



General Certificate of Secondary Education  
2022

Centre Number

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Candidate Number

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# Biology

Unit 2  
Foundation Tier



[GBL21]

\*GBL21\*

**WEDNESDAY 15 JUNE, MORNING**

## TIME

1 hour 30 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 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 4.



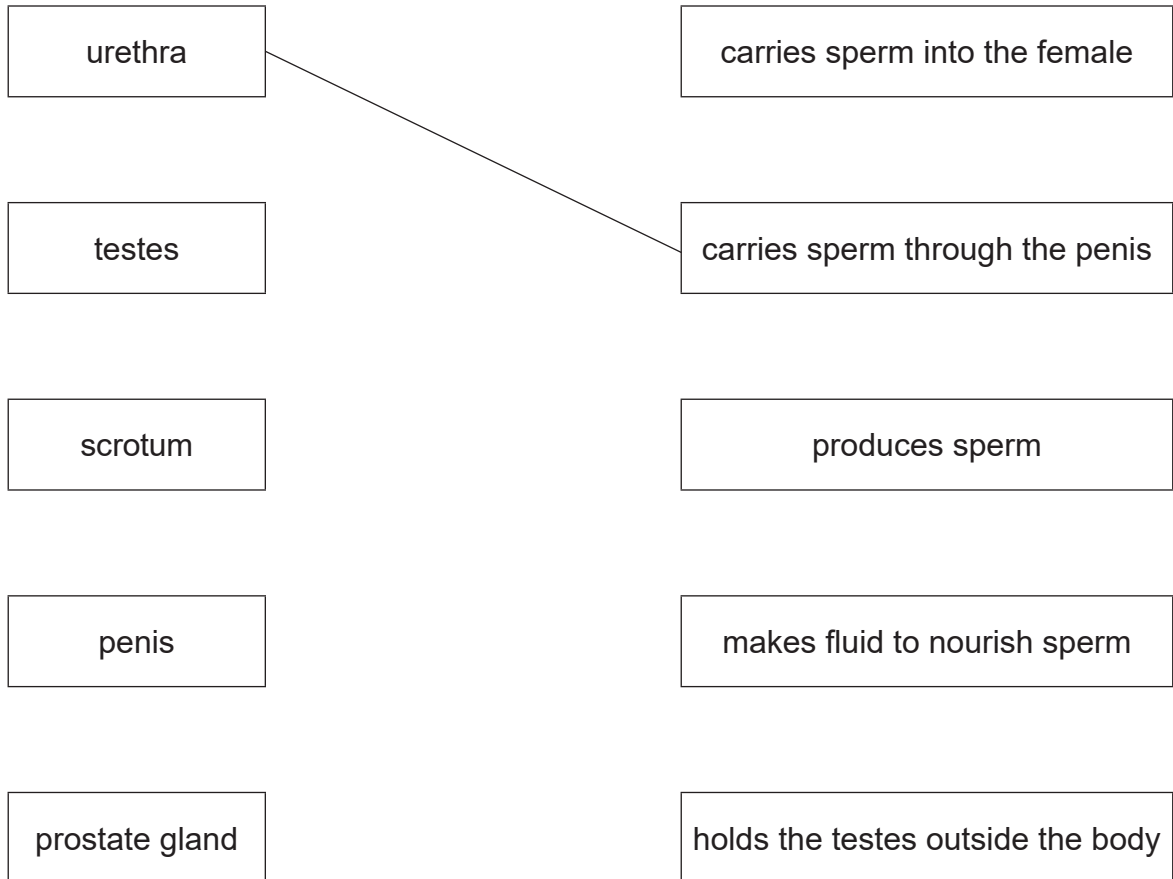
1 The parts of the male reproductive system have different functions.

Draw a straight line to link each part of the male reproductive system to its correct function.

The line linking the urethra to its function has been done for you.

**Part of male reproductive system**

**Function**

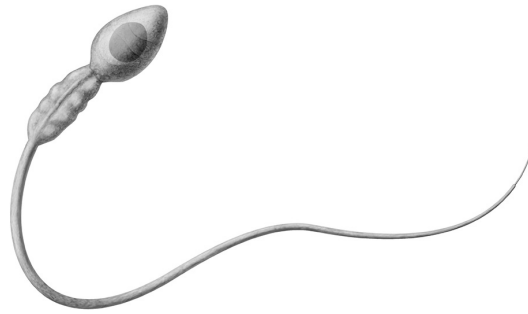


[3]



2 (a) The drawing shows a sperm cell.

The function of a sperm cell is to carry out fertilisation.



(i) What is fertilisation?

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[2]

(ii) Where in the female reproductive system does fertilisation take place?

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[1]

Look at the drawing.

(b) Give **two** adaptations of the sperm cell shown in the drawing.

Describe how these adaptations help the sperm cell to carry out fertilisation.

