



General Certificate of Secondary Education  
2016

Centre Number

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Candidate Number

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# Double Award Science: Biology

Unit B2  
Foundation Tier

[GSD41]

\*GSD41\*

**FRIDAY 10 JUNE, MORNING**

## 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.

**You must answer the questions in the spaces provided.**

**Do not write outside the boxed area on each page or on blank pages.**

Complete in blue or black ink only. **Do not write with a gel pen.**

Answer **all thirteen** 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 Question **11(b)**.

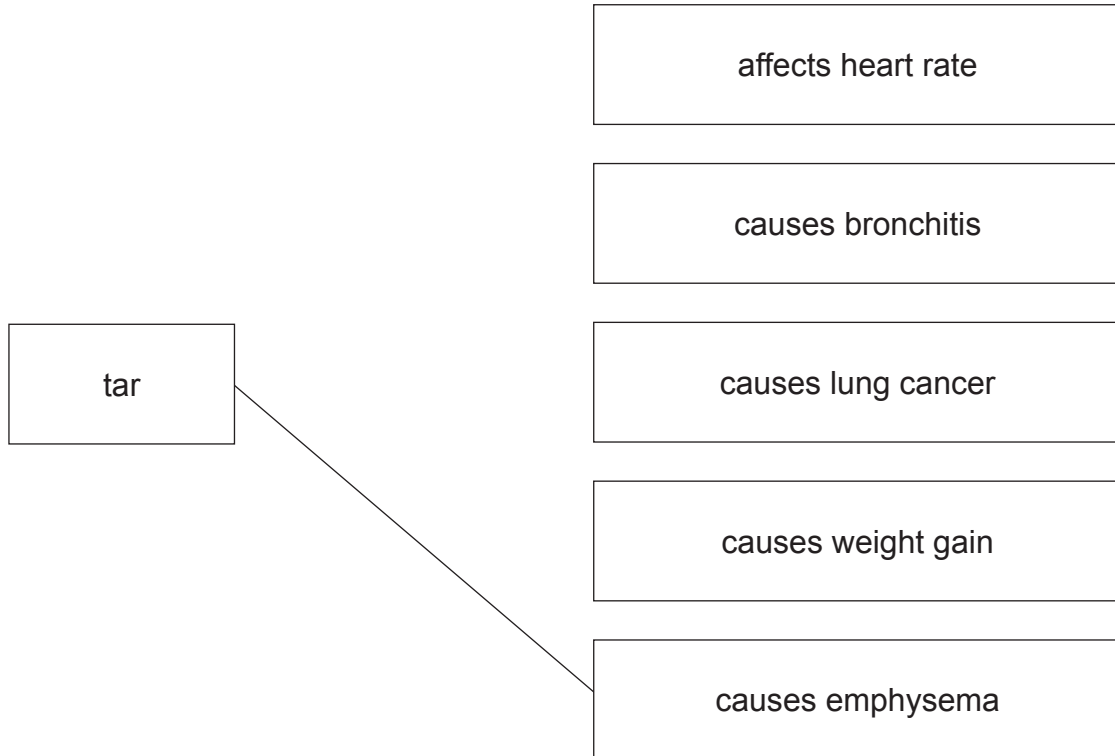
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\*24GSD4101\*

- 1 (a) Tobacco smoke contains several substances that can cause damage to the body. Tar is one of these substances.

The diagram shows a line linking tar to one of its effects on the body. Draw **two** more lines to link tar to its other effects on the body.



[2]

- (b) (i) Name the substance in tobacco smoke that is addictive.

\_\_\_\_\_

[1]

- (ii) Name the substance in tobacco smoke that reduces the amount of oxygen carried by the blood.

\_\_\_\_\_

[1]



2 (a) Complete the definition for transpiration by writing in the spaces below.

Transpiration is the \_\_\_\_\_ of water from leaf cells followed by diffusion through the \_\_\_\_\_ (pores). [2]

(b) (i) Several factors affect the rate of transpiration from leaves.

Complete the table to state how a change in each factor affects the rate of transpiration.

