



General Certificate of Secondary Education

Centre Number

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Candidate Number

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Biology

Unit 2
Higher Tier



[GBL22]

GBL22

Assessment

TIME

1 hour 30 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

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 black ink only. **Do not write with a gel pen.**

Answer **all eleven** questions.

INFORMATION FOR CANDIDATES

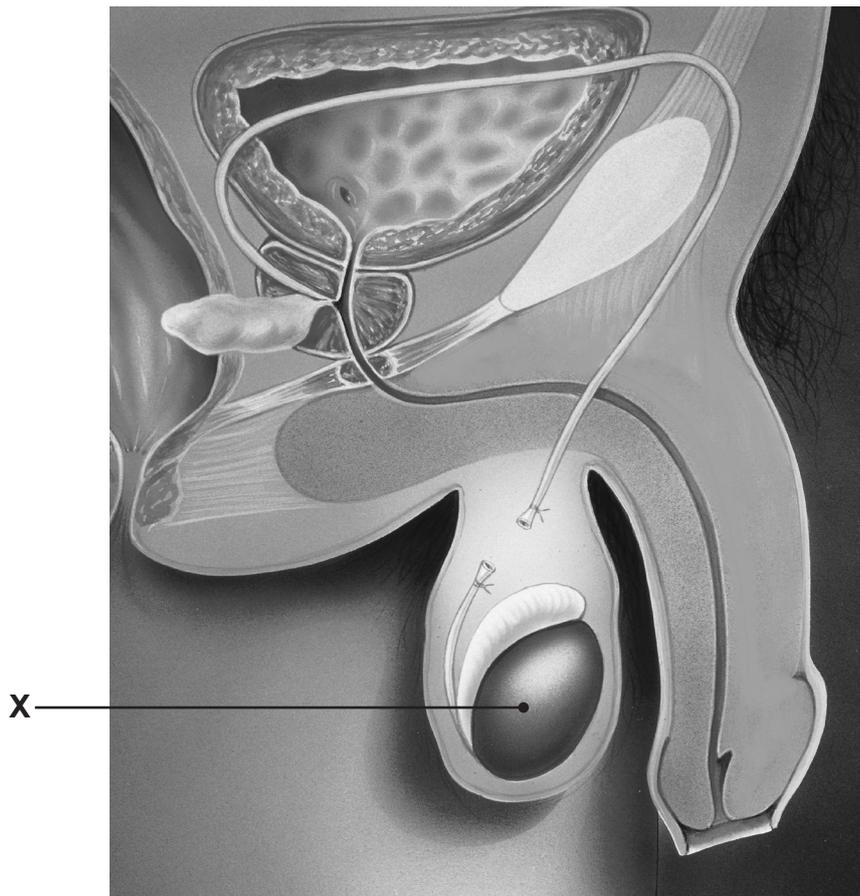
The total mark for this paper is 90.

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 **10(b)**.



1 The diagram shows a method of male contraception.



© David Gifford / Science Photo Library

Look at the diagram.

(a) Name part X.

[1]

(b) (i) Name this method of contraception.

[1]



(ii) Describe how this method of contraception works.

[2]

(iii) Give **one** advantage and **one** disadvantage of this method of contraception.

Advantage _____

Disadvantage _____

[2]



2 The volume of milk produced by cows is a genetically inherited characteristic.

The table shows how the average volume of milk produced per cow has changed from 2001 to 2017 in the UK.

Year	Average volume of milk produced per cow / litres per year
2001	6346
2005	6986
2009	7061
2013	7543
2017	7889

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(a) Calculate the percentage increase in the average volume of milk produced per cow from 2001 to 2017.

Give your answer to **one** decimal place.

Show your working.

_____ % [3]



(b) Suggest how farmers have used selective breeding to bring about this change in milk production.

