Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2014

GCSE Biology

Unit 2

Higher Tier

[GBY22]

GBY22

MONDAY 16 JUNE, MORNING

TIME

1 hour 45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of the page.
You must answer the questions in the spaces provided. Do not write outside the box, around 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

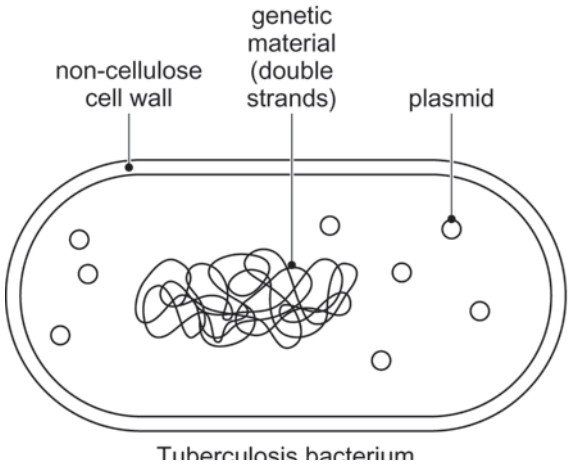
The total mark for this paper is **115**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part of question.

Quality of written communication will be assessed in questions **5** and **13(b)**.

8956

36GBY2201

1 The diagrams show a tuberculosis bacterium and a Human Immunodeficiency Virus (HIV).



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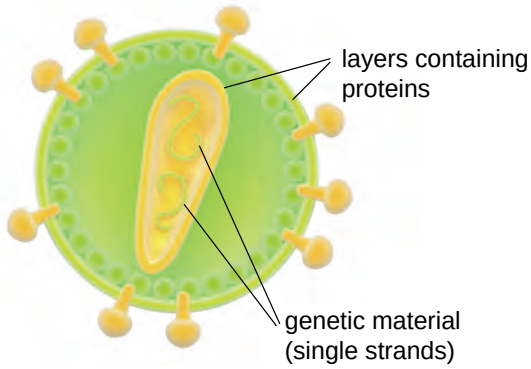

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Examiner Only	
Marks	Remark

Look at the diagrams.

(a) Give one similarity and one difference between the bacterium and the virus.

Similarity _____

_____

_____ [1]

Difference _____

_____

_____ [1]

(b) Tuberculosis is spread by droplet infection.

Explain what is meant by droplet infection.

_____

_____ [1]

(c) Give one way HIV can be spread and prevented.

Spread _____

_____ [1]

Prevented _____

_____ [1]

Examiner Only	
Marks	Remark
Total Question 1	

[Turn over

2 **(a)** The table shows the number of deaths from coronary heart disease in men and women in the UK during 2008.

Age/years	Deaths from coronary heart disease per 100 000 of population	
	Men	**Women**
35–44	17	4
45–54	67	14
55–64	175	47
65–74	443	179

© Crown copyright / Office of National Statistics

Look at the table.

(i) Describe one similarity and one difference between the number of deaths from coronary heart disease in men and women.

Similarity _____

_____ [1]

Difference _____

_____ [1]

(ii) The number of deaths from coronary heart disease will affect the number of men and women surviving in the population.

Suggest how the number of 65–74 year old men and women surviving in the population will differ.

_____

_____ [1]

Examiner Only	
Marks	Remark

(b) Describe **two** ways to reduce the risk of coronary heart disease.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark
Total Question 2	

[Turn over

3 A market gardener investigated the variation in the mass of strawberry fruits. The photograph shows how he sampled his crop of strawberries.

Examiner Only	
Marks	Remark

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The results are shown in the table.

Mass interval/g	Number of strawberries
6.0 to 7.9	29
8.0 to 9.9	68
10.0 to 11.9	211
12.0 to 13.9	45
14.0 to 15.9	35
16.0 to 17.9	0

(a) Describe the method the market gardener used to sample the strawberries.

_____

_____

_____

_____

_____ [3]

(b) **(i)** Name the variation shown by these results.

_____ [1]

(ii) What type of graph should be used to present these results?

_____

_____ [1]

(c) Give **one** conclusion that can be made from these results.

_____

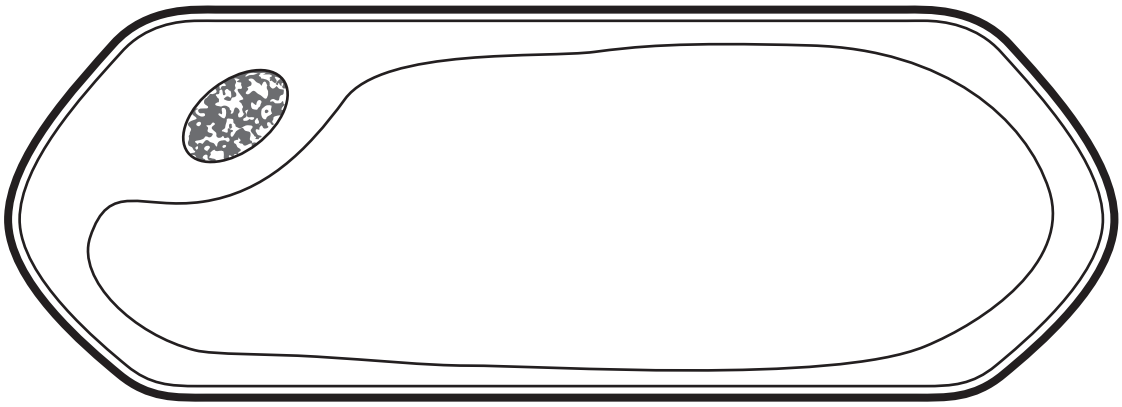
_____ [1]

