

Please write clearly in block capitals.

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I declare this is my own work.

INTERNATIONAL GCSE BIOLOGY

Paper 1

Wednesday 28 October 2020 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a ruler with millimetre measurements
- a scientific calculator.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against the answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- There are 90 marks available on this paper.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

Advice

In all calculations, show clearly how you work out your answer.



Answer **all** questions in the spaces provided.

0 1 There are different types of animal behaviour.

0 1 . 1 Which statement describes innate behaviour?

Tick (✓) **one** box.

[1 mark]

Behaviour an animal develops by problem solving.

Behaviour an animal is born with.

Behaviour an animal learns as it gets older.

0 1 . 2 Which of the following is an example of imprinting?

Tick (✓) **one** box.

[1 mark]

A bird chooses a mate and stays with that mate for life.

A bird follows the first moving object it sees after hatching.

A bird stops responding to a noise if there is no reward.

0 1 . 3 Parental care of the young is an example of reproductive behaviour.

What is **one** advantage of parental care?

Tick (✓) **one** box.

[1 mark]

Increased chance of offspring surviving.

Less chance of parental genes being passed to offspring.

Only one individual is needed as a parent.



0 1 . 4

Conditioning is a type of animal behaviour.

Training sniffer dogs is one example of conditioning.

A dog trainer hides a scented cloth. The trainer gives the dog a ball to play with each time the dog finds the scented cloth.

Why does the trainer give the dog a ball to play with each time the dog finds the scented cloth?

[1 mark]

0 1 . 5

There are many different breeds of dog.

Table 1 shows three different breeds of dogs and some of their characteristics.

Table 1

Breed A	Breed B	Breed C
125 million smell receptors	190 million smell receptors	225 million smell receptors
Very intelligent	Very intelligent	Very intelligent
Long fur	Short fur	Short fur
Difficult to train	Moderately difficult to train	Very easy to train

Suggest what breed is most suited to become a sniffer dog.

Give **two** reasons why the breed you chose is better suited than the other two breeds.

[3 marks]

Breed _____

Reason 1 _____

Reason 2 _____

Turn over ►



0 1 . 6 The dogs were used to search ships arriving at a port.

The dogs identified 2 366 places where there might be drugs.

Drugs were only found at 348 places.

Calculate the percentage of places where dogs correctly detected drugs.

[2 marks]

Percentage of places correctly identified = _____ %

0 1 . 7 Give **one** example of conditioning to train an animal.

Do **not** refer to sniffer dogs in your answer.

[1 mark]

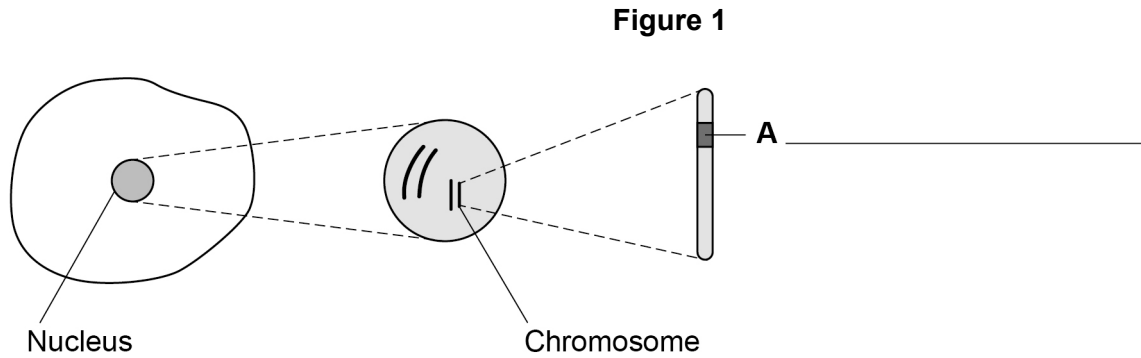
10



0 2

This question is about cells.

0 2 . 1

Figure 1 shows an animal cell and some of the structures inside the cell.Label part **A** in **Figure 1**.

Choose the answer from the box.

[1 mark]

gene	ribosome	vacuole
------	----------	---------

0 2 . 2

Which **two** are parts of an animal cell?Tick (✓) **two** boxes.

