



Rewarding Learning

General Certificate of Secondary Education
2014

Centre Number

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Candidate Number

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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

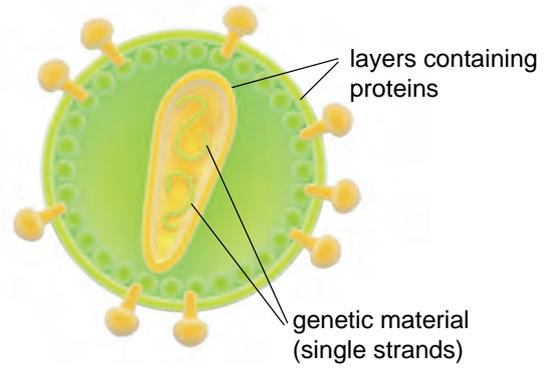
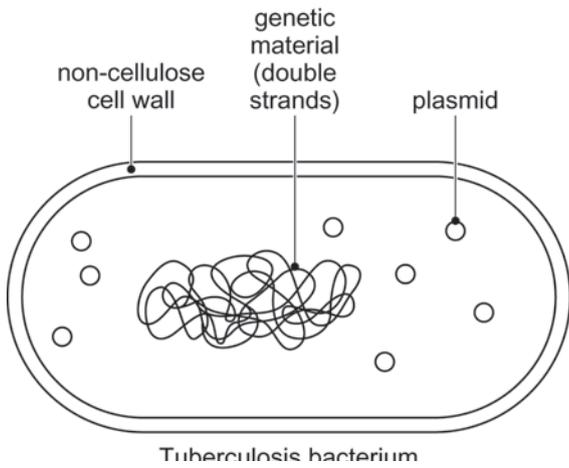
The total mark for this paper is **115**.

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)**.



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



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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]

Examiner Only	
Marks	Remark



- 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



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



© rayvee / iStock / Thinkstock

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

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Examiner Only	
Marks	Remark

- (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



(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**.

	At rest /ml per minute	During exercise /ml per minute
Heart	250	750
Muscles	1200	12 000
Skin	500	
Intestine	3100	2000
		1500

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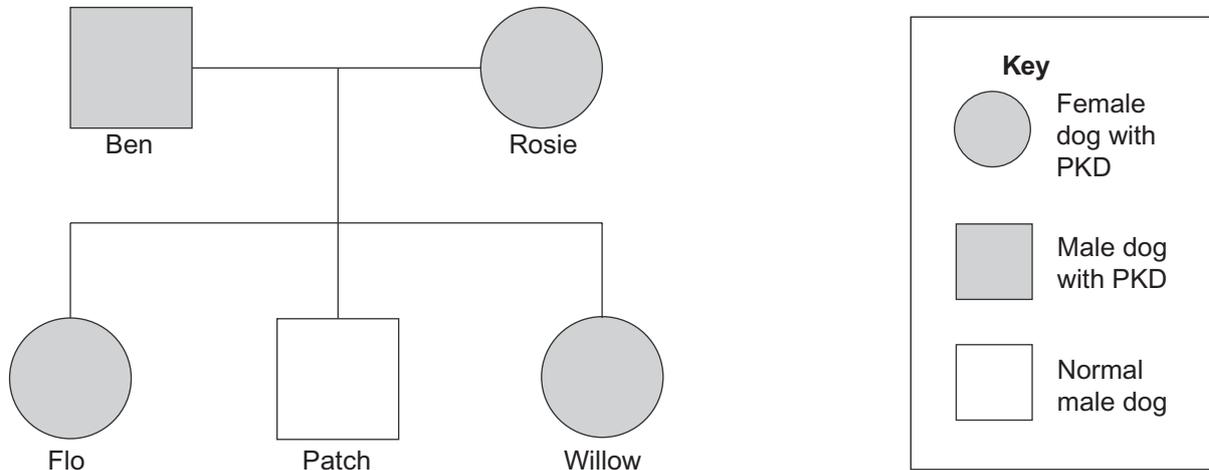