Examiner Only	
Marks	Remark
Total Question 3	

[Turn over

4 **(a)** The diagram shows one cell from an onion epidermis.

Examiner Only	
Marks	Remark



Part of the cell is selectively permeable.

(i) Name this part.

_____ [1]

(ii) What does selectively permeable mean?

_____

_____ [1]

(b) The cell is placed in concentrated sugar solution for 30 minutes.

(i) Complete the diagram below to show the appearance of this cell **after** 30 minutes.

[3]

(ii) What word is used to describe the cell after 30 minutes?

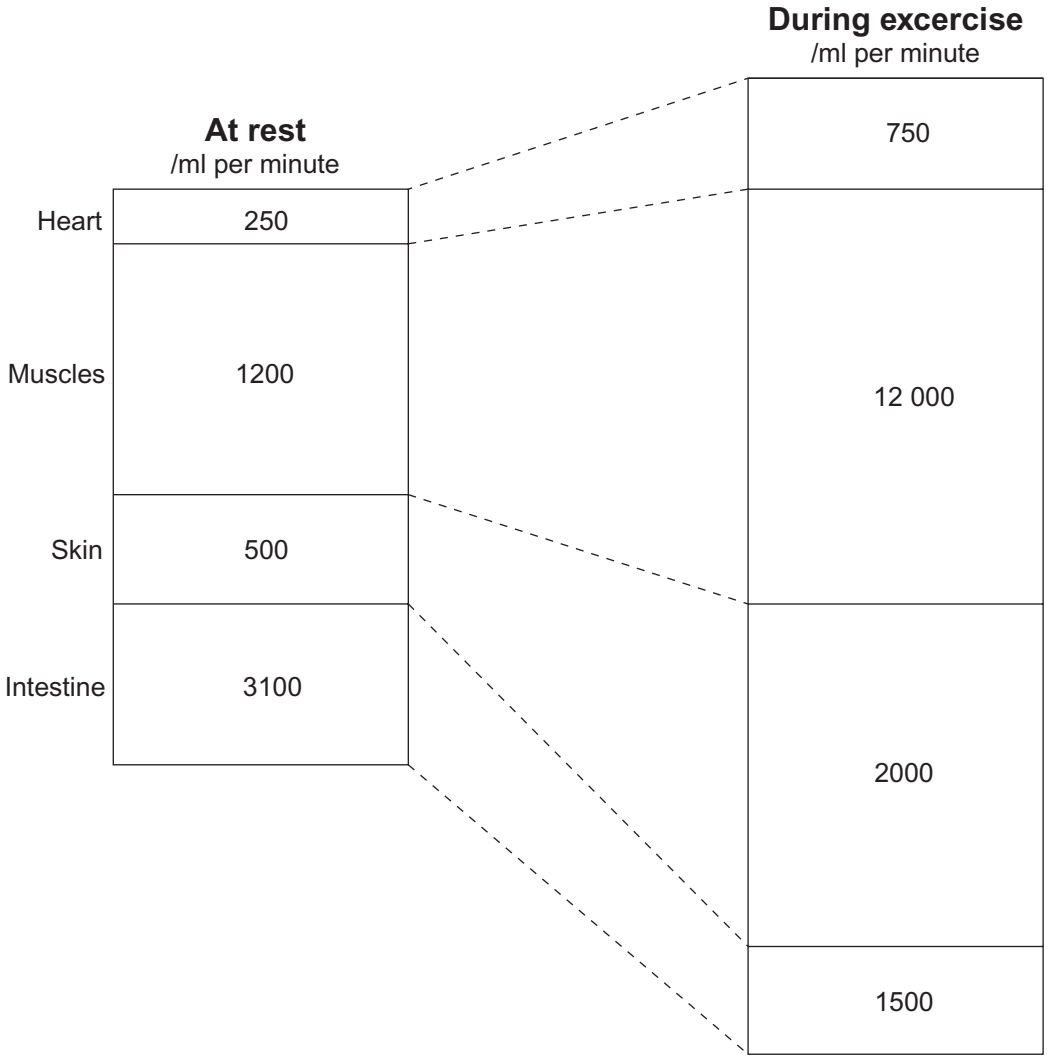
_____ [1]

Examiner Only	
Marks	Remark
Total Question 4	

[Turn over

5 The diagram shows blood flow to various parts of the body.
The volume of blood flowing to each organ is shown **at rest** and **during exercise**.

