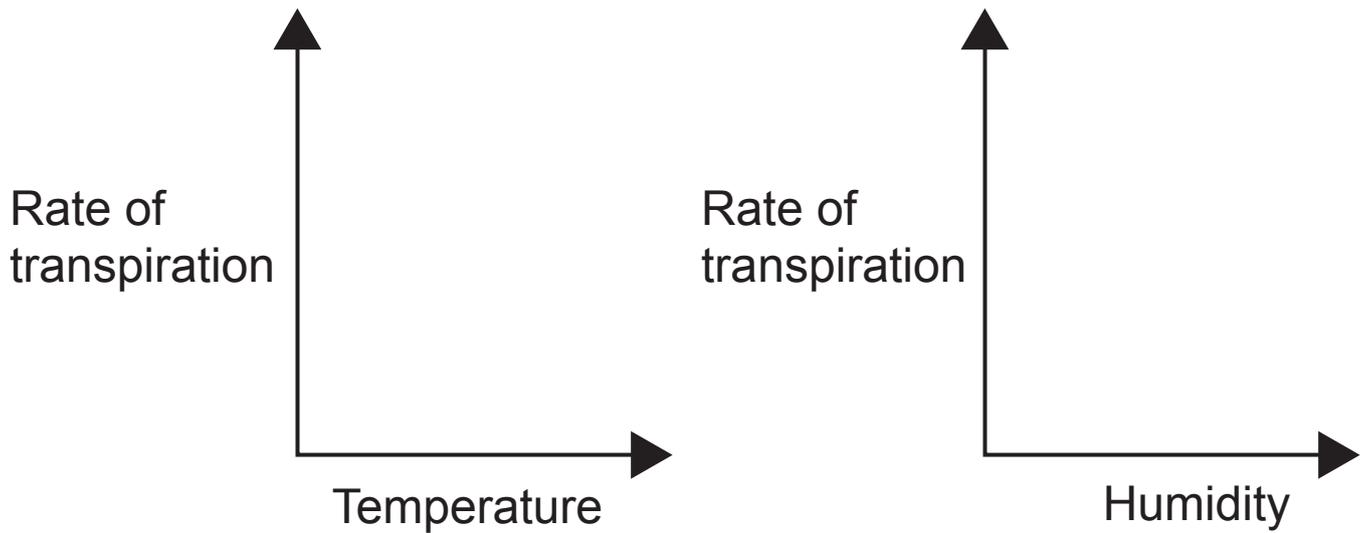
- 9 (a) The graph below shows the effect of increasing wind speed on the rate of transpiration in plants.



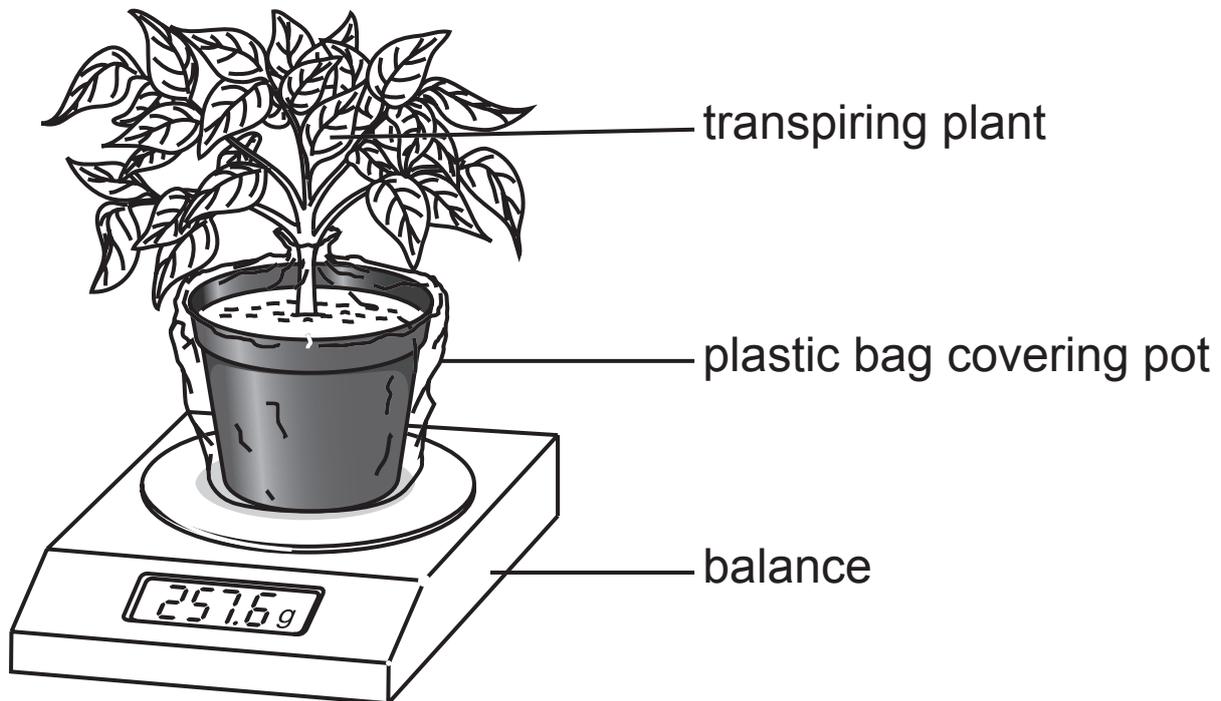
- (i) Using the graph, describe the trend shown. [1 mark]

Temperature and humidity are two other factors that have an effect on the rate of transpiration in plants.