6 A dominant allele (**H**) causes polycystic kidney disease (PKD) in bull terrier dogs.

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



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

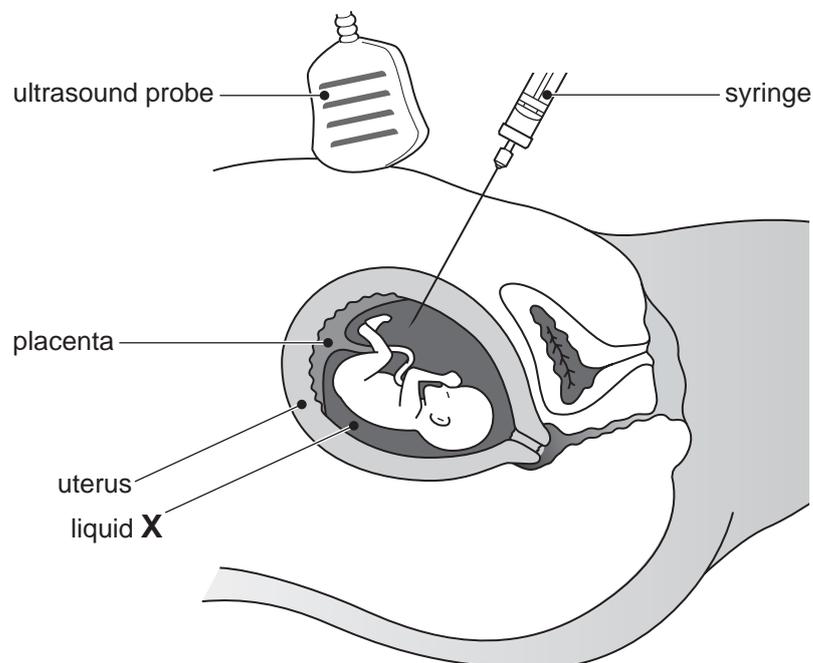
_____ [1]

(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]

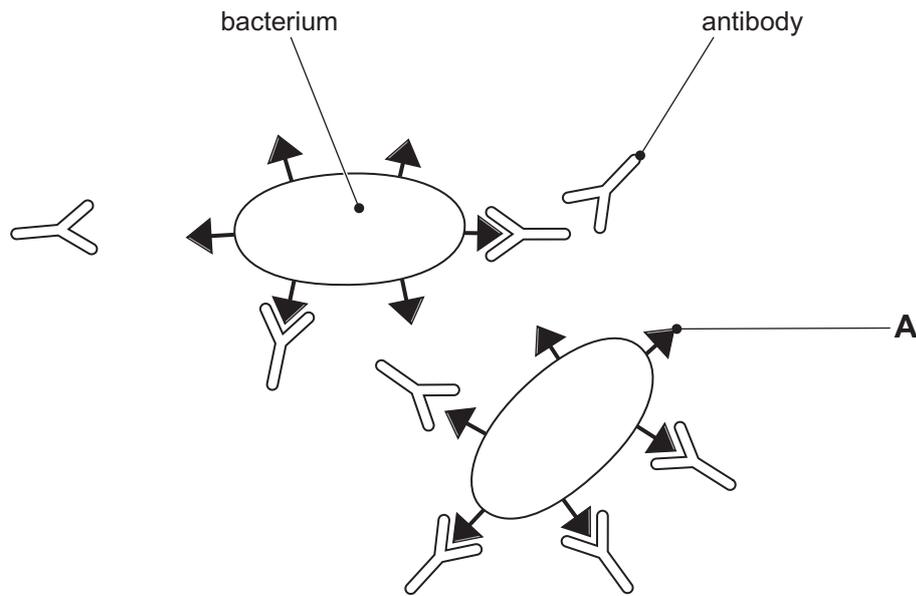
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Marks Remark

[Turn over



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



- (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]

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Marks	Remark
Total Question 8	

[Turn over



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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.

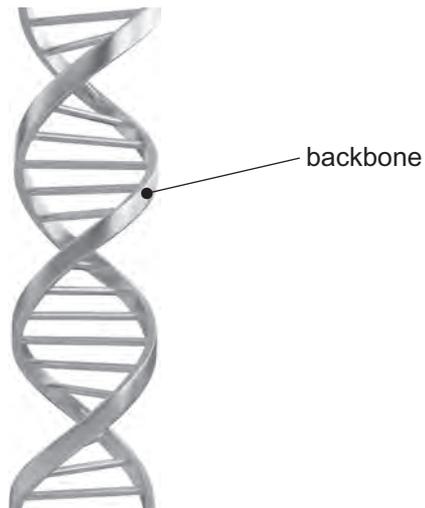
Describe this change and explain what causes it.

[4]

Examiner Only	
Marks	Remark



11 The diagram shows part of a DNA molecule.



© iStockphoto / Thinkstock

(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.

Mammal	Percentage of bases			
	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]

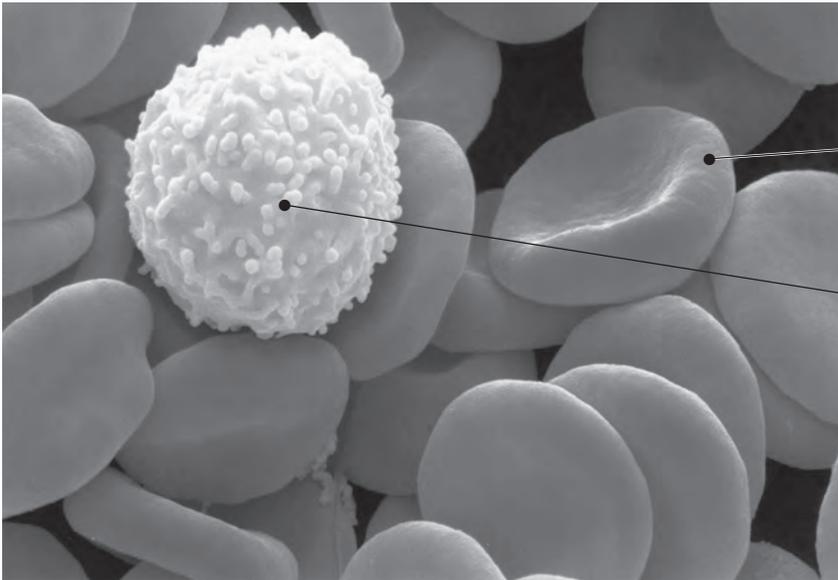
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Marks	Remark
Total Question 11	