Examiner Only	
Marks	Remark



Describe and **explain** the effect of exercise on the blood flow to

- the heart.
- the muscles.
- **one** other part of the body.

Use evidence from the diagram in your answer.

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

[6]

Examiner Only	
Marks	Remark
Total Question 5	

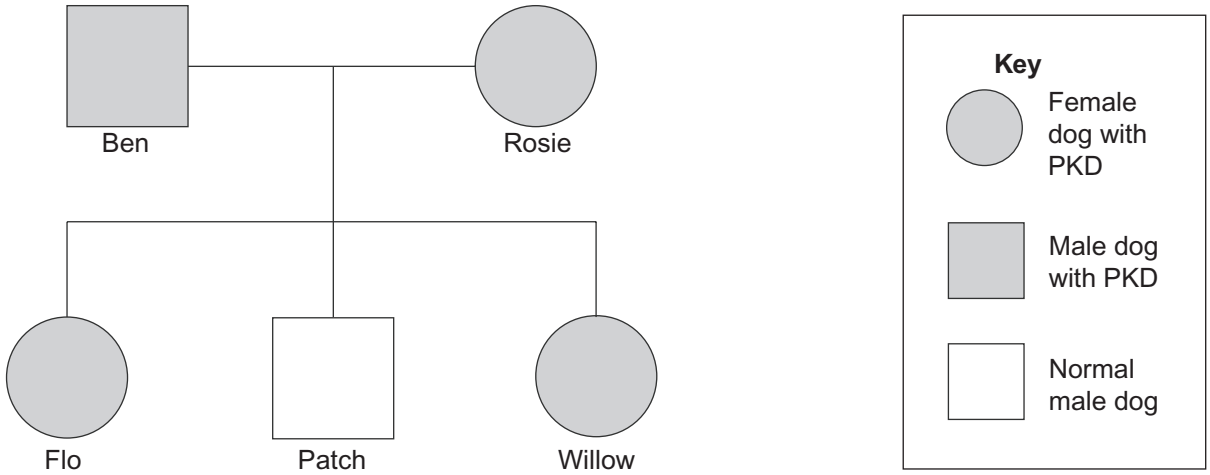
[Turn over

6 A dominant allele **(H)** causes polycystic kidney disease (PKD) in bull terrier dogs.

Dogs with this condition have cysts or swellings in their kidneys.

This causes the kidneys to enlarge and become painful.

The pedigree diagram shows the pups produced by two bull terriers, Ben and Rosie.



(a) Explain how the pups show that Ben and Rosie are both heterozygous for PKD.

Use **H** for the PKD allele and **h** for the normal allele.

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

(b) A dog breeder wants to find out the genotype of Willow.

Name and describe the cross she would use to do this.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [5]

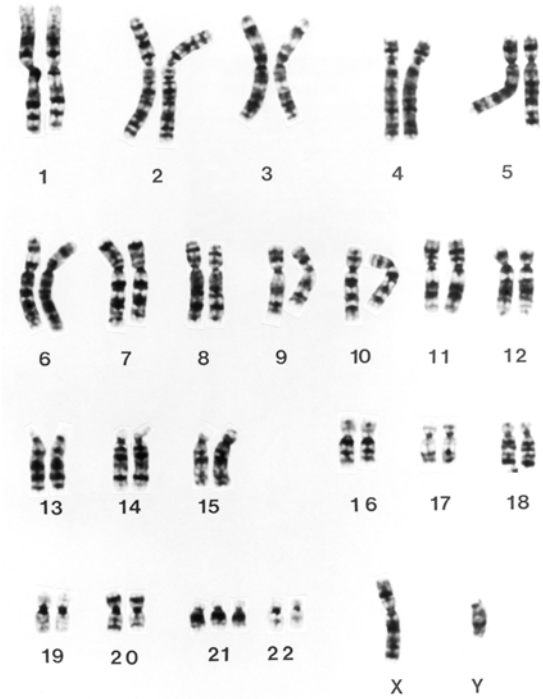
Examiner Only	
Marks	Remark
Total Question 6	

[Turn over

Examiner Only	
Marks	Remark

7 **(a)** Mutations can cause inherited conditions.

The diagram shows a set of chromosomes with a mutation.



© L. Willatt, East Anglian Regional Genetics Service / Science Photo Library

(i) Name the condition this mutation causes.

_____ [1]

(ii) Use evidence from the diagram to explain how you identified this condition.

_____

_____

_____ [2]

(iii) What evidence in the diagram suggests these chromosomes belong to a human?

_____

_____ [1]

Examiner Only	
Marks	Remark

(iv) What evidence in the diagram suggests these chromosomes belong to a male?