[2 marks]

Cell membrane

Cell wall

Chloroplast

Cytoplasm

Plasmid

Turn over ►



0 2 . 3 How many pairs of chromosomes are there in a human body cell?

Tick (✓) **one** box.

[1 mark]

23

36

92

0 2 . 4 Human body cells divide by mitosis.

Complete **Table 2**.

Tick (✓) **one** box in each row to show if the statement about mitosis is true or false.

[2 marks]

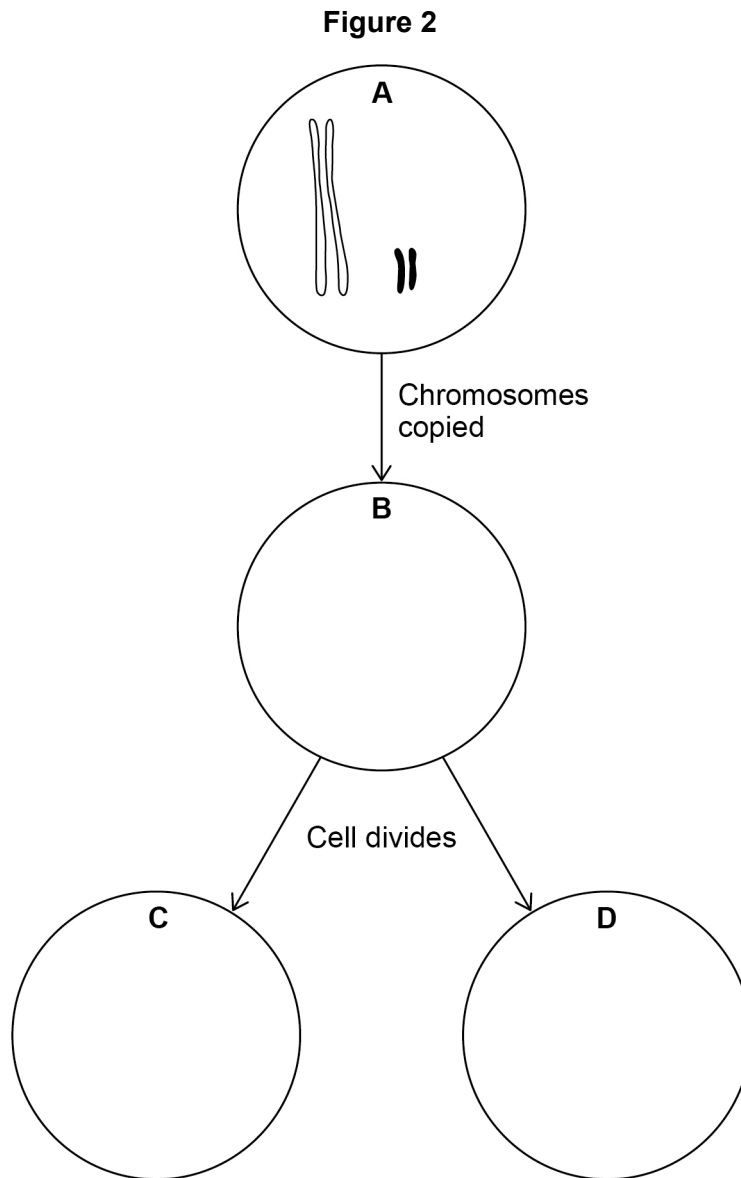
Table 2

Statement about mitosis	True	False
Produces cells for growth		
Produces gametes		
Produces replacement cells		



Figure 2 shows how a cell divides by mitosis.

The cell has four chromosomes.



0 2 . 5

Complete **Figure 2** to show the chromosomes in cell **B**, cell **C** and cell **D**.

[3 marks]

0 2 . 6

Give **one** way the diagram in **Figure 2** would be different if cell **A** divided by meiosis.

[1 mark]

10

Turn over ►



0 3

This question is about diffusion.

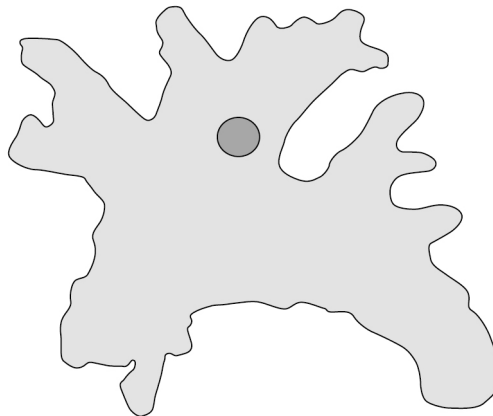
0 3 . 1

Describe what is meant by diffusion.

