

Please write clearly in block capitals.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL GCSE COMBINED SCIENCE

Paper 1 Biology Core

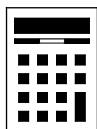
C

Wednesday 25 October 2023 07:00 GMT Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- a pencil and a ruler
- 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.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- You are expected to use a scientific calculator where appropriate.

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

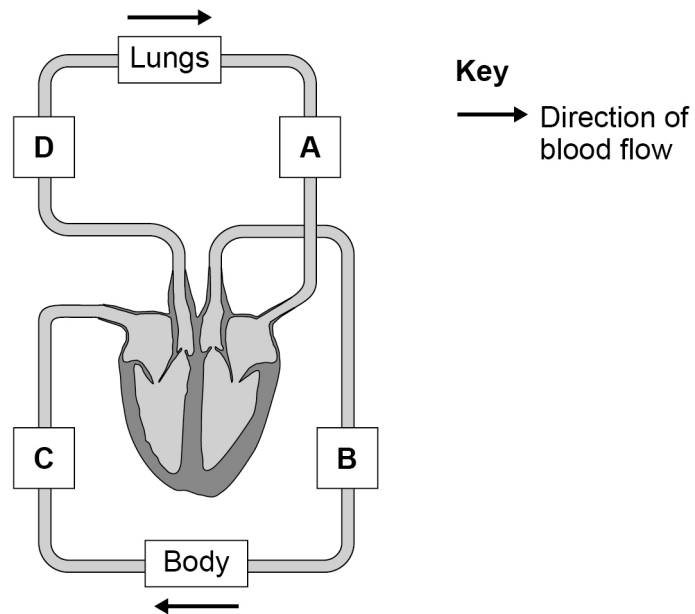


Answer **all** questions in the spaces provided.

0 1

Figure 1 shows the flow of blood around the body in blood vessels.

Figure 1



0 1 . 1

Which blood vessels carry blood **away from** the heart?

[1 mark]

Tick (✓) **one** box.

A and B

☐

A and D

☐

B and D

☐


0 1 . 2 Blood vessel **A** is the pulmonary vein.

Which blood vessel is the pulmonary artery?

[1 mark]

Tick (✓) **one** box.

B

☐

C

☐

D

☐

0 1 . 3 Which statement describes the system shown in **Figure 1**?

[1 mark]

Tick (✓) **one** box.

It is a central nervous system.

☐

It is a double circulatory system.

☐

It is a respiratory system.

☐

0 1 . 4 There are valves in the heart.

What is the function of the valves in the heart?

[1 mark]

Question 1 continues on the next page

Turn over ►



The blood transports gases around the body.

0 1 . 5 Which blood component transports carbon dioxide around the body?

[1 mark]

Tick (✓) **one** box.

Plasma

☐

Platelets

☐

White blood cells

☐

0 1 . 6 Complete the sentence.

[1 mark]

Oxygen is carried in the blood by _____ .

0 1 . 7 Substances diffuse through the walls of blood capillaries.

How are blood capillaries adapted for fast diffusion?

[1 mark]

Tick (✓) **one** box.

They have a thick elastic layer.

☐

They have a very thin wall.

☐

They have many valves.

☐

0 1 . 8

Which **two** substances diffuse into the bloodstream in the small intestine?**[2 marks]**Tick (✓) **two** boxes.

Amino acids

☐

Fatty acids

☐

Hydrochloric acid

☐

Proteins

☐

Starch

☐

9**Turn over for the next question****Turn over ►**

0 2

Microorganisms can cause disease.

0 2 . 1

What is the name given to bacteria that cause disease?

Tick (✓) **one** box.

[1 mark]

Decomposers

☐

Infections

☐

Pathogens

☐

0 2 . 2

Draw **one** line from each microorganism to the activity of the microorganism in the body.

[2 marks]

Microorganism**Activity of the
microorganism in the
body**

Makes extra chromosomes

Bacteria

Moves glucose into cells

Viruses

Produces poisons

Reproduces inside cells



0 2 . 3 Which cells produce antibodies?

[1 mark]

Tick (✓) **one** box.

Platelets

☐

Red blood cells

☐

White blood cells

☐

Question 2 continues on the next page

Turn over ►



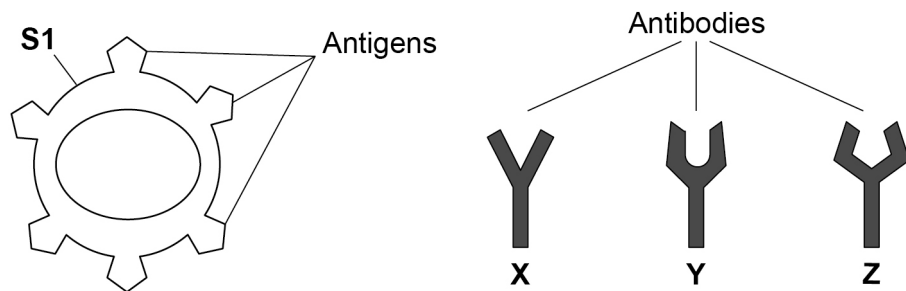
Bacteria have antigens on their surface.