Choose your answer from the list for each factor.

- **increases**
- **decreases**
- **stays the same**

Factor	How it affects the rate of transpiration
Higher wind speed	
Higher temperature	
Larger surface area	
Higher humidity	

[4]

(ii) Name the apparatus used to measure the rate of transpiration from the leaves of a plant.

\_\_\_\_\_

[1]

(c) Give **one** use of water in plants, other than in transpiration.

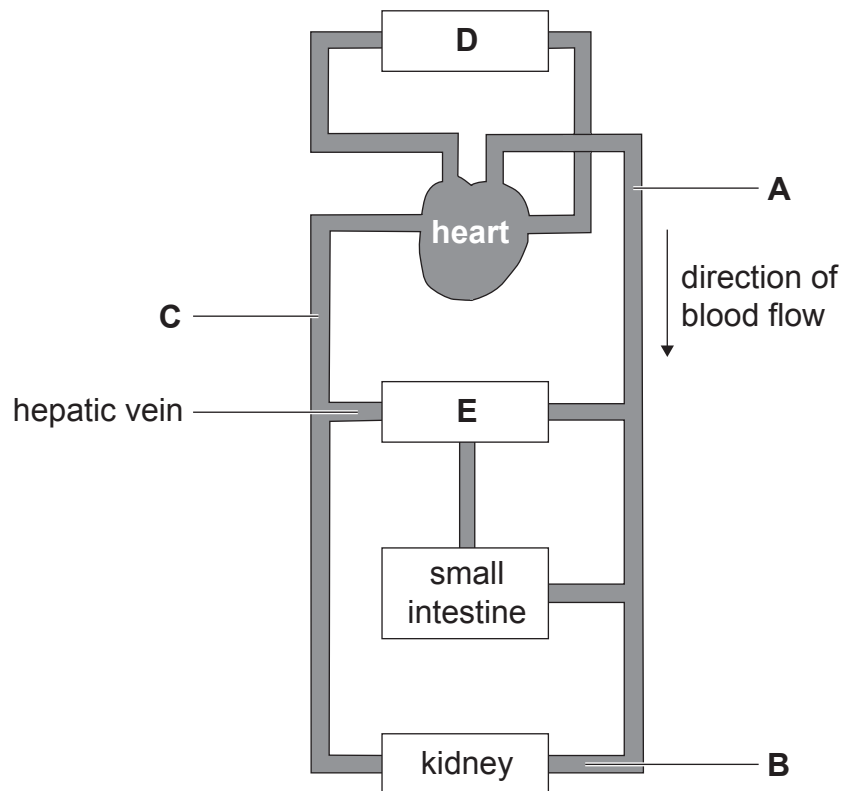
\_\_\_\_\_

[1]

[Turn over



3 The diagram shows part of the circulatory system in the body.



(a) (i) Name blood vessels **A**, **B** and **C**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_

**C** \_\_\_\_\_

[3]

(ii) Draw an arrow on the diagram to show the direction of blood flow in blood vessel **C**.

[1]

(iii) Name organs **D** and **E**.

**D** \_\_\_\_\_

**E** \_\_\_\_\_

[2]



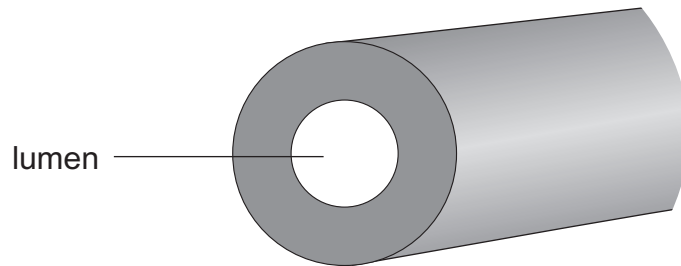
(iv) Name the upper and lower chambers of the heart.

Upper chambers \_\_\_\_\_

Lower chambers \_\_\_\_\_

[2]

(b) The diagram shows a cross section of a blood vessel.  
The centre of the blood vessel, that blood flows through, is called the lumen.