[2 marks]

0 3 . 2

An amoeba is a single-celled organism that lives in water.

Figure 3 shows an amoeba.**Figure 3**

An amoeba obtains oxygen by diffusion through its cell surface.

An amoeba gets enough oxygen by diffusion because it has a large surface area to volume ratio.

The volume of the amoeba is $1.25 \times 10^{-13} \text{ m}^3$ The surface area of the amoeba is $6.0 \times 10^{-8} \text{ m}^2$

Calculate the surface area to volume ratio of the amoeba.

[1 mark]

surface area : volume ratio = _____ : 1



0 3 . 3 Name **one** substance that moves into or out of cells by diffusion.

Do **not** refer to oxygen in your answer.

[1 mark]

0 3 . 4 Larger organisms have organs which are specialised for gas exchange.

Explain **one** way the lungs of mammals are specialised for gas exchange.

[2 marks]

Question 3 continues on the next page

Turn over ►



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12

Turn over for the next question

Turn over ►

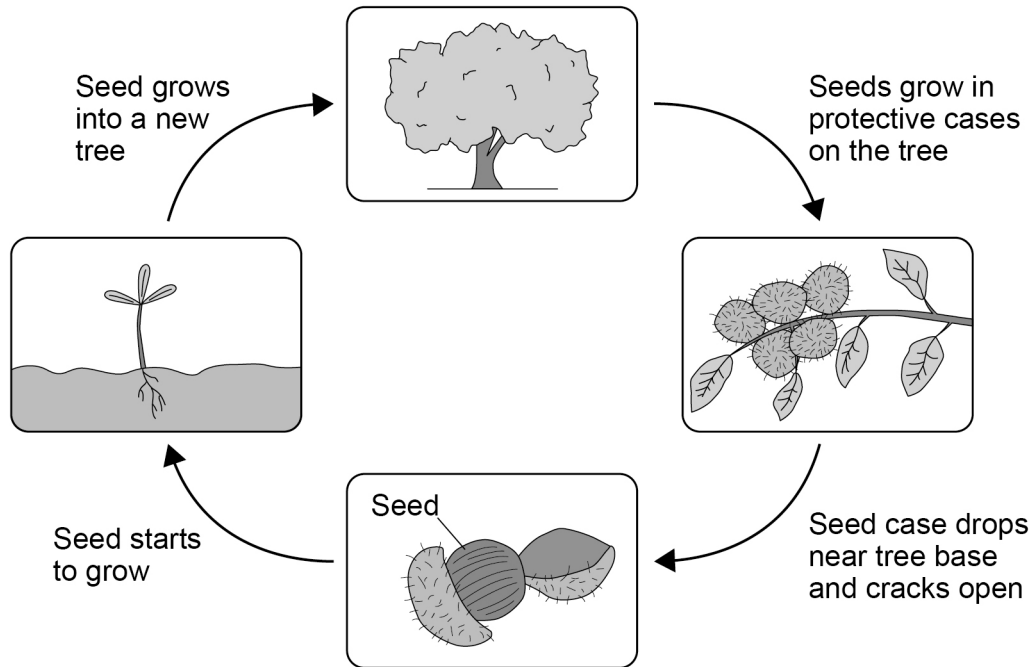


0 4

Sweet chestnut trees are large trees.

Figure 5 shows the life cycle of a sweet chestnut tree.

Figure 5



0 4 . 1

Animals may move the seed to another area after the seed has fallen to the ground.

Give **two** reasons why it is an advantage for the new tree to grow in a different area away from the parent tree.

[2 marks]

1 _____

2 _____



Figure 6 shows a protective case covering a sweet chestnut seed.

Figure 6



0 4 . 2 Explain how **one** feature of the protective case helps the seed to survive.