[3]

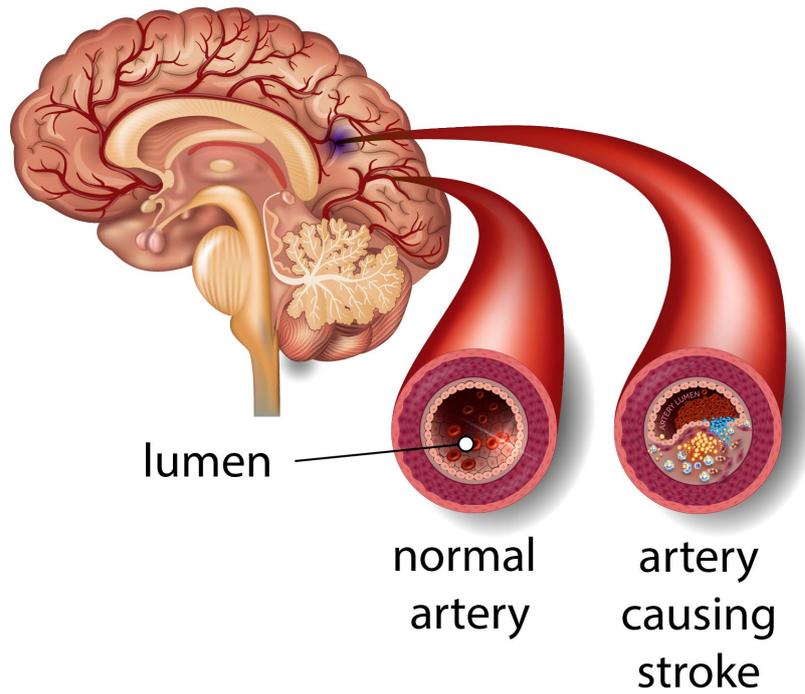
(c) Suggest **one** environmental factor which may affect the volume of milk produced by a cow.

[1]

[Turn over



- 3 (a) The diagram shows part of the brain and blood vessels of a patient who has suffered a stroke.



© Getty Images

- (i) Describe **two** differences between the normal artery and the artery causing the stroke.

1. _____

2. _____

_____ [2]

- (ii) Explain how these differences may lead to a stroke.

_____ [1]



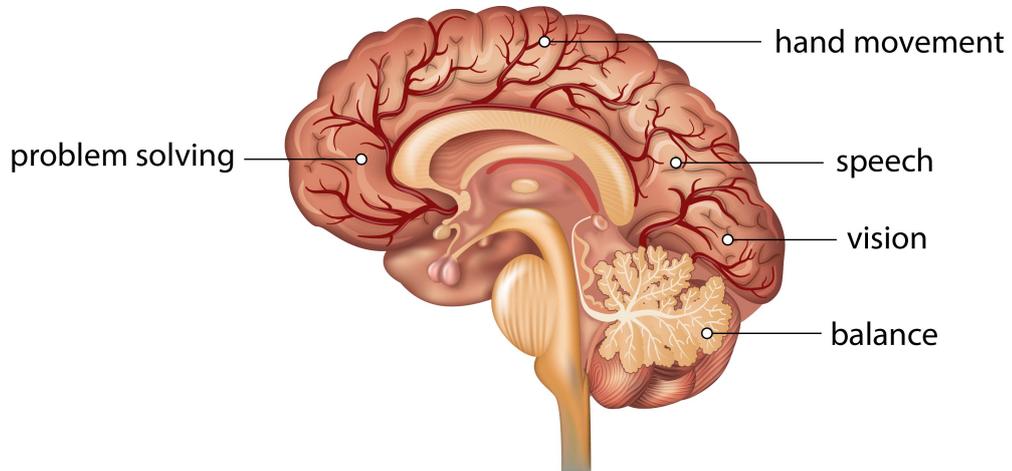
(b) (i) Describe how angioplasty and stents could be used to treat this patient.

[2]

(ii) Explain how angioplasty and stents help reduce the risk of this patient suffering another stroke.

[2]

The diagram shows the functions of some parts of the brain.



© Getty Images

(c) Use the information from **both diagrams** to suggest which brain function of this patient may be affected by a stroke.

[1]

[Turn over



- 4 The table shows the percentage (%) of women who smoked cigarettes during pregnancy from 2011 to 2016.

Year	Percentage of women who smoked cigarettes during pregnancy
2011	13.5
2012	13.3
2013	13.0
2014	12.0
2015	11.4
2016	10.5

*Statistics on Women's Smoking Status at Time of Delivery. Published by NHS Digital, part of the Government Statistical Service
Copyright © 2017 Health and Social Care Information Centre.
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- (a) The percentage of women who smoked cigarettes during pregnancy decreased from 2011 to 2016.