© Chief Examiner

The table gives information about the three types of blood vessels.

Blood vessel	Diameter of lumen/ cm	Rate of blood flow/ cm/s
Vein	0.6	3
Capillary	0.000008	less than 0.1
Artery	0.4	25

(i) Describe how the rate of blood flow in the vein and capillary changes with the diameter of the lumen.

\_\_\_\_\_  
\_\_\_\_\_ [1]

(ii) Name the **type** of blood vessel that allows exchange of materials between the blood and body tissues.

\_\_\_\_\_ [1]

[Turn over



(iii) Name the **type** of blood vessel that carries blood under the highest pressure.

\_\_\_\_\_

[1]

(iv) Name the structures found in veins that prevent the backflow of blood.

\_\_\_\_\_

[1]

(c) If fatty deposits build up in a blood vessel going to the brain it can cause a stroke.

Describe how this build-up of fatty deposits can cause a stroke.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[4]



- 4 Two boys, James and Luke, exercised for ten minutes. The table shows data for the two boys taken before and immediately after exercise. Recovery time is the time taken for the pulse rate to return to the same rate as before exercise.

	James		Luke	
	Before exercise	After exercise	Before exercise	After exercise
Pulse rate/beats per minute	70	160	60	150
Recovery time/minutes		12		7

- (a) Luke is fitter than James. Use the information in the table to describe **three differences** that support this statement.

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[3]

- (b) Give **two** ways the heart benefits from regular exercise.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

[Turn over



- 5 Aseptic techniques are used when carrying out experiments with bacteria. The photograph shows a loop being used to inoculate an agar plate.



© Arno Masee / Science Photo Library

- (a) Explain why the loop would be put into a Bunsen burner flame at the start of the experiment.

\_\_\_\_\_ [1]

- (b) During inoculation the lid of the agar plate was completely removed. Suggest what could happen as a result of this poor aseptic technique.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

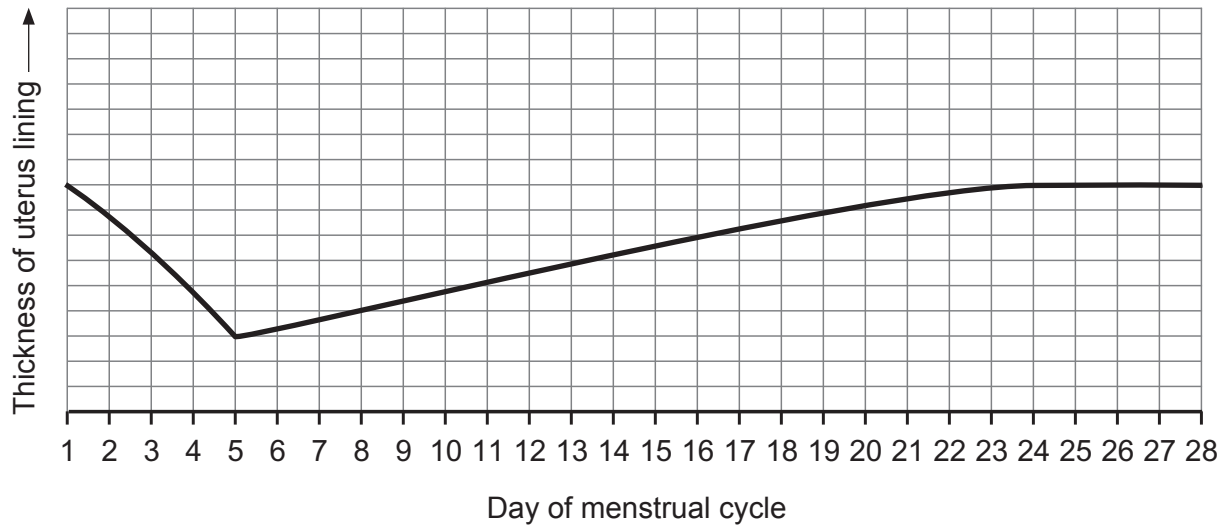
- (c) After inoculation the agar plate was sealed and then incubated at less than 25 °C. Suggest a reason for each of these two steps.