[2 marks]

Feature _____

How it helps the seed to survive _____

Question 4 continues on the next page

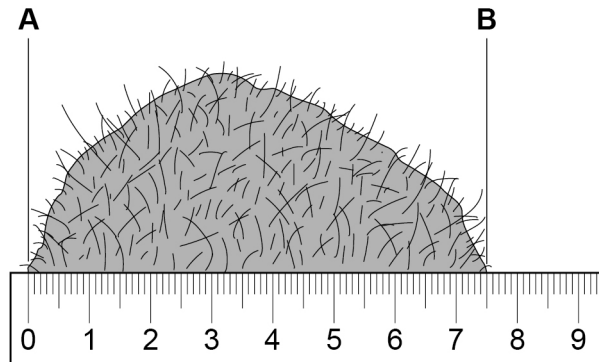
Turn over ►



A student measured the width of a sweet chestnut seed case between points **A** and **B**.

Figure 7 shows the sweet chestnut seed case and a section of the ruler the student used.

Figure 7



The student measured the maximum width of the sweet chestnut seed case as 73 mm.

The student did **not** measure the width correctly.

0 4 . 3 Write the true value in **Table 3**.

[1 mark]

Table 3

	Width between points A and B in mm
Student's measured value	73
True value	

0 4 . 4 What is the measurement error of the student's value in **Table 3**?

[1 mark]

Measurement error = _____ mm



0 4 . 5

The diameter of a different sweet chestnut seed case was 62 mm.

Calculate the volume of the sweet chestnut seed case.

Assume the sweet chestnut seed case is a sphere.

Use the equation:

$$V = \frac{4}{3} \pi \times r^3$$

Where r = the radius

Use $\pi = 3.14$

Give your answer in standard form.

[4 marks]

Volume (in standard form) = _____ mm³

10

Turn over for the next question

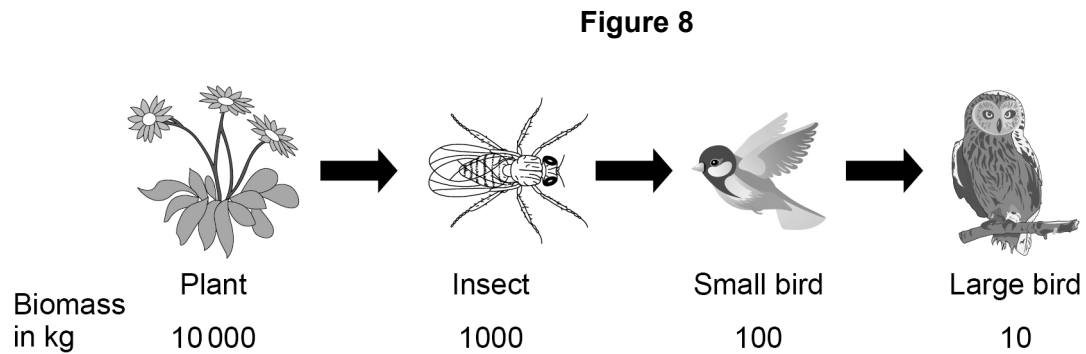
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0 5

This question is about food chains.

Figure 8 shows a food chain.



0 5

1

What percentage of biomass is transferred between the plant and the insect in Figure 8?

[1 mark]

Percentage of biomass = _____ %

0 5

2

Give **two** reasons why some of the biomass from the insect is **not** transferred to the small bird.

[2 marks]