Calculate the average percentage decrease per year.

Show your working.

_____ % per year [3]



(b) (i) Name the chemical in cigarette smoke which affects the oxygen carrying capacity of the blood.

[1]

(ii) Describe and explain how this chemical affects the oxygen carrying capacity of the blood.

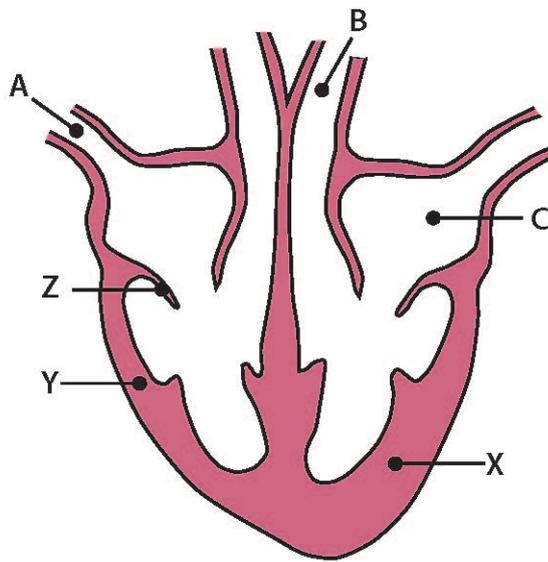
Description _____

Explanation _____

[2]



5 (a) The diagram shows a section through a heart.



© CCEA

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

A _____

B _____

C _____

[3]

(ii) Explain why the muscle wall is thicker at **X** than the muscle wall at **Y**.

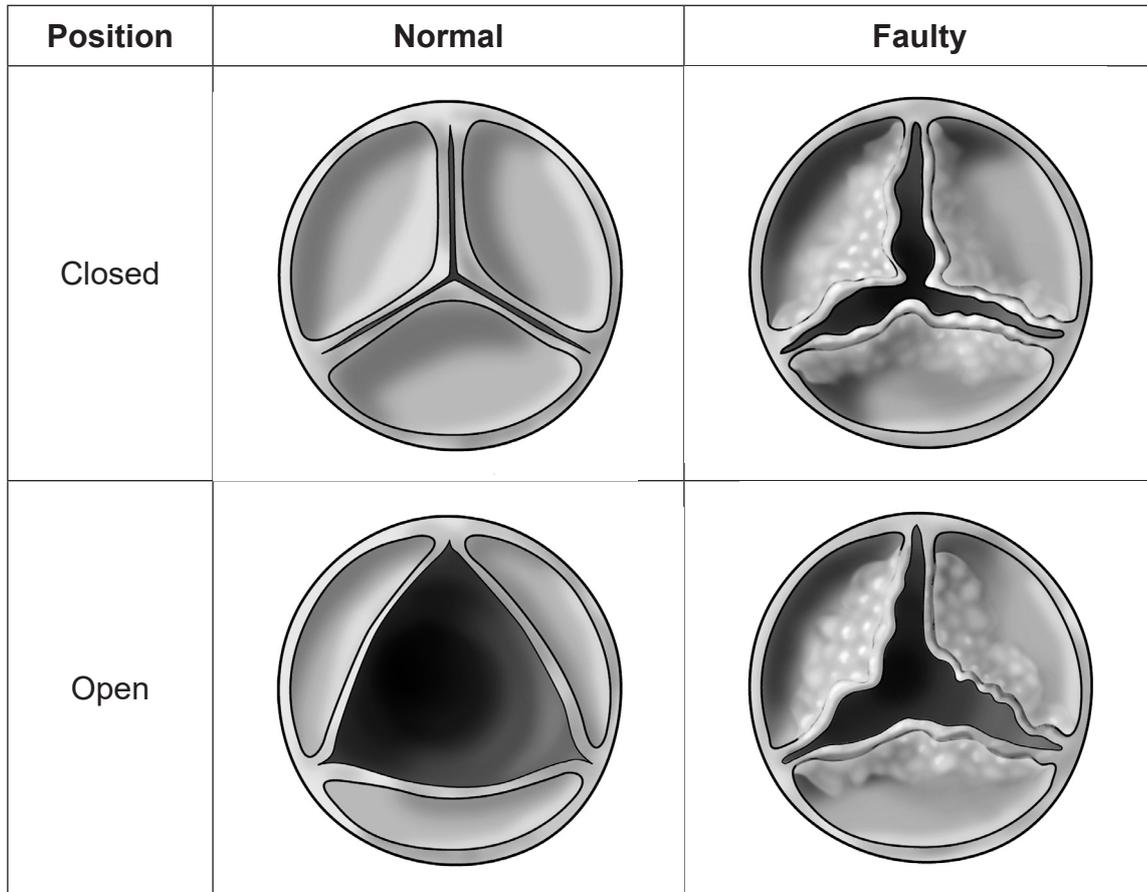
[2]