_____

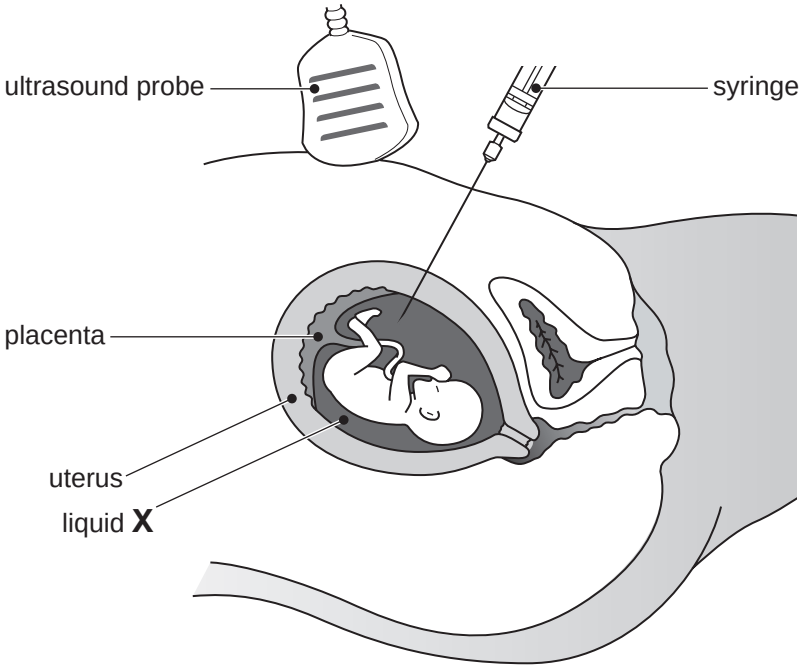
_____ [1]

(b) Genetic screening is used to find out if a developing foetus has a condition caused by a mutation.

Liquid containing foetal cells is removed using a syringe.

These cells are allowed to multiply in a Petri dish.

The chromosomes are examined to see if the foetus has the condition.



© Reproduced from: Royal College of Obstetricians and Gynaecologists. Chorionic villus sampling and amniocentesis. Patient Information Leaflet. London: RCOG; 2011, with the permission of the Royal College of Obstetricians and Gynaecologists.

(i) Name liquid **X**.

_____ [1]

[Turn over

(ii) Name this test.

_____ [1]

(iii) During the test the doctor uses an ultrasound probe to find the position of the foetus.

Why is this necessary?

_____

_____

_____ [1]

(iv) Give **two ethical** objections to genetic screening.

_____

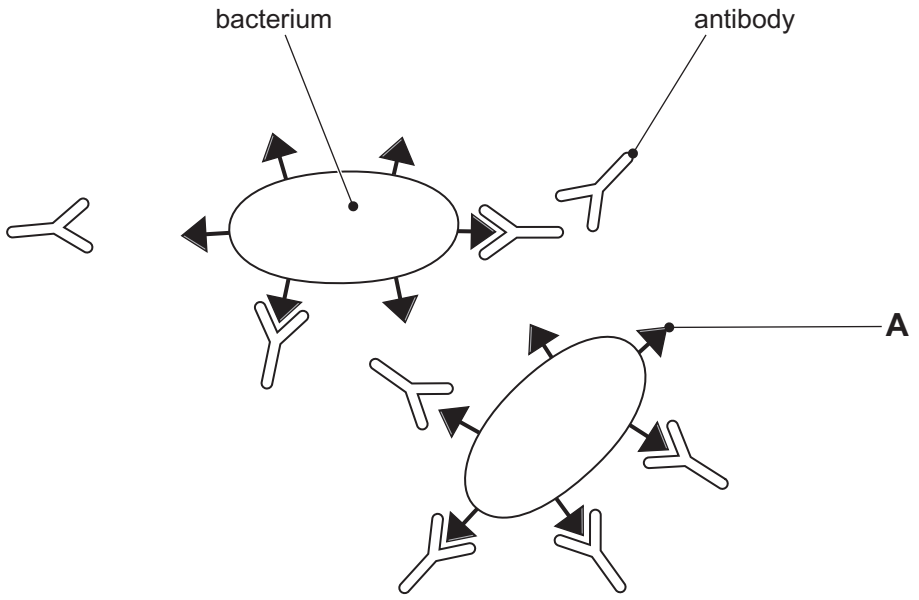
_____

_____

_____ [2]

Examiner Only	
Marks	Remark
Total Question 7	

8 **(a)** The diagram shows antibodies attacking bacteria.



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(i) Name structure **A** on the bacterium.

_____ [1]

(ii) Describe how antibodies prevent the spread of the bacteria within the body.