1 _____

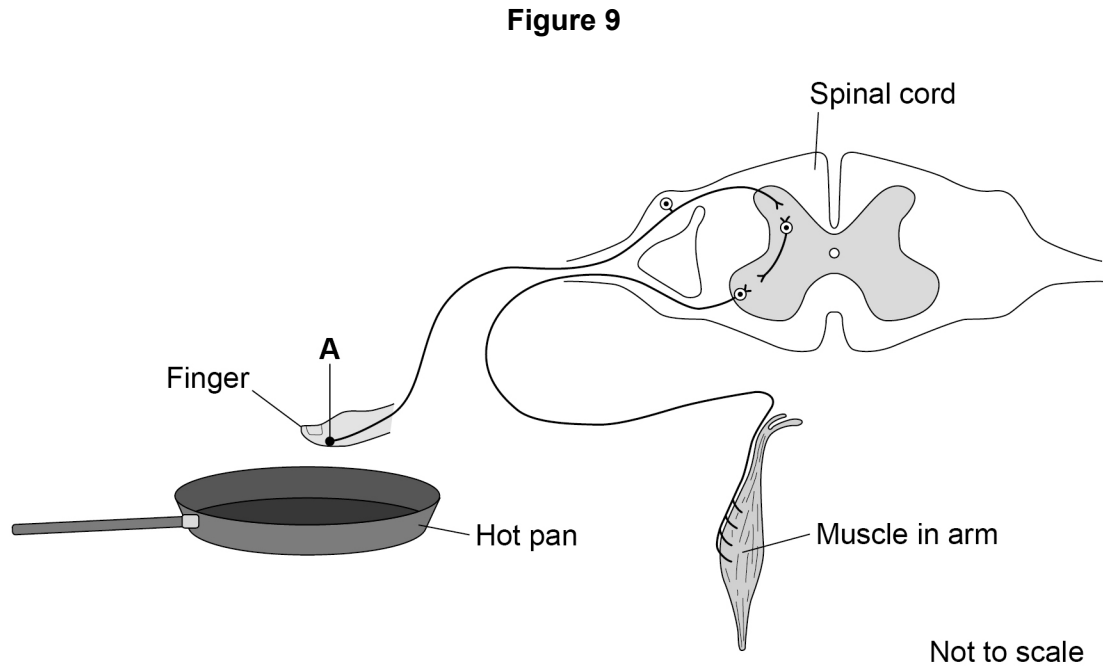
2 _____



0 6

One example of a reflex action is when a hand is quickly removed from a hot surface.

Figure 9 shows the nerve pathway involved in the reflex action.



0 6 . 1

The part labelled **A** in **Figure 9** detects the high temperature of the hot pan.

Name part **A**.

[1 mark]



Syndrome **X** is a rare disorder which causes the loss of sensory neurones.

A person with syndrome **X** cannot detect pain.

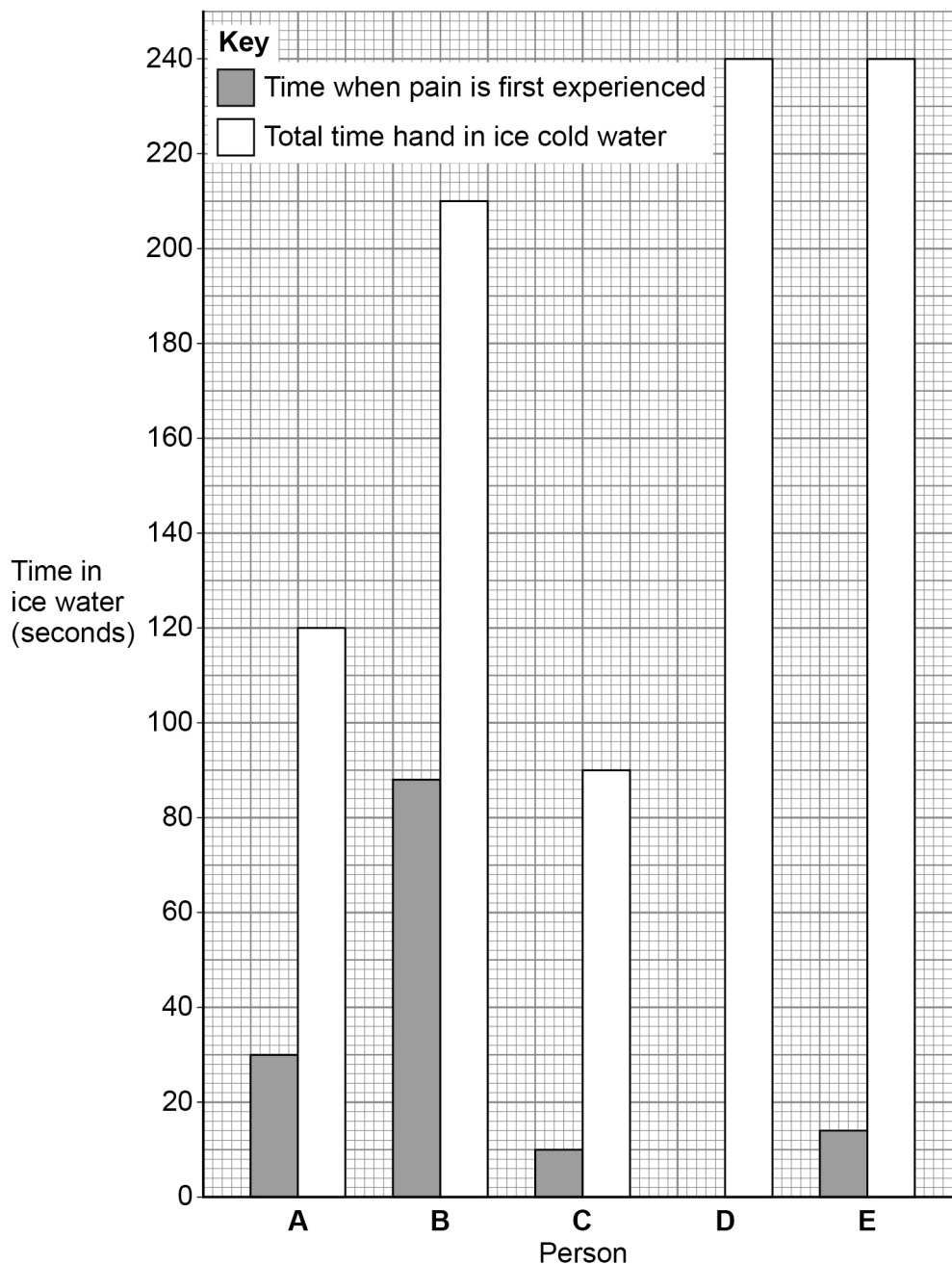
A scientist investigated the pain tolerance of five people.