Antibodies attach to antigens to kill bacteria.

Figure 2 shows:

- antigens on a strain of bacteria (**S1**)
- three different antibodies.

Figure 2



0 2 . 4 Which antibody will attach to antigens on the **S1** bacteria in **Figure 2**?

[1 mark]

Tick (✓) **one** box.

X

☐

Y

☐

Z

☐

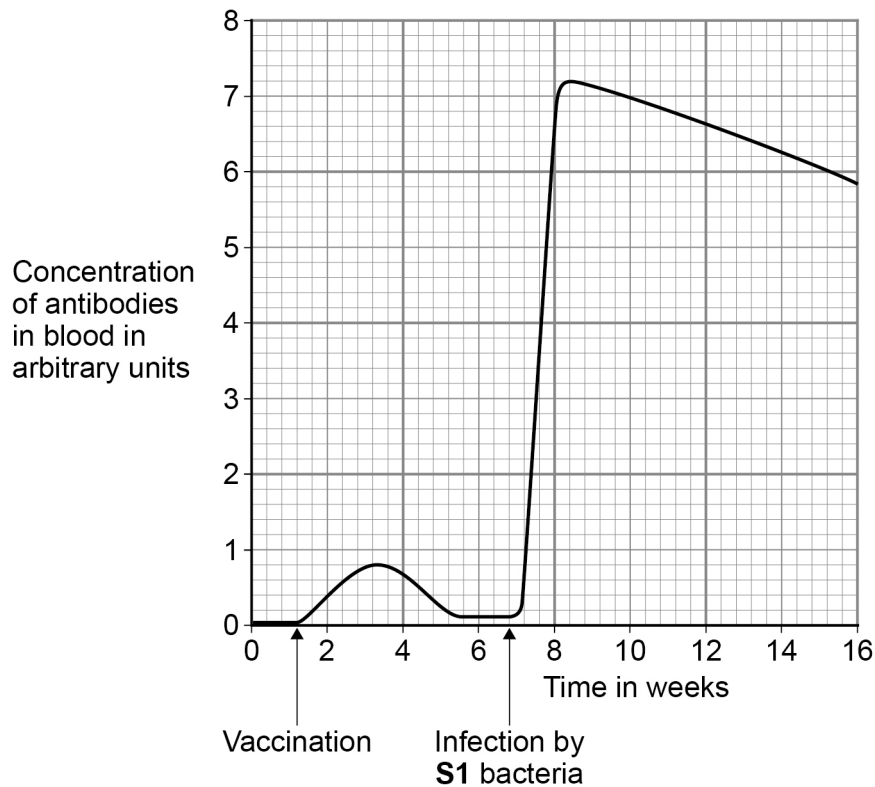

0 2 . 5

A person was given a vaccination to protect them from **S1** bacteria.

After several weeks the person was infected by **S1** bacteria.

Figure 3 shows how the concentration of antibodies in the person's blood changed.

Figure 3



Describe **two** ways that antibody production after **infection** was different to antibody production after **vaccination**.

[2 marks]

1 _____

2 _____

Question 2 continues on the next page

Turn over ►



0 2 . 6

Which process can produce a **new** strain of bacteria?

[1 mark]

Tick (✓) **one** box.

Decomposition

☐

Digestion

☐

Mutation

☐

Antibiotics can be used to cure most diseases caused by bacteria.

0 2 . 7

MRSA is a strain of bacteria that causes disease.

Give the reason why antibiotics have become **less** effective against some bacterial infections.

[1 mark]

0 2 . 8

How can scientists cure more diseases such as MRSA?

[1 mark]

Tick (✓) **one** box.

Develop new antibiotics

☐

Develop new enzymes

☐

Develop new strains of bacteria

☐

10

Turn over for the next question

*Do not write
outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

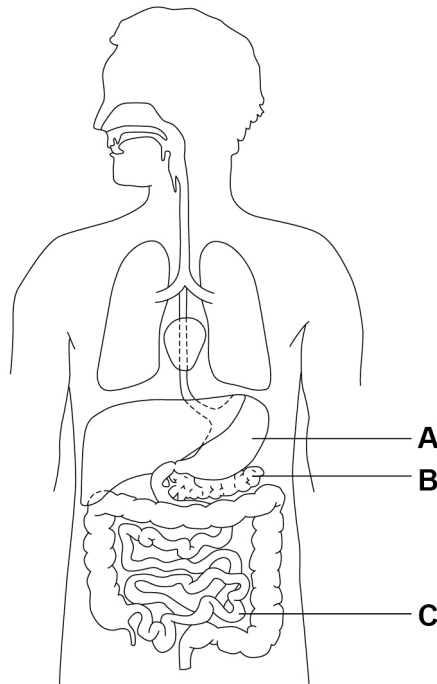
Turn over ►



0 3

Figure 4 shows some organs in the human body.