- (ii) On the axes below, draw a line to show the effect of increasing temperature and a line to show the effect of increasing humidity on the rate of transpiration.
[2 marks]



- (b) The diagram below shows apparatus used to investigate the effect of surface area of leaves on the rate of transpiration in a plant.



- (i) Suggest why the pot was covered with a plastic bag.
[1 mark]
-

The plant was weighed, left for **24 hours** and then reweighed.

The **rate** of transpiration was calculated as 3.8 g per hour.

Some leaves were removed from the plant and the experiment was repeated.

The table below shows the result for the second experiment.

Mass of plant at start/g	Mass of plant after 24 hours/g
257.6	185.6

- (ii) Using the data in the table above, calculate the rate of transpiration (in g per hour) in the second experiment. [2 marks]

Show your working.

_____ g per hour

- (iii) Explain why the rate of transpiration is lower when some leaves were removed. [2 marks]

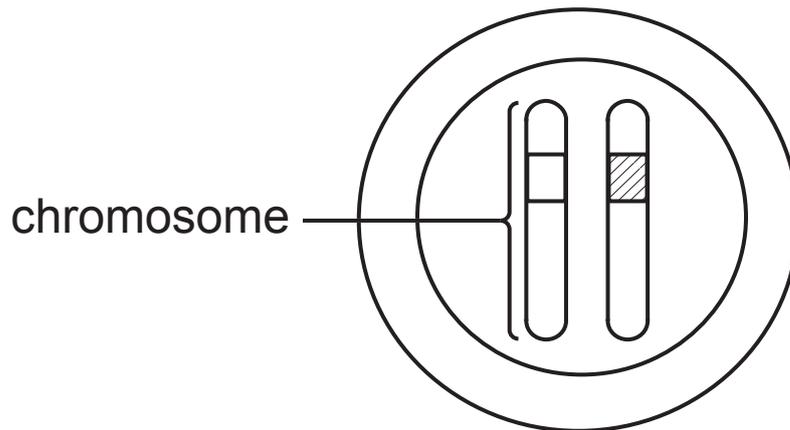
- (iv) Plants use water in transpiration.

Give two **other** uses of water by a plant. [2 marks]

1. _____

2. _____

- 10 (a) The diagram below shows a cell containing a nucleus with two chromosomes.



- (i) Name the molecule that makes up chromosomes.
[1 mark]
-

- (ii) In the space below, draw the cells and chromosomes that would be produced when this cell divides by **mitosis**. [3 marks]

(b) Genes control characteristics in organisms.

Peas can be smooth or wrinkled.

This characteristic is shown in the photograph below.



smooth



wrinkled

Let H represent the allele for smooth peas.

Let h represent the allele for wrinkled peas.

(i) Using a Punnett square, show the possible offspring produced when a heterozygous, smooth pea plant is crossed with a wrinkled pea plant. [4 marks]

(ii) Using your Punnett square, give the ratio of smooth pea plants to wrinkled pea plants. [1 mark]

SOURCES

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 Pg 8 Q4(a) - - - Diagram showing part of the female reproductive system © Focus Educational Software Ltd
 Pg 12 Q5 - - - Diagram showing a plant cell as seen under a microscope © CCEA
 Pg 15 Q6(b) - - - Photograph of a mosquito © Sinclair Stammers/ Science Photo Library
 Pg 18 Q7(a) - - - Diagram showing an artery and a vein connected by capillaries © 3D4Medical.com/ Science Photo Library
 Pg 20 Q7(b) - - - Diagram showing a section through the heart © Paul Wootton/ Science Photo Library
 Pg 22 Q8(a) - - - Graph showing the average pulse rates of two groups of students before, during and after exercise © CCEA
 Pg 28 Q9(b) - - - Diagram showing apparatus used to investigate the effect of surface area on the rate of transpiration in a plant © CCEA
 Pg 30 Q10(a) - - - Diagram showing a cell containing a nucleus with two chromosomes © CCEA
 Pg 31 Q10(b) - - - Photograph of a smooth pea and a wrinkled pea © Walter Eberhart, Visuals Unlimited/ Science Photo Library

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Question Number	Marks
1	
2	
3	
4	
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8	
9	
10	
Total Marks	

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