This is the method used:

1. Set up a bowl of ice cold water.
2. Place the hand of one person in the water and start a stopwatch.
3. Record the time when pain is first experienced.
4. Record the time when the pain can no longer be tolerated and the person removes their hand from the water.
5. Do not allow the person to leave their hand in the water for more than 240 seconds.
6. Repeat steps 2 to 5 with the other four people.

Figure 10 shows the results.

Figure 10



0 6 . 3 Pain threshold is the time when pain is first experienced.

Pain tolerance can be calculated using the equation:

$$\text{Pain tolerance} = \text{total time hand in ice cold water} - \text{pain threshold.}$$

Calculate the pain tolerance for person **B**.

[2 marks]

Pain tolerance = _____ seconds

0 6 . 4 Suggest why people were **not** allowed to leave their hand in ice cold water for more than 240 seconds.

[1 mark]

0 6 . 5 Which person is most likely to have syndrome **X**?

Give evidence from **Figure 10** for your answer.

[2 marks]

Person _____

Evidence _____

Question 6 continues on the next page

Turn over ►



0 6 . 6 Syndrome **X** is an inherited disorder. The allele for syndrome **X** is recessive.

A man and a woman do **not** have syndrome **X**. They have a child who has syndrome **X**.

Complete the genetic diagram to show the probability that the next child of the man and the woman will have syndrome **X**.

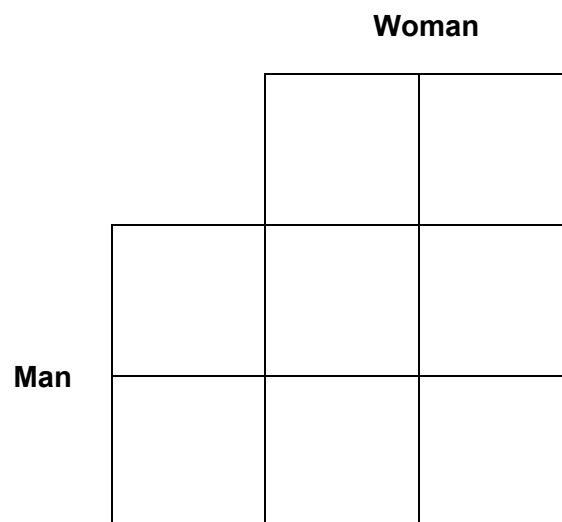
Draw a ring around any genotypes of children with syndrome **X**.

Use the following symbols:

A = dominant allele

a = recessive allele

[4 marks]



Probability = _____

14



0 7

Conditions inside the human body are kept relatively constant.

0 7 . 1

What biological term describes keeping internal conditions relatively constant?

[1 mark]

Blood glucose concentration is one condition inside the human body that needs to be kept relatively constant.

Blood glucose concentration is monitored and controlled by the pancreas.

0 7 . 2

Blood glucose concentration rises after eating.

Explain what happens to return the blood glucose concentration to normal.