_____

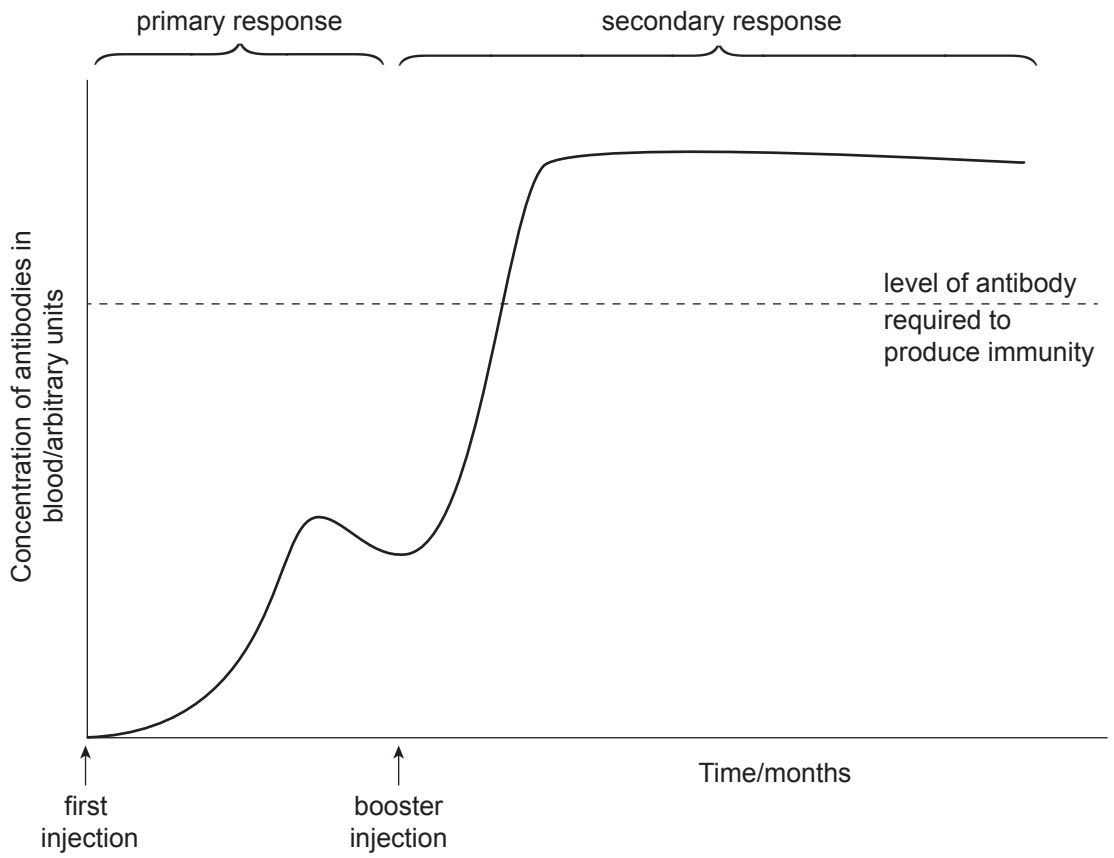
_____

_____ [2]

Examiner Only	
Marks	Remark

[Turn over

(b) The graph shows the concentration of antibodies in the blood after vaccination.
Two injections were given.
Each injection contained the same type of weakened bacteria.



(i) Explain why the secondary response is faster than the primary response.

_____

_____ [1]

(ii) Describe **two other** differences between the primary and secondary response.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

(iii) Use evidence from the graph to suggest why a booster injection must be given a few months after the first injection.

_____

_____

_____

_____ [2]

(iv) Suggest **one** disadvantage of the vaccination being given as two injections rather than one.

_____

_____ [1]

(v) Explain why manufacturers of this vaccine weaken the bacteria used in the injections.

_____

_____

_____

_____ [2]

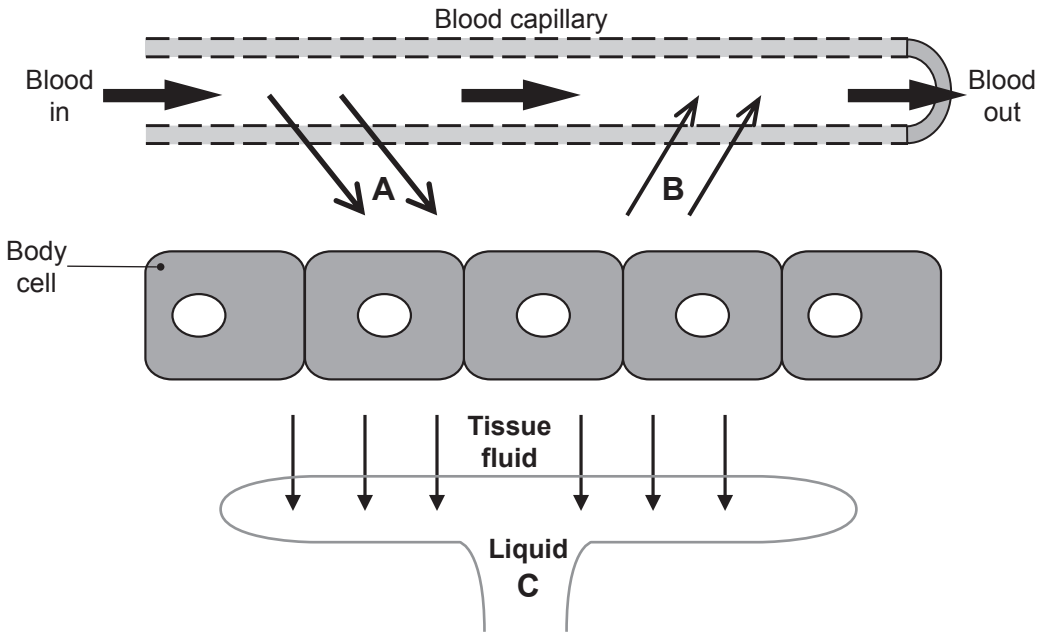
(vi) Name the type of immunity given by this vaccination.