(iii) Describe the function of **valve Z**.

[2]



(b) The diagram shows a normal heart valve and a faulty heart valve in closed and open positions.



© Monica Schroeder / Science Source/ Science Photo Library

(i) Describe **one** difference in the functioning of the normal and faulty heart valve and suggest how this may affect the flow of blood through the heart.

[2]

[Turn over



(ii) People with faulty heart valves often suffer from a lack of energy and tiredness.

Suggest why.

[2]





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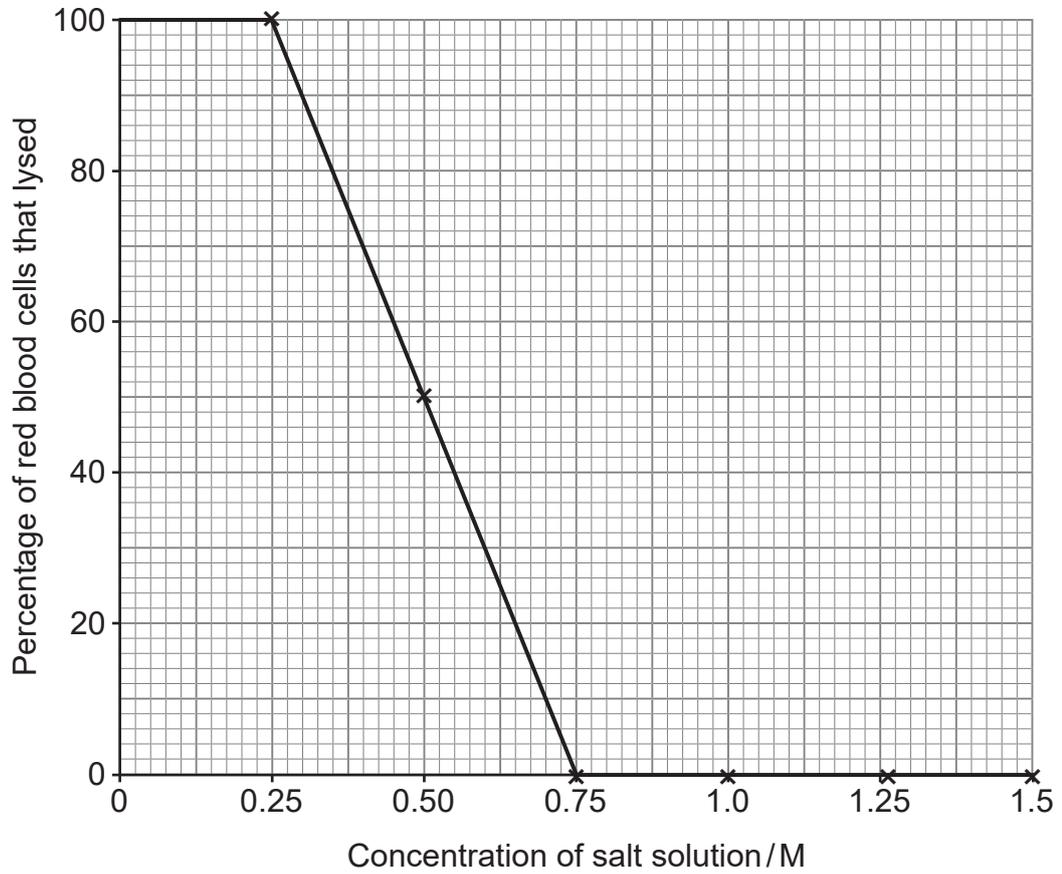
(Questions continue overleaf)

[Turn over



- 6 (a) When red blood cells are placed in different concentrations of salt solution, some may lyse.