[4 marks]

Question 7 continues on the next page

Turn over ►

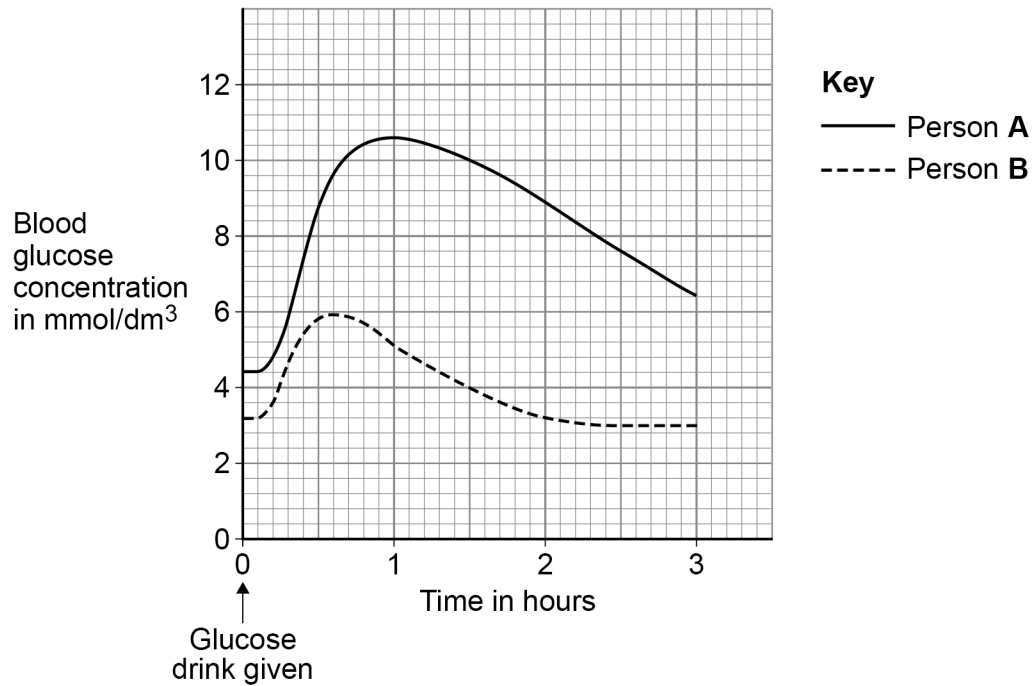


0 7 . 3 In people with Type 1 diabetes the pancreas does **not** function correctly.

Two people drank 250 cm³ of a glucose drink.

Figure 11 shows the changes in their blood glucose concentration.

Figure 11



A doctor concluded that person **A** had diabetes.

Give **three** pieces of evidence from **Figure 11** to support the doctor's conclusion.

[3 marks]

1 _____

2 _____

3 _____

8

Turn over for the next question

Turn over ►



0 8 . 1

Arteries and veins are two types of blood vessel.

Compare the structure and functions of arteries and veins.

[4 marks]

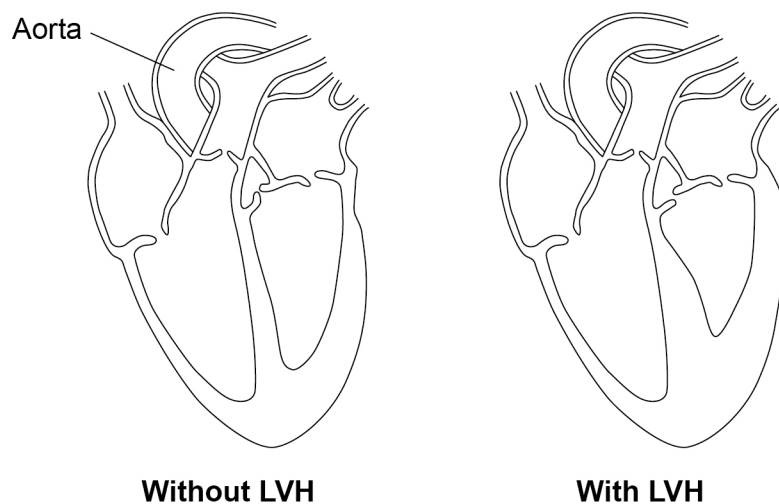
0 8 . 2

High blood pressure can cause a heart condition called left ventricular hypertrophy (LVH).