_____ [1]

Examiner Only	
Marks	Remark
Total Question 8	

[Turn over

9 The diagram shows the formation of tissue fluid.



(a) Give **two** ways the capillary is adapted to allow substances to move in direction **A**.

_____

_____

_____

_____ [2]

(b) Name **one** substance which moves in direction **B**.

_____ [1]

(c) Name and describe what happens to liquid **C**.

Name _____

Description _____

_____ [2]

Examiner Only	
Marks	Remark
Total Question 9	

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(Questions continue overleaf)

10 A medical student placed samples of blood in three different solutions.

The table shows changes in the average diameter of the red blood cells in each solution.

Test tube	Concentration of salt solution/grams per litre	Average diameter of red blood cells/ micrometres	
		At start	After 10 minutes
A	15	8	4
B	10	8	8
C	0	8	10

(a) The average diameter of the red blood cells placed in **test tube A** changes.

Describe this change and explain what causes it.

_____

_____

_____

_____

_____

_____

_____

_____ [4]

Examiner Only	
Marks	Remark

Patients suffering from dehydration are given replacement fluids using a sterile salt solution in a drip.

The salt solution in the drip passes into the bloodstream.

(b) Explain why solution **B** is used in the drip rather than solution **C**.

_____

_____

_____

_____

_____

_____

_____

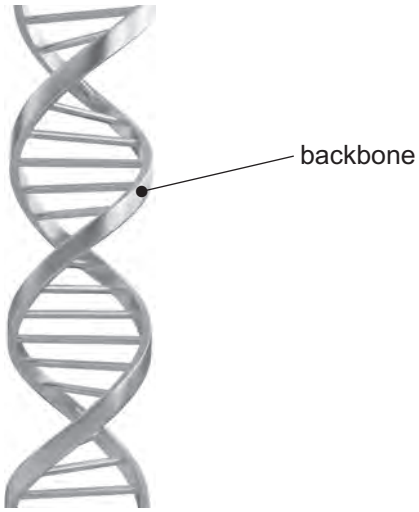
_____ [4]

Examiner Only	
Marks	Remark
Total Question 10	

[Turn over

11 The diagram shows part of a DNA molecule.

Examiner Only	
Marks	Remark



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(a) Name the two molecules found in the DNA backbone.

1. _____

2. _____ [2]

(b) Chargaff investigated the chemical composition of DNA in different animals. The table shows some of his results.

	Percentage of bases			
Mammal	**A**	**G**	**C**	**T**
Rat	28.6	21.6	20.4	28.4
Human	30.9	19.1	18.4	29.6
Pig	29.4	20.5	20.5	29.6
Sheep			21.0	

(i) Give **three** conclusions from Chargaff's results.

_____

_____

_____

_____

_____ [3]

(ii) Sheep have 21% cytosine (C) in their DNA.

Calculate the expected percentage of adenine (A) in sheep.

Show your working.

_____ [2]

(c) Other scientists built on the work of Chargaff to discover the structure of DNA.

Name these scientists and describe the approaches they used.

_____

_____

_____

_____

_____

_____

_____

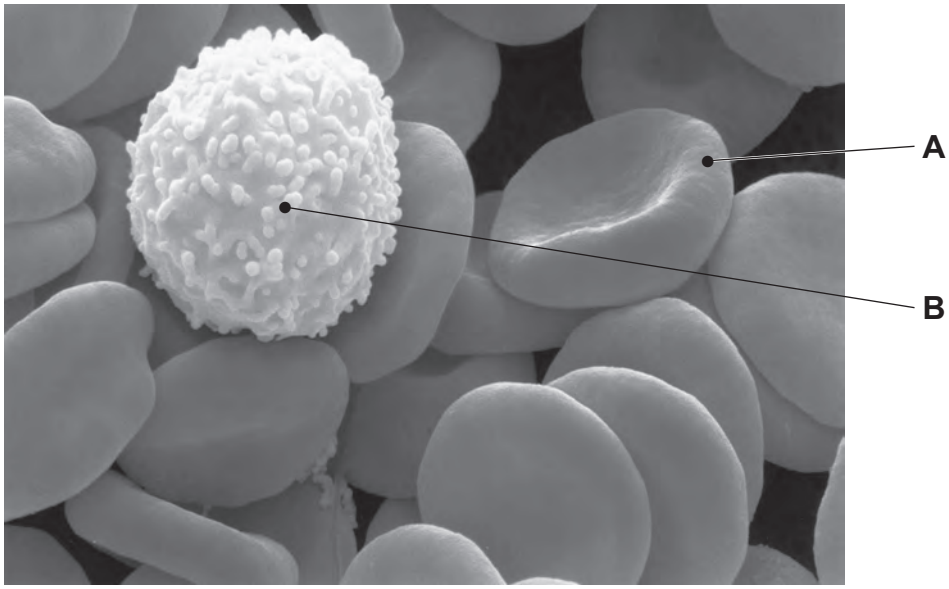
_____ [4]