The graph shows the effect of different concentrations of salt solution on the percentage (%) of red blood cells that lysed.



(i) Give the percentage of red blood cells lysed in salt solutions below a concentration of 0.25 M.

_____ % [1]

(ii) Explain why these red blood cells lysed.

[4]

When **plant cells** were placed in the same concentrations of salt solutions below 0.25 M they did not lyse.

(b) Explain why.

[2]

[Turn over



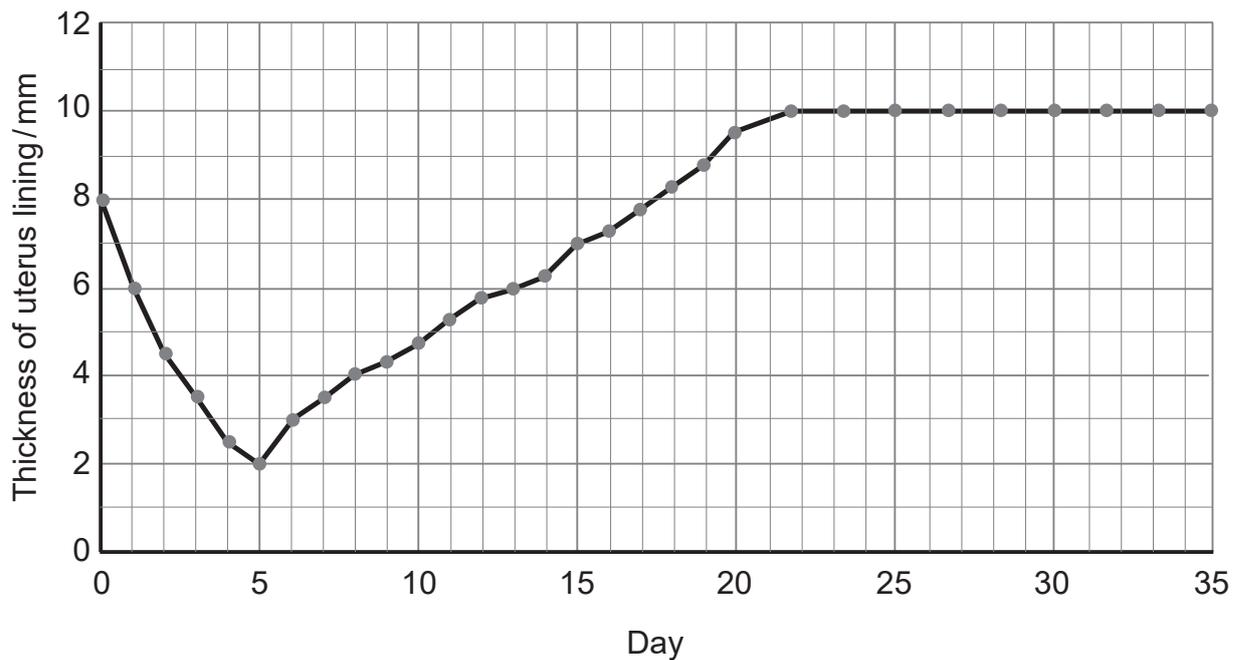
7 (a) Name **two** female hormones produced by the ovaries which help control the events of a menstrual cycle.

1. _____

2. _____

[2]

(b) The graph shows the changes in thickness of the uterus lining over a period of 35 days.



Source: Chief Examiner

(i) Use **data** to describe the change in the thickness of the uterus lining during days 1–5.

[1]



(ii) Explain what has happened during days 1 to 5 to cause this change in the thickness of the uterus lining.

[1]

(c) What event takes place on day 14 of the menstrual cycle?

[1]

(d) What evidence from the graph suggests fertilisation has occurred?

[2]

[Turn over



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8 (a) The NHS provides screening programmes for different types of cancer.