People with LVH feel tired and have little energy.

Figure 12 shows the heart from a person **without** LVH and the heart from a person **with** LVH.

Figure 12



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0 9 . 1 The stomach releases hydrochloric acid and protease enzymes.

The optimum pH for the protease enzyme is pH 2.

Explain why the protease enzyme does **not** work at pH 5.

[2 marks]

0 9 . 2 Drug **A** is used to treat painful joint conditions.

Drug **A** must be released slowly to have a long-lasting effect.

Drug **A** can damage the stomach and cause stomach ulcers.

Cellulose acetate phthalate (CAP) is a harmless chemical used to coat Drug **A** tablets.

CAP is insoluble in the pH range 1 – 6.

Explain why Drug **A** is covered with a thick CAP coating.

[3 marks]

Question 9 continues on the next page

Turn over ►



09.3

Drugs can be used to treat swelling in the eye.

Scientists carried out a trial on 90 mice with swollen eyes.

Two different drugs, **D** and **E**, were used.

The mice were put into three groups.

Group 1: given no drug.

Group 2: given drug **D**.

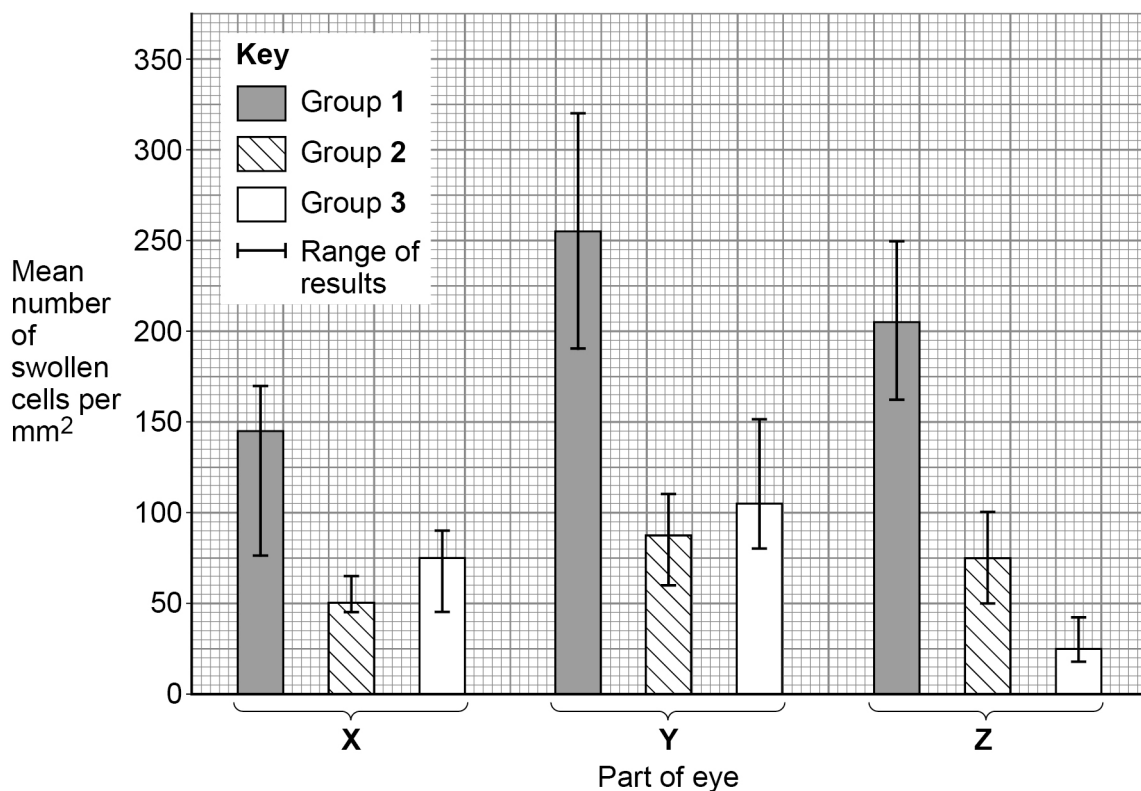
Group 3: given drug **E**.

Several samples were taken from three parts of the eye in each mouse.

The number of swollen cells per mm^2 for each part of the eye was counted.

Figure 13 shows the results.

Figure 13



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