Examiner Only	
Marks	Remark
Total Question 11	

[Turn over

12 **(a)** The photograph shows blood cells.

Examiner Only	
Marks	Remark



© Dr. G Moscoso/ Science Photo Library

(i) Name cells **A** and **B**.

A _____ [1]

B _____ [1]

(ii) Give the function of cell **A**.

_____ [1]

(iii) Describe **one** adaptation of cell **A**, **visible in the photograph**, and explain how this enables it to carry out its function.

_____

_____

_____

_____ [2]

(iv) When the skin is cut changes occur in the blood proteins to bring about clotting and scab formation.

Describe these changes.

_____

_____

_____

_____

_____

_____ [3]

(b) Many people suffer from anaemia.

Anaemia is caused by a mineral deficiency.

(i) Name this mineral.

_____ [1]

One of the symptoms of anaemia is lack of energy.

(ii) Explain how anaemia can result in a lack of energy.

_____

_____

_____

_____ [3]

(c) Blood donation and transfusion is needed to treat certain blood disorders.

(i) Name the blood component needed to treat patients who lack clotting factors.

_____ [1]

Examiner Only	
Marks	Remark

[Turn over

Patients with severe burns lose tissue fluid.

(ii) Name the blood component needed to treat these patients.

_____ [1]

The table shows the number of units of blood stored by the UK blood transfusion service and the number of days this store of blood will last.

Blood group	Store of blood/ number of units	Number of days store of blood will last
AB	1465	11.45
A	15281	8.07
B	3352	7.42
O	22430	10.18

© NHS Blood and Transplant

(iii) Comment on the figures for blood group **AB** and explain what this suggests about the proportion of blood group **AB** in the population.

_____

_____

_____

_____

_____

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark
Total Question 12	

13 **(a)** Penicillin was one of the first antibiotics to be used in the treatment of disease.

(i) Name the scientist who discovered penicillin.

_____ [1]

(ii) What type of organism produces penicillin?

_____ [1]

(iii) Describe the role of Florey and Chain in the development of penicillin as an antibiotic that could be used to treat disease.