(i) Give **two** types of cancer in women the NHS screens for.

1. _____

2. _____

[2]

(ii) Suggest why screening programmes may result in more women surviving these types of cancer.

[1]



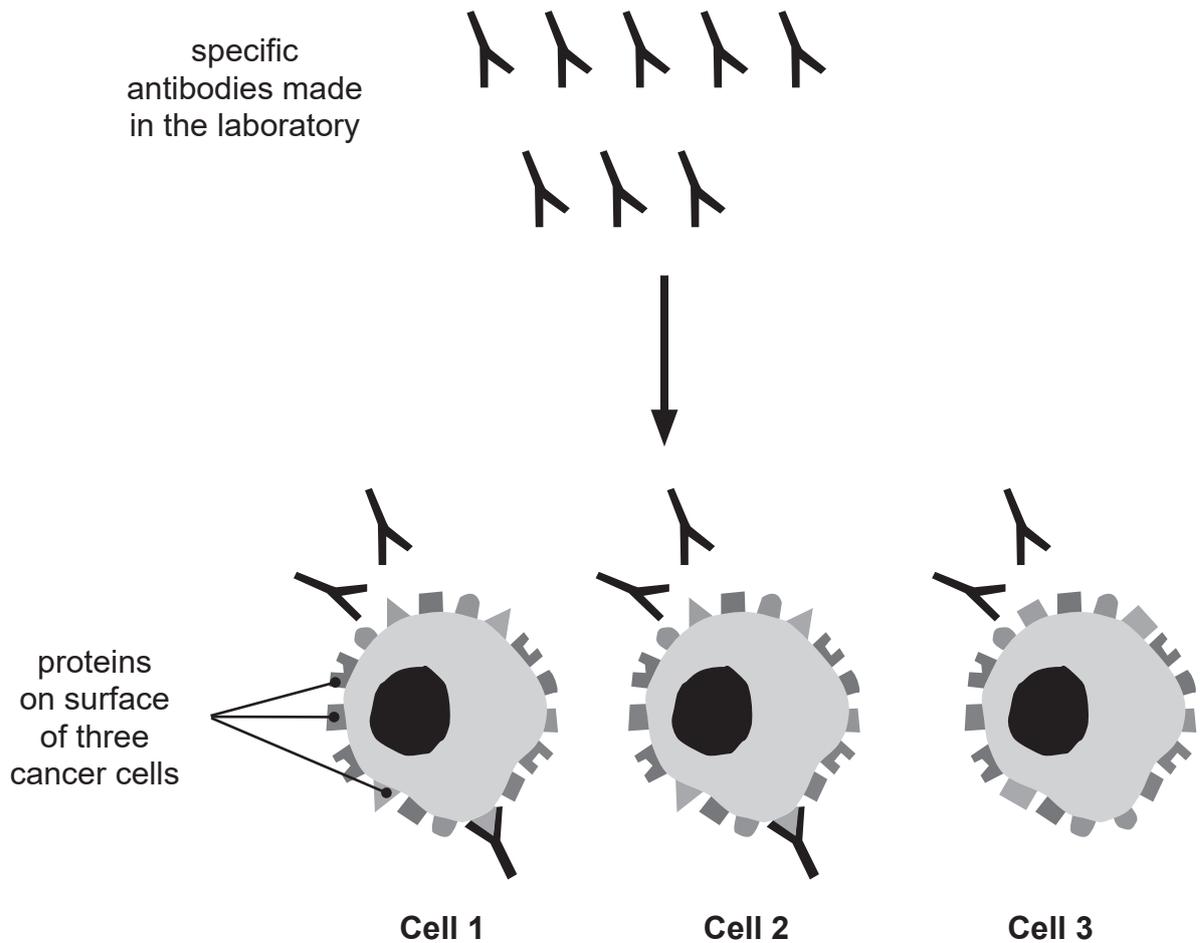
(b) A new form of treatment for cancer is immunotherapy.

Immunotherapy uses antibodies to treat skin cancer.

These antibodies are made in a laboratory.

Once in the body, these antibodies behave like normal antibodies.

The diagram shows how these antibodies help to treat skin cancer in a patient.



Source: Chief Examiner

Use the diagram and your knowledge to answer the following questions.