1. Sealed \_\_\_\_\_  
\_\_\_\_\_  
2. Incubated at **less than 25 °C**. \_\_\_\_\_  
\_\_\_\_\_ [2]





- 6 The graph shows how the thickness of the uterus lining varies during a woman's menstrual cycle of 28 days.  
The woman is not pregnant.



Source: Principal Examiner

- (a) Use the graph to give the days when menstruation is occurring.

\_\_\_\_\_ to \_\_\_\_\_ [1]

- (b) Name and describe the event that takes place on day 14 of this menstrual cycle.

Name \_\_\_\_\_

Description \_\_\_\_\_

\_\_\_\_\_ [2]

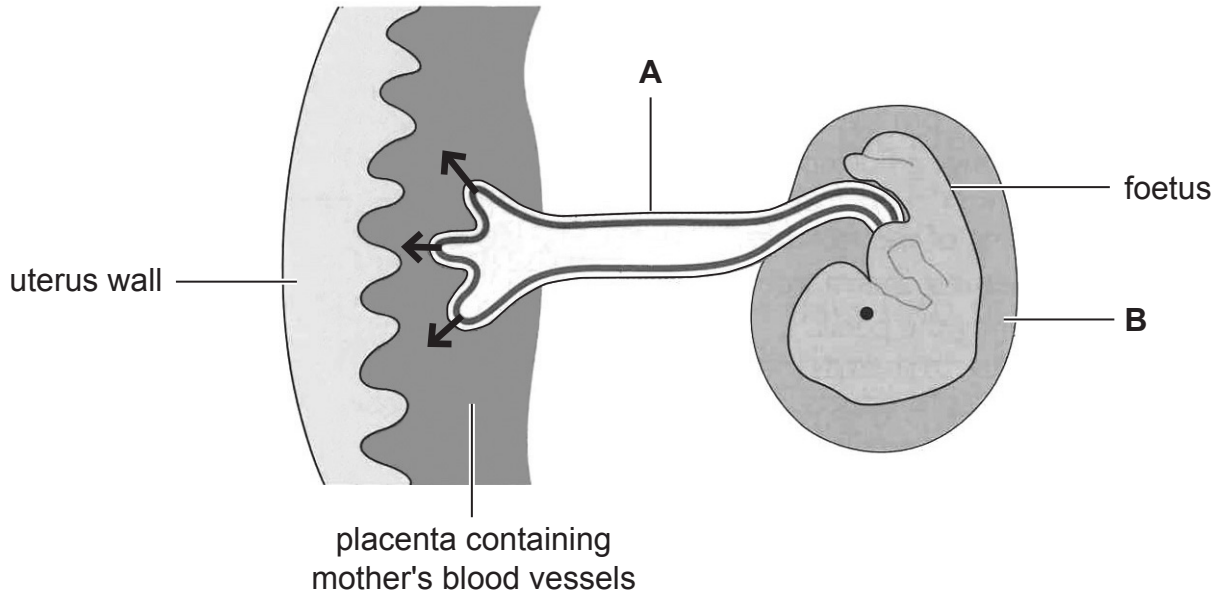
- (c) Suggest what you would expect to happen to the uterus lining after day 28 if the woman became pregnant.

\_\_\_\_\_ [1]

[Turn over



7 The diagram shows a foetus and structures that form in the uterus during pregnancy.



© GCSE Biology for CCEA, 2nd Edition by James Napier. (ISBN: 9780340983805)  
"Reproduced by permission of Hodder Education".

(a) Name structure **A** that links the placenta to the foetus.

\_\_\_\_\_

[1]

(b) (i) Give the function of the placenta and describe how it is adapted for its function.

Function \_\_\_\_\_

\_\_\_\_\_

Adaptation \_\_\_\_\_

\_\_\_\_\_

[2]

(ii) Name **one** substance that passes in the direction shown by the arrows on the diagram.