Adaptation \_\_\_\_\_

Description \_\_\_\_\_

\_\_\_\_\_

Adaptation \_\_\_\_\_

Description \_\_\_\_\_

\_\_\_\_\_

[4]

[Turn over



3 (a) Tobacco smoke contains chemicals such as nicotine which can have a harmful effect on the body.

(i) Give **two** ways nicotine affects the body.

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

(ii) Name the chemical in tobacco smoke which can cause lung cancer.

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

(iii) Name the gas found in tobacco smoke which reduces the ability of red blood cells to carry oxygen.

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

(b) The table shows the percentage of males and females of different age groups who binge drink.

Age group /years	Percentage of males and females who binge drink	
	Males	Females
16–24	29	23
25–44	26	20
45–64	22	15
65 and over	6	2

(i) What is binge drinking?

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

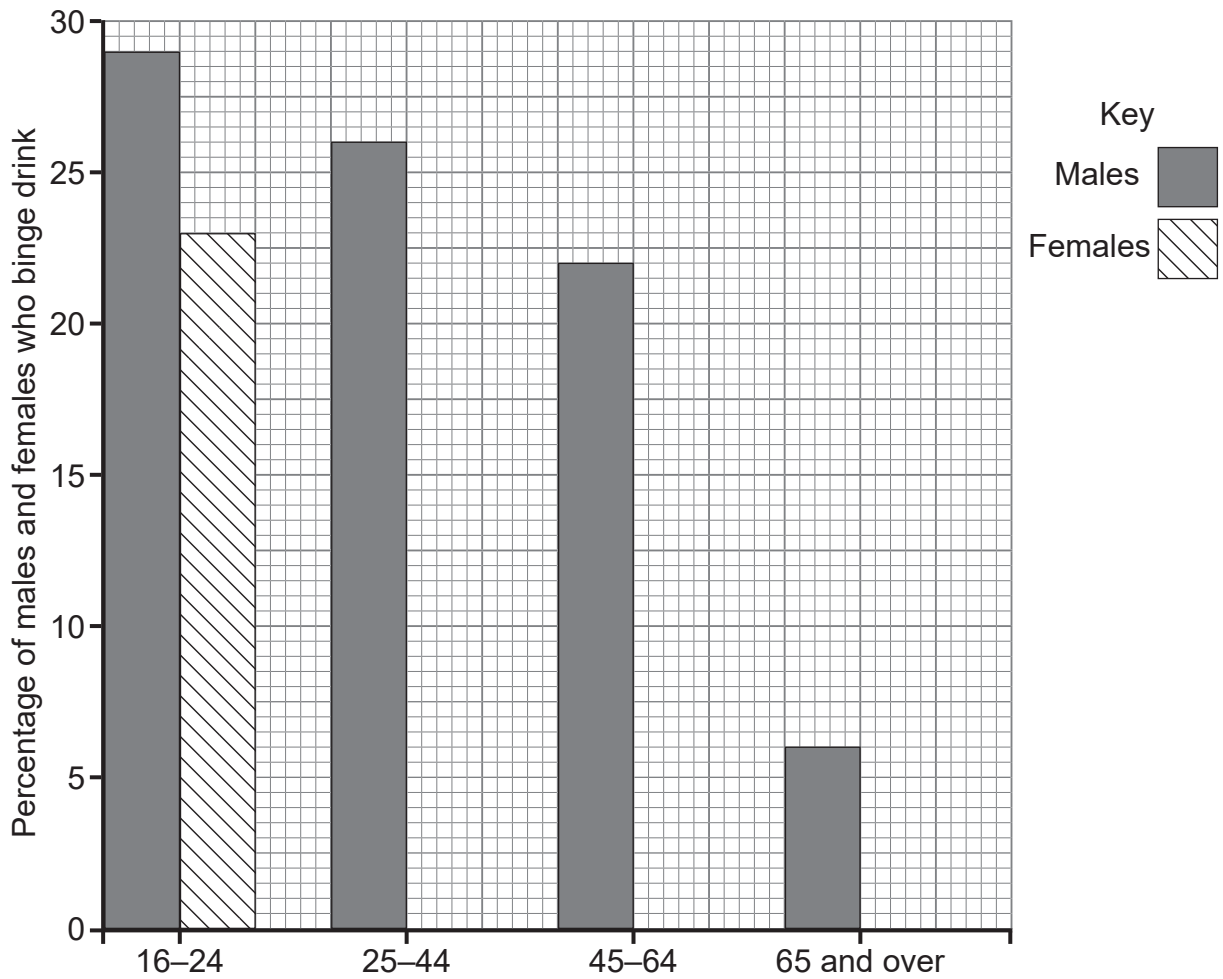


Look at the table.

(ii) Use the data from the table to complete the bar chart by

- labelling the x-axis, including units, in the box provided.
- plotting the bars for females.

The 16–24 years age group has been done for you.



[4]

[Turn over



Look at the bar chart.

(iii) Give **one similarity** and **one difference** between the trends shown for males and females.