Figure 4



0 3 . 1

Name organ **A** and organ **C** in **Figure 4**.

[2 marks]

A _____

C _____

0 3 . 2

Organ **B** controls blood glucose concentration in the body.

What is organ **B** in **Figure 4**?

[1 mark]

Tick (✓) **one** box.

Heart

☐

Liver

☐

Pancreas

☐


0 3 . 3

Insulin helps control blood glucose concentration.

How does insulin reduce a high blood glucose concentration?

[1 mark]

Tick (✓) **one** box.

Insulin allows glucose to leave the body as waste.

☐

Insulin causes glucose to enter cells.

☐

Insulin moves glucose to the kidneys.

☐

Scientists use a Glycaemic Index (GI) to show how quickly foods raise blood glucose concentration.

Blood glucose concentration **increases** rapidly after food with a **high** GI has been eaten.

0 3 . 4

Suggest **one** reason why people who have diabetes should **not** eat food with a high GI.

[1 mark]

Question 3 continues on the next page

Turn over ►



Table 1 shows the GI for some types of bread.

Table 1

Type of bread	GI
Crackerbread	85
Dark rye	51
French baguette	95
Kaiser roll	73
Oatbread	65
Sourdough	56
Wheat tortilla	30
Wholegrain bread	40
Wholewheat bread	69

A person with diabetes is recommended to:

- eat food with a GI < 55
- **never** eat food with a GI > 70

0 3 . 5 Give **one** type of bread that is suitable for a person with diabetes to eat.

Use **Table 1**.

[1 mark]

0 3 . 6 Give **one** type of bread that a person with diabetes should never eat.

Use **Table 1**.

[1 mark]



0 3 . 7 Table 2 is a different chart that shows the GI for types of bread.

Table 2

Low GI	Medium GI	High GI
Fruit bread	Bran muffin	Bagel (white)
Multigrain bread	Oat bread	Croissant
Soya and linseed bread	Wholewheat bread	White bread

People with diabetes use GI food charts when choosing which foods to eat.

Suggest **one** advantage and **one** disadvantage of using the chart in **Table 2** rather than **Table 1**.

[2 marks]

Advantage _____

Disadvantage _____

0 3 . 8 Type 1 diabetes can be controlled using insulin injections.

Give the reason why insulin injections are **not** always an effective way to control **Type 2** diabetes.

[1 mark]

Question 3 continues on the next page

Turn over ►



03.9

A student compared the glucose content of three different fruits.

The student determined the glucose content in:

- 1 apple
- 1 grape
- 1 banana.

Suggest why this is **not** a valid comparison.

[1 mark]

11



0	4
---	---

The arctic hare is adapted to its environment.

Figure 5 shows an arctic hare in the snow.

Figure 5



0	4
---	---

.	1
---	---

Suggest **one** adaptation that helps the arctic hare avoid predators.

[1 mark]

0	4
---	---

.	2
---	---

Arctic hares live in groups that huddle together.

Suggest **one** reason why huddling behaviour helps the arctic hares survive.

[1 mark]

Question 4 continues on the next page

Turn over ►



Arctic hares:

- are eaten by foxes
- feed on plant material.

Wolves are predators of the foxes.

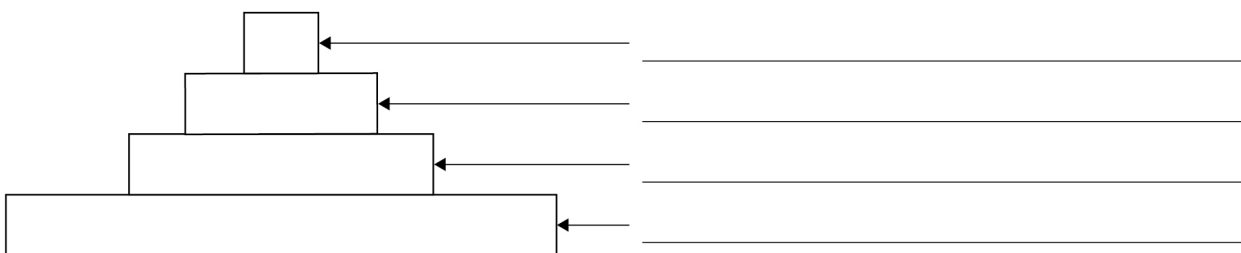
0 4 . 3

Figure 6 is a pyramid of biomass for arctic hares, foxes, plants, and wolves.