\_\_\_\_\_

[1]

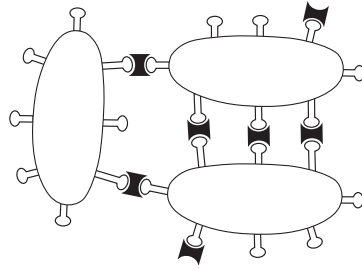
(c) Name structure **B** shown on the diagram.

\_\_\_\_\_

[1]



- 8 (a) The body has a number of defence mechanisms against disease-causing microorganisms. One of these mechanisms is the clumping of microorganisms. The diagram shows a clump of three microorganisms.



Source: Principal Examiner

- (i) On the diagram, label an antigen. [1]

- (ii) Describe the stages that have occurred to produce this clump.

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[3]

- (iii) Microorganisms in a clump cannot easily move. Suggest how this helps in the defence against disease.

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[1]

- (b) After the clump has been formed it is then destroyed by another process. Name and describe this process.

Name \_\_\_\_\_

Description \_\_\_\_\_

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[3]

[Turn over

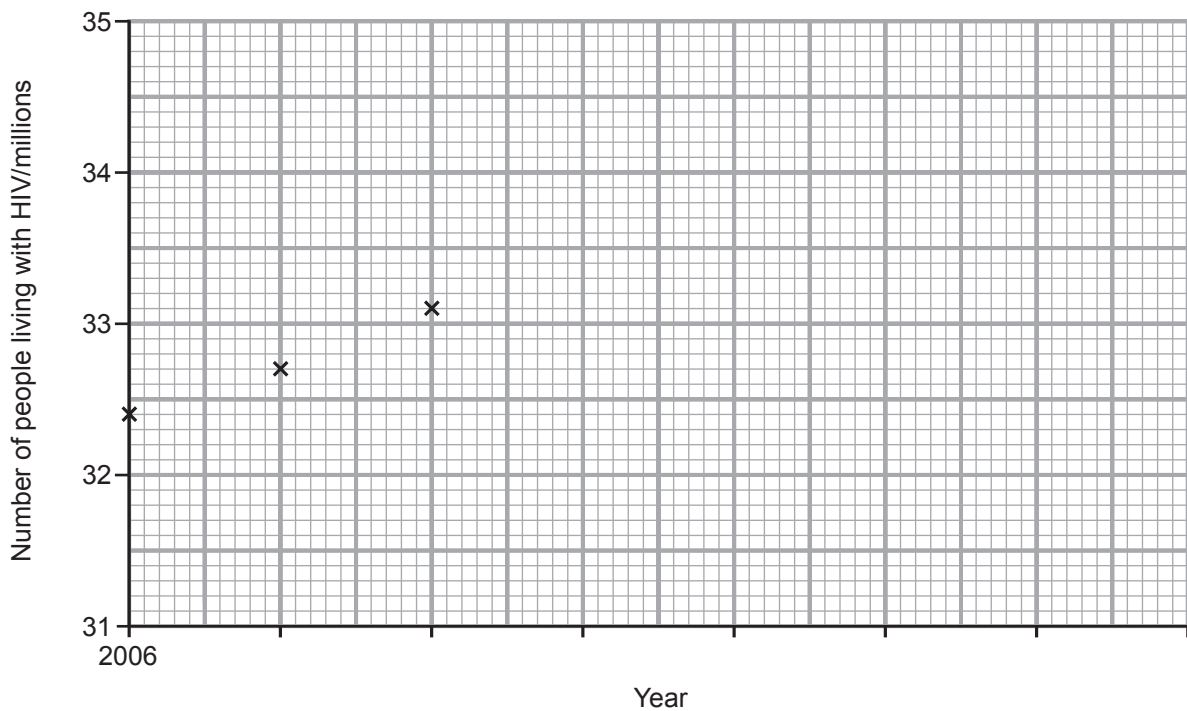


- 9 AIDS is a disease caused by the human immunodeficiency virus (HIV).  
**Table 1** shows worldwide data for HIV and AIDS for the years 2006 to 2013.