Similarity \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Difference \_\_\_\_\_

\_\_\_\_\_

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





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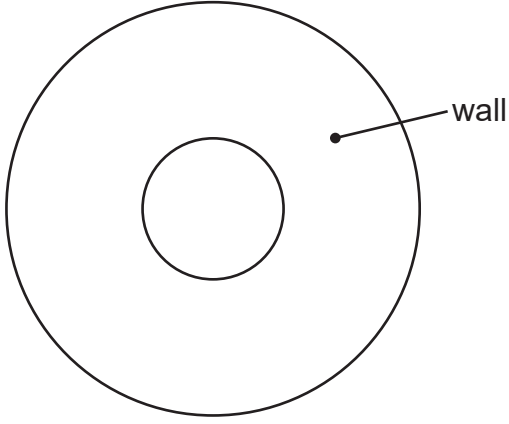
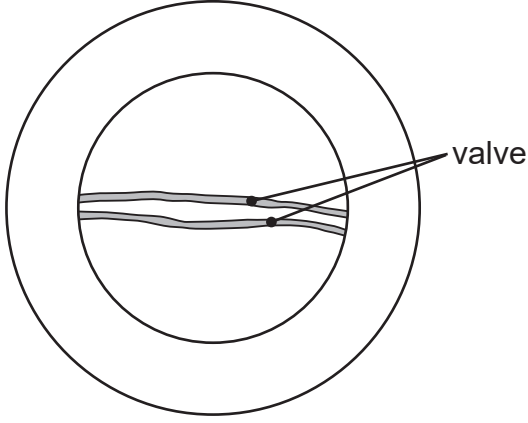
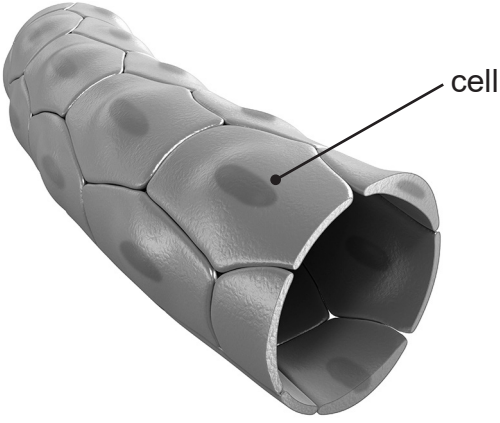
13183.06 R



\*28GBL2107\*

4 The diagrams show sections through an artery, a vein and a capillary.

The diagrams are not drawn to the same scale.

artery	 <p>Source: © CCEA</p>
vein	 <p>Source: © CCEA</p>
capillary	 <p>© Maurizio De Angelis / Science Photo Library</p>



Look at the diagrams.

Use the diagrams and your knowledge to describe how an artery, a vein and a capillary are adapted to their functions.

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

**Artery** \_\_\_\_\_

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**Vein** \_\_\_\_\_

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**Capillary** \_\_\_\_\_

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[6]

**[Turn over**



5 (a) Deer mice live in sand dunes in Nebraska, U.S.A.

They can have a light golden-brown coat colour or a dark brown coat colour.

Their coat colour is controlled by a gene.

Deer mice are preyed on by hawks.

(i) Use the information about coat colour in deer mice to explain what is meant by variation.

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[2]

(ii) Suggest the **type** of variation shown by coat colour in deer mice.

Circle the correct answer.

continuous                  gradual                  discontinuous                  [1]

(b) Scientists counted the number of deer mice of each coat colour in an area of sand dunes and in a surrounding area of darker soil.

The table shows their results.

Habitat	Coat colour of deer mice	
	light golden-brown	dark brown
sand dunes	122	37
surrounding area of darker soil	27	109



Look at the table.

- (i) Describe **one** trend in the distribution of deer mice with a light golden-brown coat.

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[1]

- (ii) Explain how natural selection may have led to the distribution of deer mice with a light golden-brown coat in the sand dunes.