(i) Name the type of white blood cell which produces antibodies.

[1]



(ii) What term is used to describe the proteins on the surface of the cancer cells?

[1]

(iii) Describe the action of the antibodies on the cancer cells 1 and 2 in this patient.

[2]

(iv) Immunotherapy may not be completely successful at treating all of these cancer cells in this patient.

Use evidence from the diagram to explain why.

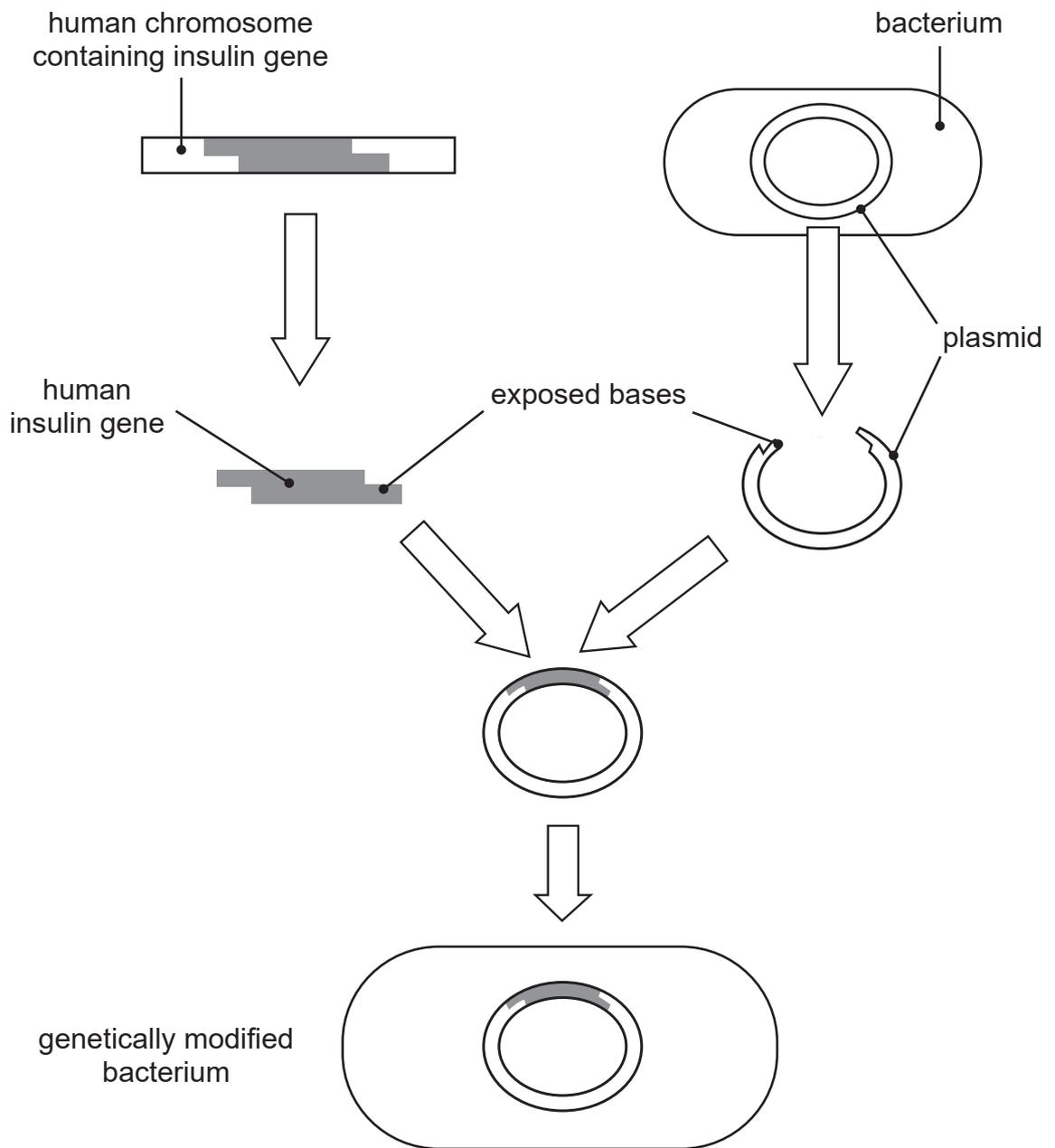
[4]

[Turn over



9 (a) Genetic engineering is used to produce human insulin.