Table 1	Number of people worldwide/millions							
	2006	2007	2008	2009	2010	2011	2012	2013
People living with HIV	32.4	32.7	33.1	33.4	33.8	34.2	34.6	35.0
New HIV infections	2.8	2.7	2.6	2.5	2.5	2.4	2.2	2.1
AIDS related deaths	2.2	2.2	2.1	2.1	2.1	2.1	2.0	1.9
People receiving treatment				5.2	7.4	9.0	10.6	12.9

© UNAIDS, Global Report 2013, Fact Sheet

- (a) (i) Use the data in **Table 1** to complete the line graph to show the number of **people living with HIV** for the years 2006 to 2013. The first three points have been plotted for you. Add the scale to the x-axis.



[4]

- (ii) Describe the trend shown in the graph.

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[1]



**Table 2** shows the amount of money spent on HIV and AIDS treatment and education for the same years.

Table 2	Year							
	2006	2007	2008	2009	2010	2011	2012	2013
Money spent/ billions of dollars	8.8	10.5	14.6	15.5	15.6	17.1	18.9	19.1

© UNAIDS, Global Report 2013, Fact Sheet

(b) The number of **AIDS related deaths** decreased from 2006 to 2013.

(i) Use the data in **Table 1 opposite**, to calculate the percentage decrease in **AIDS related deaths** from 2006 to 2013.

Show your working.

\_\_\_\_\_ % [2]

(ii) Use the data in the tables to give **two** reasons to explain this decrease in AIDS related deaths over this period.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_ [2]

(c) (i) Some other diseases caused by viruses can be prevented using vaccinations.

Name the scientist who developed the first vaccination.

\_\_\_\_\_ [1]

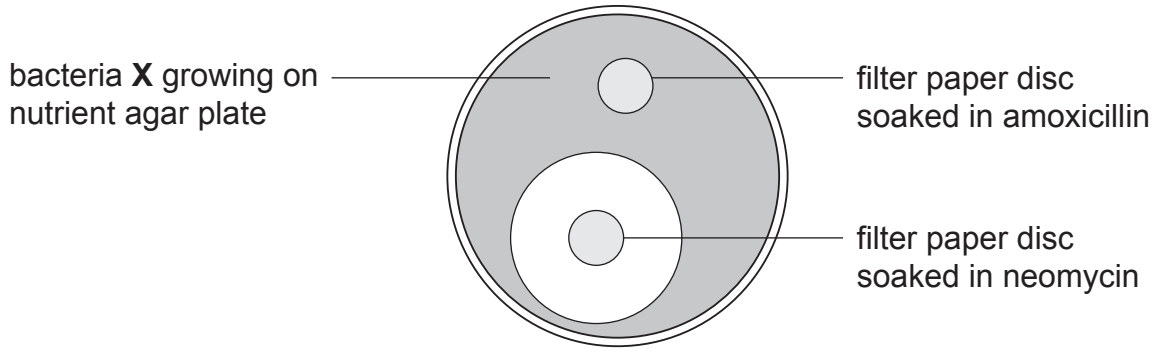
(ii) What disease was this vaccination used against?

\_\_\_\_\_ [1]

[Turn over



10 Antibiotics are chemicals that are used to kill bacteria.  
 A nutrient agar plate had one type of bacteria (**X**) growing on the surface.  
 Two discs of filter paper, each soaked with a different antibiotic, were placed on the surface of the nutrient agar plate.  
 One disc of filter paper was soaked in amoxicillin and the other was soaked in neomycin.  
 The diagram shows the nutrient agar plate after it had been incubated for two days.



Use the diagram and your knowledge to describe and explain the effects of the antibiotics amoxicillin and neomycin on the growth of bacteria **X**.

Description \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[4]





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11 Infertility in women can have several causes.

(a) Give **two** causes of infertility in women.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_ [2]

(b) In vitro fertilisation (IVF) can be used to treat infertility in some women. Describe the stages in the process of IVF.