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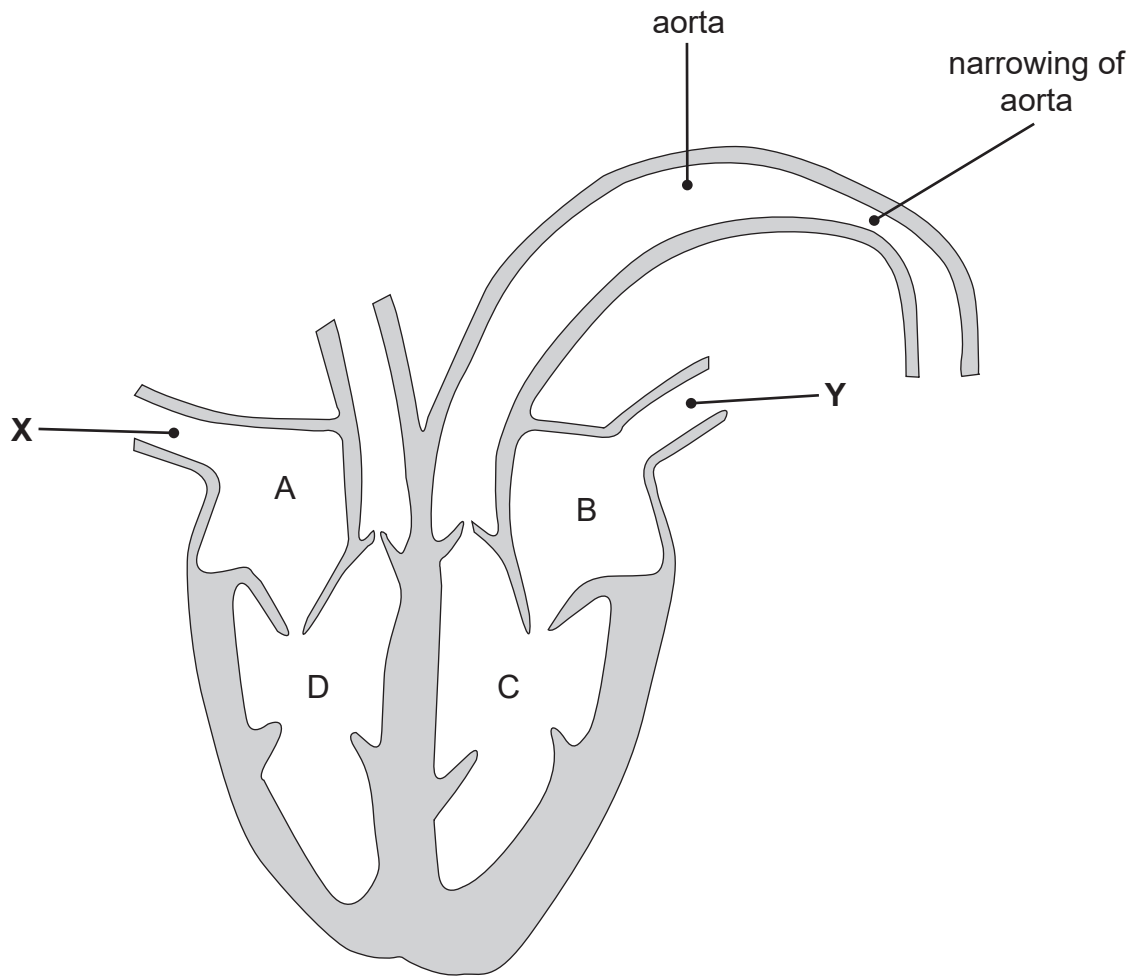
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[4]

[Turn over



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



Source: © CCEA

Look at the diagram.

(i) Name blood vessels X and Y.

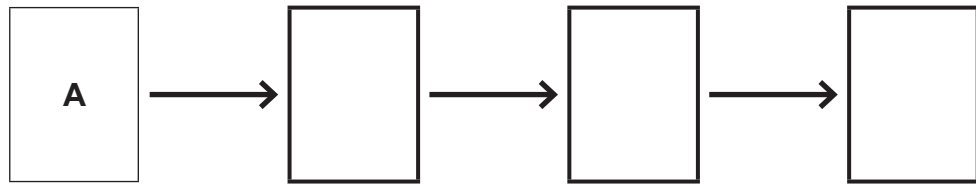
X \_\_\_\_\_

Y \_\_\_\_\_

[2]



- (ii) Complete the diagram by writing letters in the boxes to show the direction of blood flow through the chambers of the heart.



[3]

- (b) As well as transporting digested food and oxygen, blood distributes heat around the body.

Some babies are born with a heart condition which causes the aorta to become narrower.

One of the symptoms of this condition is cold legs and feet.

- (i) Suggest how **narrowing of the aorta** causes this symptom.

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[1]

These babies' hearts often have a thicker left ventricle wall than healthy babies.

- (ii) Suggest why.

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[2]