The diagram shows some of the stages in genetic engineering.



The same enzyme is used to cut out the human insulin gene and to cut open the plasmid.

(i) Name this enzyme.

[1]

(ii) Use the diagram to explain why the same enzyme is used to cut out the human insulin gene and to cut open the plasmid.

[3]

Insulin is needed to treat diabetes.

Before genetically engineered insulin was produced, the insulin needed to treat diabetes was obtained from animals.

(b) Give **two** advantages of producing human insulin by genetic engineering to treat diabetes rather than using insulin from animals.

1. _____

2. _____

[2]

[Turn over



10 (a) Tuberculosis is a disease which affects the lungs.

(i) Name the type of microorganism which causes tuberculosis.

[1]

(ii) Describe how tuberculosis is spread.

[1]

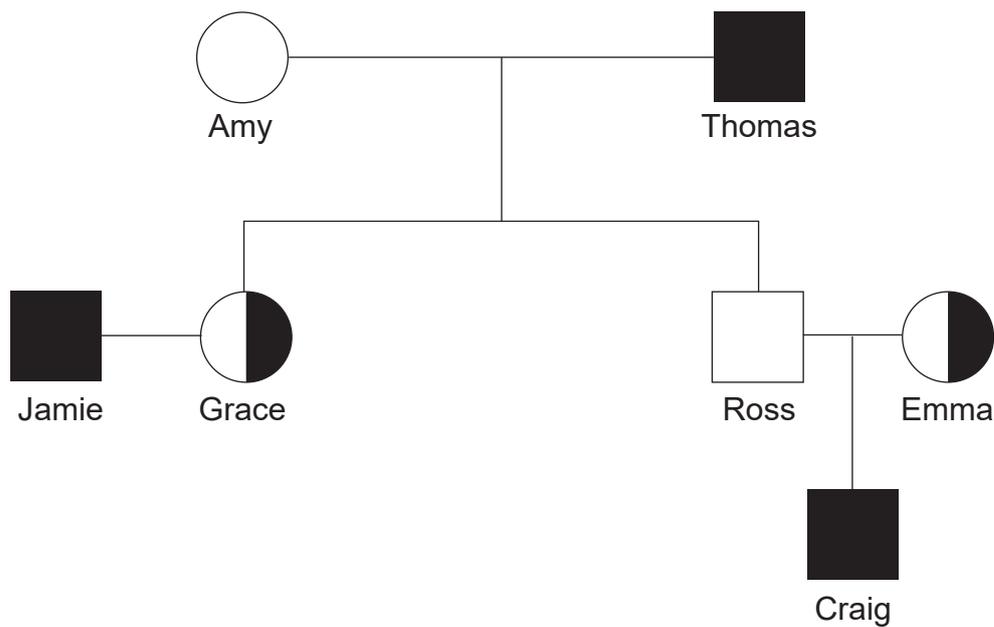


11 Haemophilia is a recessive sex-linked condition.

(a) Describe how haemophilia affects the body.

[1]

(b) The diagram shows the inheritance of haemophilia in a family.



Let X^H represent a chromosome carrying the normal allele.

Let X^h represent a chromosome carrying the haemophilia allele.

Key	
Normal male	
Normal female	
Haemophiliac male	
Carrier female	

(i) Name this type of diagram.

[1]



(ii) Explain why the allele for haemophilia is described as sex-linked.

[1]

(iii) Explain why Ross is a normal male even though his father has haemophilia.

[2]

(c) Jamie and Grace are expecting a child.

(i) Complete the Punnett square to show Jamie's and Grace's gametes and the possible genotypes of the child.

		Grace's gametes	
Jamie's gametes			
	Y		

[4]

(ii) Jamie and Grace's first child is a normal male.

What is the probability that their second child is a male with haemophilia?

[1]

[Turn over



(d) Explain why there are fewer females than males with haemophilia in a population.

[3]

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For Examiner's use only	
Question Number	Marks
1	
2	
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11	

Total Marks	
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Examiner Number

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