_____

_____

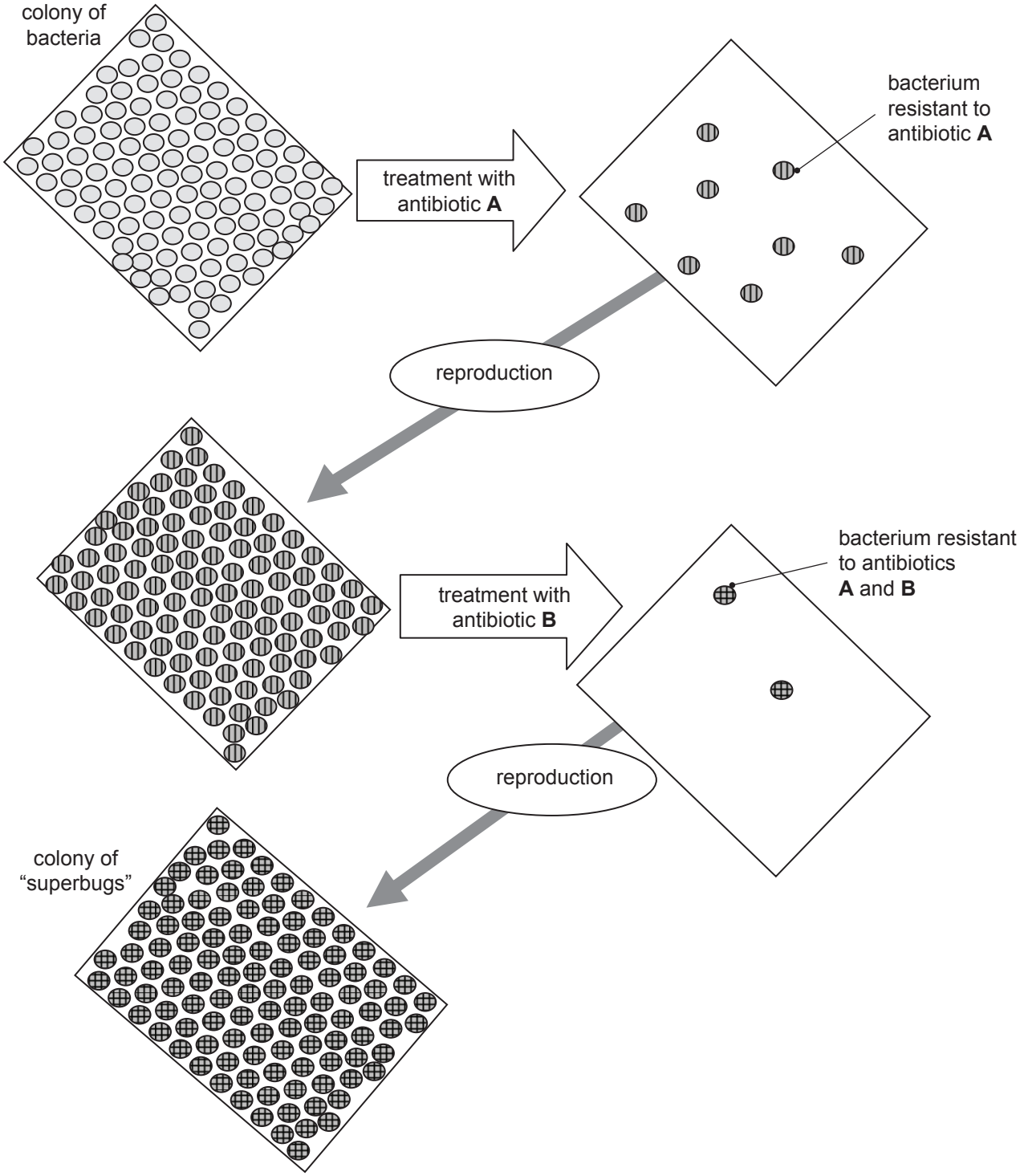
_____

_____ [2]

Examiner Only	
Marks	Remark

[Turn over

The diagram shows part of a bacterial colony and what happened when it was treated with antibiotics.



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(b) **Use information from the diagram** to help explain how the overuse of antibiotics in treating bacteria can cause the development of 'superbugs' such as MRSA.

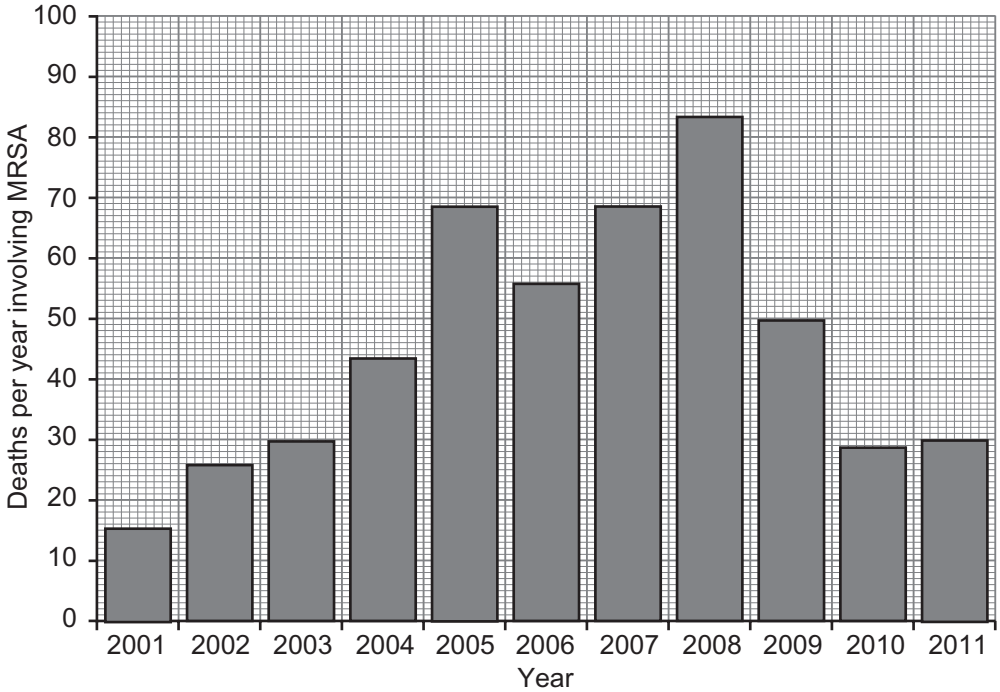
In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

[Turn over

(c) The graph shows some deaths in Northern Ireland hospitals between 2001 and 2011. The "superbug" MRSA was thought to have been involved in these deaths.



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(i) Describe the trend shown in the graph.

_____

_____

_____ [2]

(ii) Suggest why "superbugs" like MRSA are more likely to arise in hospitals than in family homes.

_____

_____

_____ [1]

Examiner Only	
Marks	Remark

(iii) Describe three procedures used in hospitals to reduce infections by “superbugs”.

1. _____

_____ [1]

2. _____

_____ [1]

3. _____

_____ [1]

Examiner Only	
Marks	Remark
Total Question 13	

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For Examiner's use only	
Question Number	Marks
1	
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Examiner Number

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