[Turn over



12 (a) The photograph shows blood cells.



© Dr. G Moscoso/ Science Photo Library

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Marks	Remark

(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]

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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]

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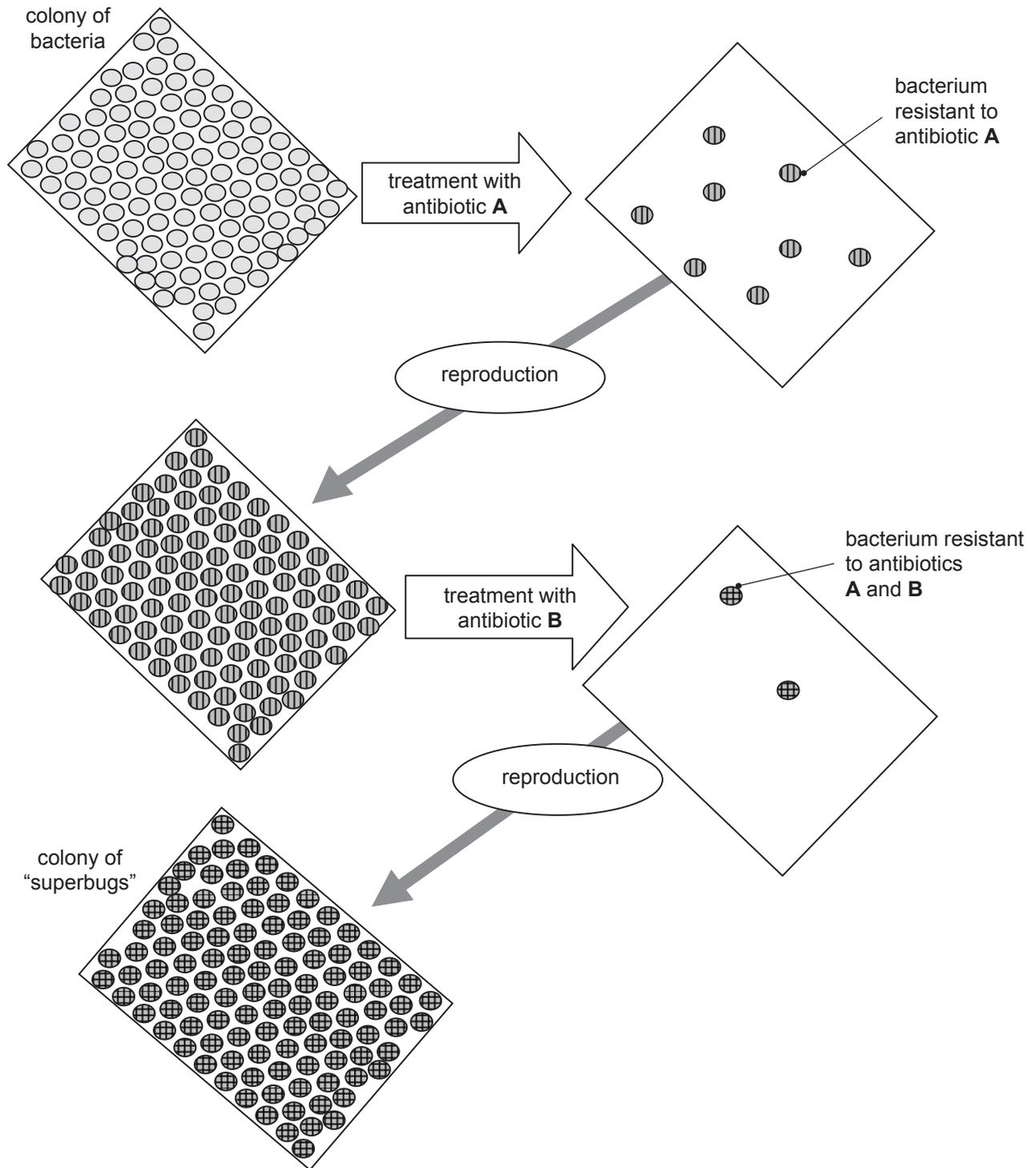
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The diagram shows part of a bacterial colony and what happened when it was treated with antibiotics.



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Question Number	Marks
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Examiner Number

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