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

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[6]

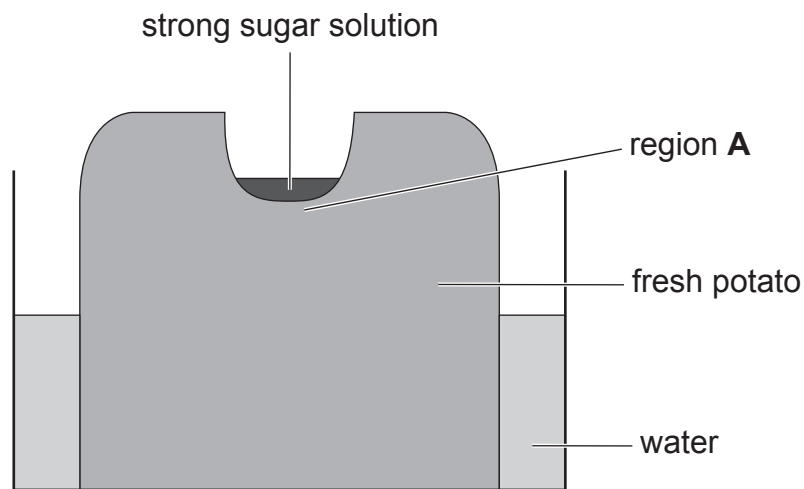
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\*24GSD4117\*

- 12 Megan and Paul set up an experiment to investigate osmosis in a potato. The diagram shows the levels of strong sugar solution and water at the start of the experiment.



The experiment was left for 4 hours.

- (a) Describe what happened to the level of the strong solution after 4 hours. Explain your answer.

Description \_\_\_\_\_

\_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [3]



(b) Describe how the vacuole and the cell membrane from a cell in region **A** will have changed after 4 hours, when the cell has become plasmolysed.

Vacuole \_\_\_\_\_

Cell membrane \_\_\_\_\_ [2]

[Turn over



- 13 Peony plants have plain red or red striped flowers.  
The photograph shows a red striped peony flower.



© Ian Gowland / Science Photo Library

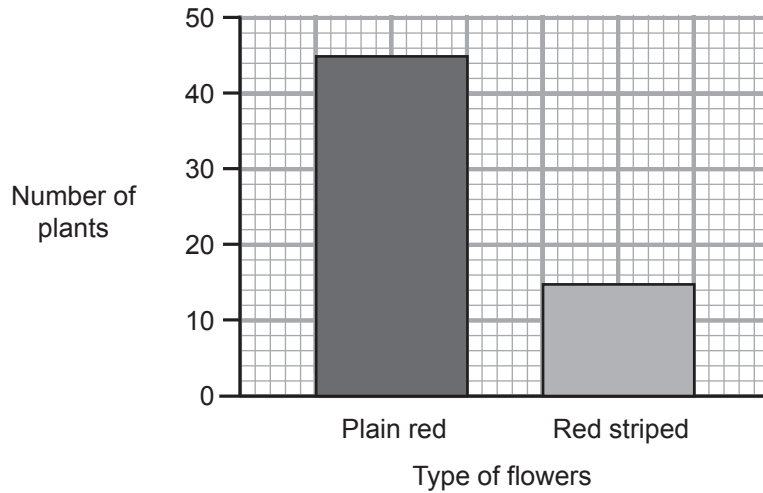
In peony flowers the allele **R** for plain red colour is dominant.  
The allele **r** for red striped flowers is recessive.

- (a) A peony plant, homozygous for plain red flowers, is crossed with a heterozygous peony plant.  
Draw a Punnett square to show the genotypes of the flowers that would be produced from this cross.

[4]



- (b) Seeds were collected from another peony plant. When plants were grown from these seeds the types of flowers produced were counted. The bar graph shows the results.



- (i) Use the graph to give the ratio of plain red flowers to red striped flowers produced from these seeds.

\_\_\_\_\_ to \_\_\_\_\_ [1]

- (ii) Use the graph to give the type of variation shown by these flowers.

\_\_\_\_\_ [1]

- (iii) Name a human characteristic that shows this type of variation.

\_\_\_\_\_ [1]

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For Examiner's use only	
Question Number	Marks
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