[Turn over



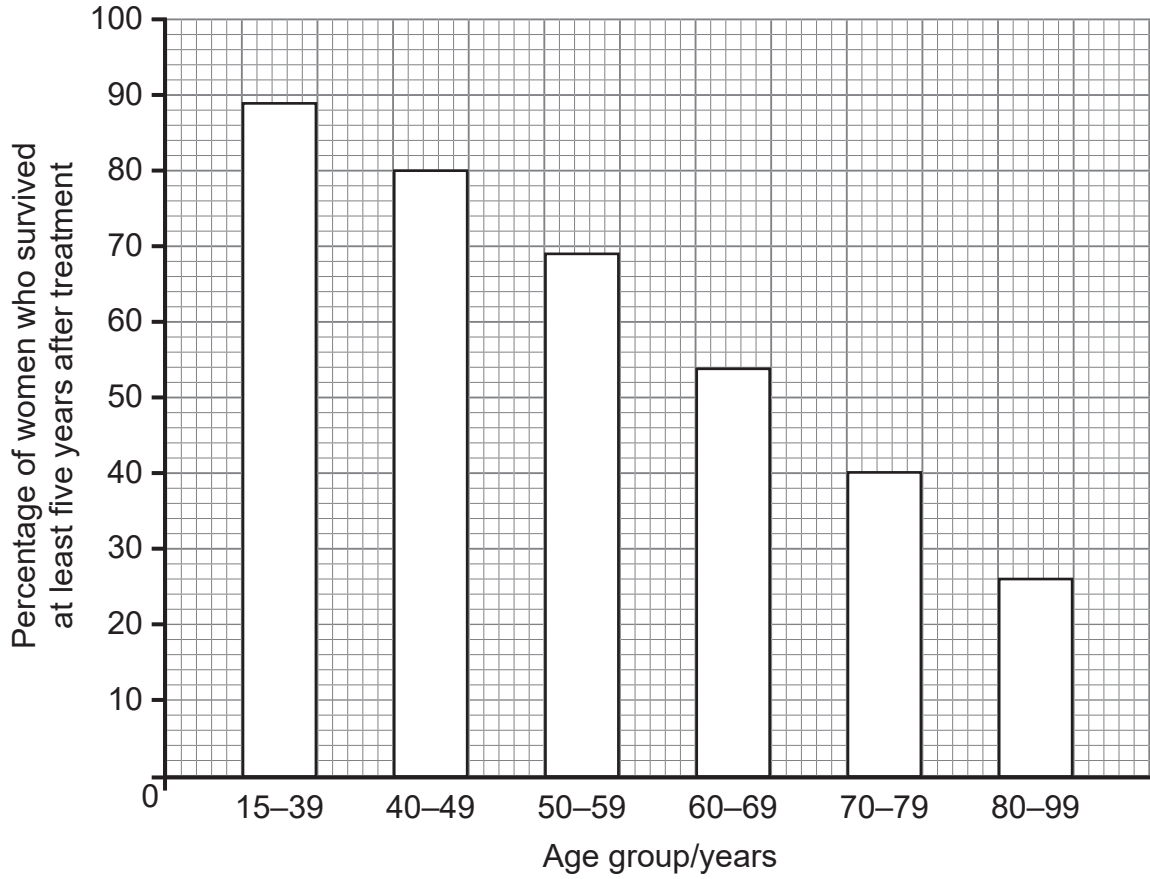
7 (a) What is cancer?

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[2]

(b) The bar chart shows the percentage of women of different age groups who survived at least five years after treatment for cervical cancer.



Look at the bar chart.

- (i) How many women aged 40–49 from a group of 5000 would be expected to survive at least five years after treatment for cervical cancer?

Show your working.

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

Screening programmes have resulted in an increased percentage of women surviving cervical cancer for at least five years.

- (ii) Suggest why.

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[3]



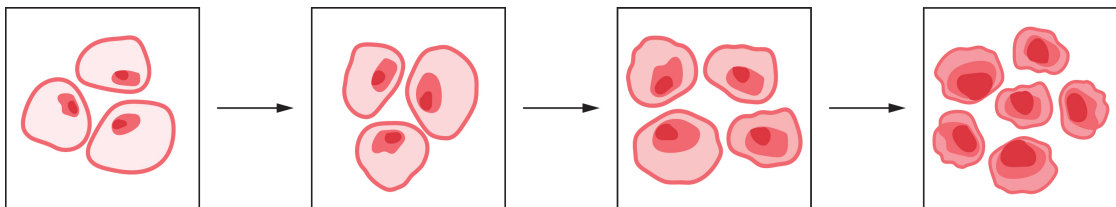
(c) Cervical cancer may be caused by some types of the human papilloma virus (HPV).

HPV can be passed on from one person to another during sexual intercourse.

The diagram shows how HPV affects cells in the cervix, causing them to develop into cancer cells.

**normal cells**

**cancer cells**



Look at the diagram.

(i) Give **two** differences between the **structure** of a cancer cell and a normal cell.

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

An HPV vaccine is given to 12-year-old children.

(ii) Suggest why the vaccine is given to children as young as 12 years old.

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





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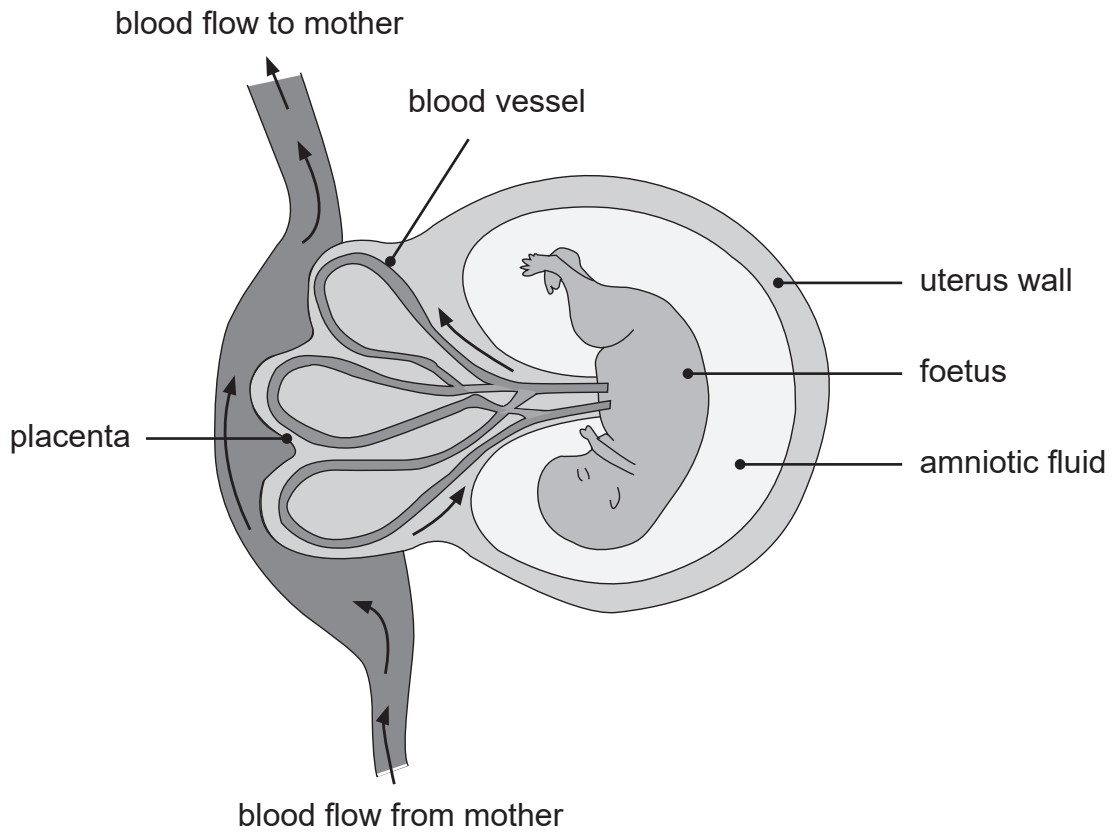
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**[Turn over**



8 The diagram shows some ways the placenta is adapted for the exchange of substances between the mother and the foetus.



Look at the diagram.

(a) Describe and explain **one** way the placenta is adapted for the exchange of substances.

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[2]



(b) Give the function of amniotic fluid.

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[1]

(c) (i) Name **two** substances which are exchanged from the mother to the foetus.

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

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

(ii) Name **two** substances which are exchanged from the foetus to the mother.

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

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



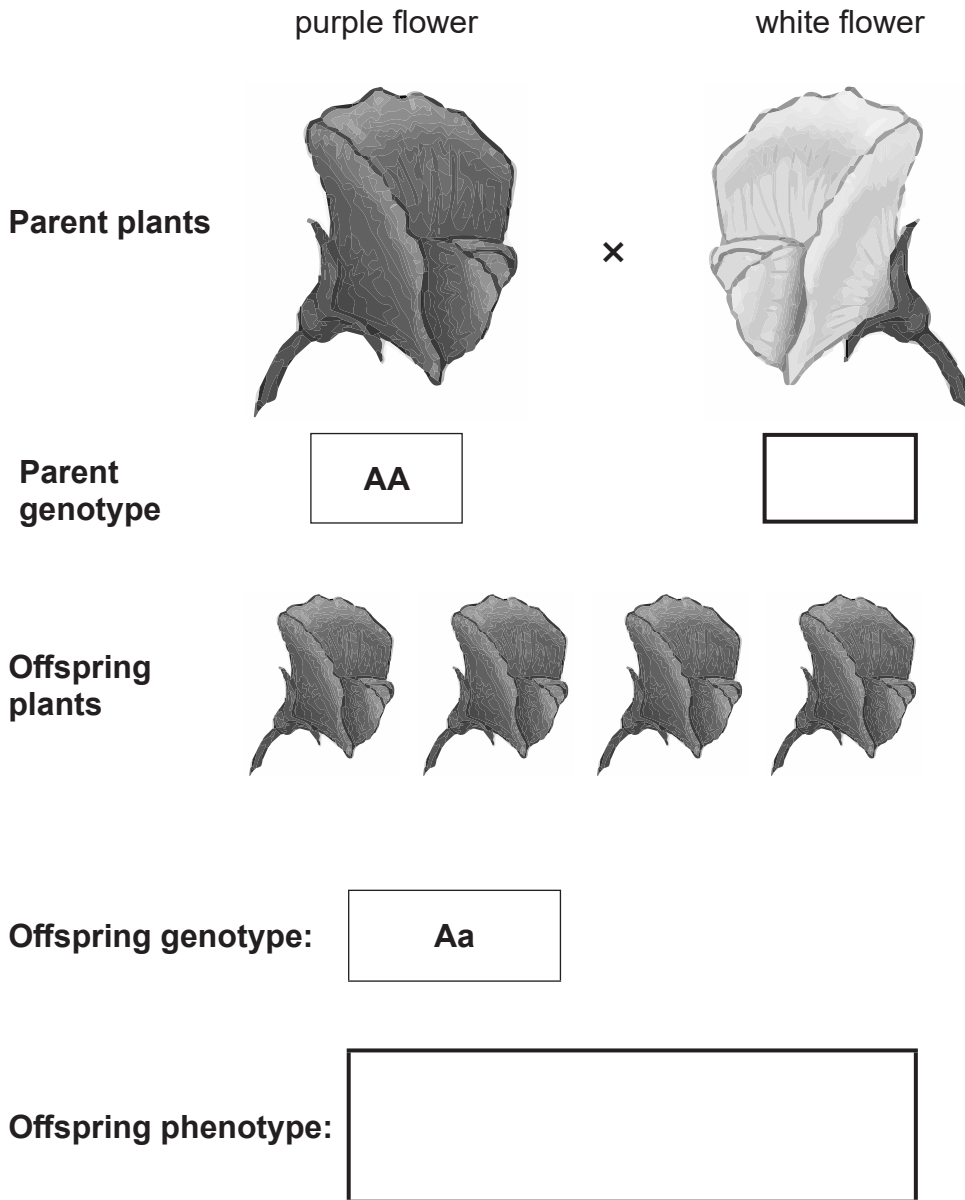
9 Flowers of the pea plant can be purple or white.

The allele for purple flowers is dominant to the allele for white flowers.

A gardener crossed a pea plant with purple flowers and a pea plant with white flowers.

Let **A** represent the allele for purple flowers.

Let **a** represent the allele for white flowers.



Look at the diagram opposite.

(a) Complete this diagram by writing in the boxes

- the parent genotype of the white flower.
- the offspring phenotype.

[2]

(b) The gardener then crossed two offspring plants.

(i) Complete the diagram below to show this cross.

Types of gamete	A	a

[3]

(ii) Name this type of diagram.

\_\_\_\_\_

[1]

(iii) What proportion of the offspring are heterozygous?

\_\_\_\_\_

[1]

(iv) Draw a circle around the genotype of the homozygous dominant offspring.

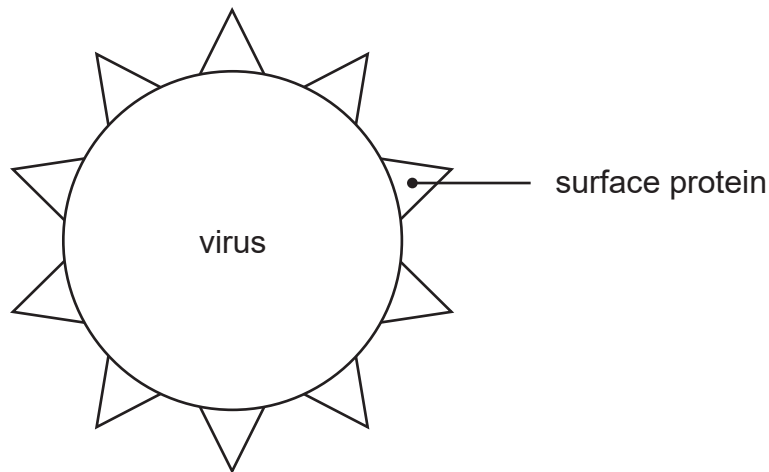
AA      Aa      aa

[1]

[Turn over



10 (a) The diagram shows one strain of the flu virus.



Look at the diagram.

(i) What term is given to the proteins found on the surface of a virus?

\_\_\_\_\_

[1]

The flu vaccine contains weakened viruses which are injected into the body. White blood cells respond to the weakened viruses and produce antibodies.

(ii) Explain why the viruses used in the vaccine must be weakened.

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

(iii) Name the type of immunity produced by the flu vaccine.

\_\_\_\_\_

[1]

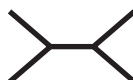


(iv) Name the type of white blood cell which produces antibodies.

[1]

\_\_\_\_\_

(v) Draw a circle around the type of antibody which would be produced in response to this flu virus.



[1]

(vi) Describe and explain the action of this type of antibody on the flu virus.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

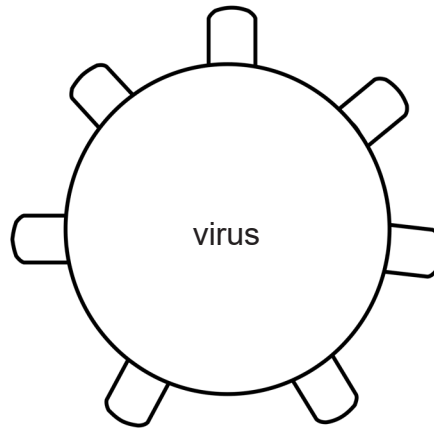
[3]

[Turn over



(b) Every year a different strain of the flu virus forms.

The diagram shows a new strain of the flu virus.



Look at the diagram.

(i) Describe **two** ways the new strain of the virus differs from the original strain.

1. \_\_\_\_\_  
\_\_\_\_\_
  2. \_\_\_\_\_  
\_\_\_\_\_
- [2]

(ii) Use the diagram to explain why a new flu vaccine has to be given every year.

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





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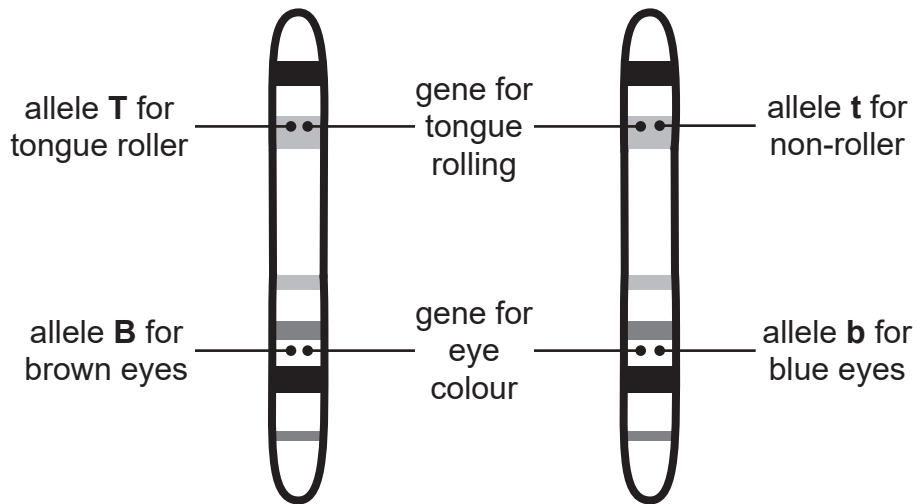
**[Turn over**

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11 The diagram shows a pair of chromosomes.



Look at the diagram.

(a) Use evidence from the diagram to explain what is meant by

a gene. \_\_\_\_\_ [1]

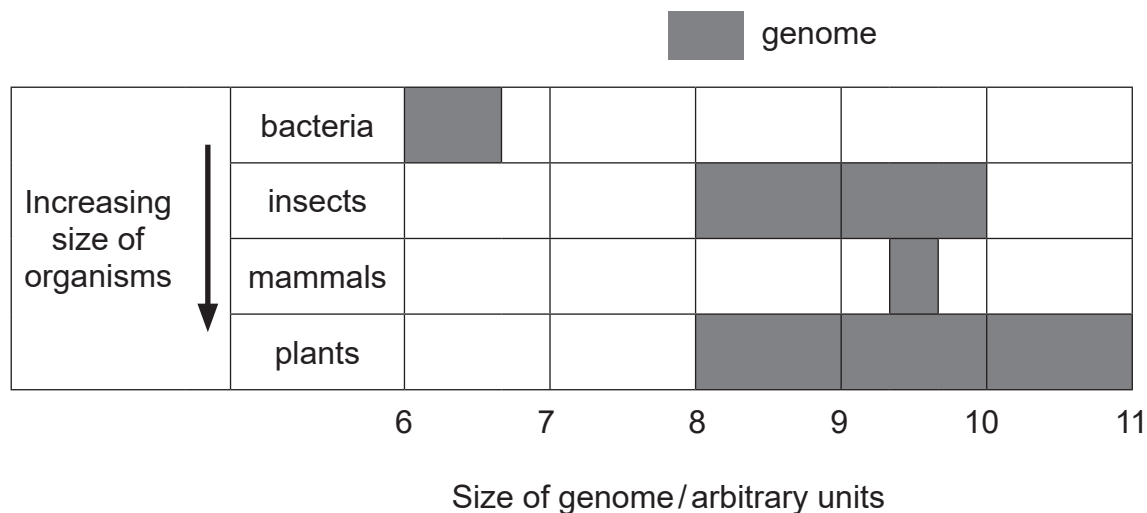
an allele. \_\_\_\_\_ [1]

(b) (i) What is a genome?

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



The diagram shows the range in size of the genomes for four groups of organisms.



Look at the diagram.

(ii) Which group of organisms has the smallest genome?

\_\_\_\_\_

[1]

(iii) Which group of organisms has the smallest **range** of sizes of genome?

\_\_\_\_\_

[1]

A student examined the diagram and claimed that the larger the genome, the bigger the organism.

(iv) Name a group of organisms which does not fit this trend.

Use evidence from the diagram to support your answer.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[2]



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Question Number	Marks
1	
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<b>Total Marks</b>	
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Examiner Number

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