Complete **Figure 6**.

[3 marks]

Figure 6



0 4 . 4

The amount of food available for the arctic hares increases.

Suggest how the population size of the foxes will be affected when the arctic hares have more food.

[1 mark]



0 4 . 5

The body mass of the arctic hares in a population varies between 2.5 kg and 5.5 kg.

What causes variation in body mass in a population of arctic hares?

[1 mark]

Tick (✓) **one** box.

Environment only

☐

Genes **and** environment

☐

Genes only

☐

0 4 . 6

Some organisms are adapted to survive in an environment with a very high temperature.

What term is used for an organism that lives in an environment with a very high temperature?

[1 mark]

Tick (✓) **one** box.

Extremophile

☐

Multicellular

☐

Prokaryotic

☐

8

Turn over for the next question

Turn over ►



0 5

Plants need water to survive.

0 5 . 1

Which part of a plant absorbs water from the soil?

[1 mark]

0 5 . 2

Name the process that moves water into cells.

[1 mark]

0 5 . 3

Complete the sentence.

Choose the answer from the box.

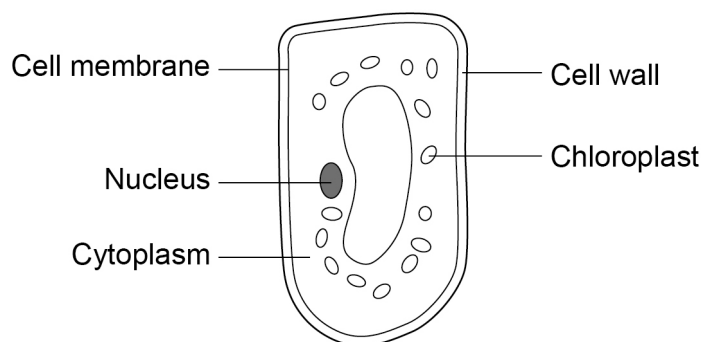
[1 mark]**concentration****temperature****volume**

Water moves into a cell because the solution inside the cell and the solution outside the cell have a different _____.



0 5 . 4 Figure 7 shows a plant cell.

Figure 7



Plant cells swell up but **do not** burst when placed in water.

Which part of the plant cell stops the plant cell bursting?

[1 mark]

Question 5 continues on the next page

Turn over ►

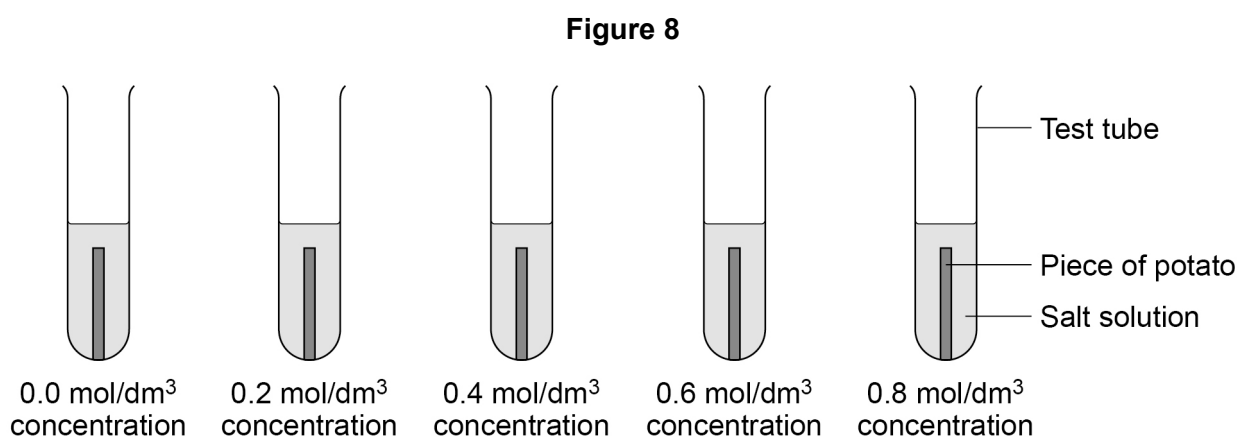


A student investigated the effect of different concentrations of salt solution on potato.

This is the method used.

1. Cut five pieces of potato, each with a length of 6.0 cm.
2. Record the mass of each piece of potato.
3. Place one piece of potato in 30 cm³ of each of the different concentrations of salt solution.
4. After 30 minutes remove the pieces of potato.
5. Record the mass of each piece of potato.

Figure 8 shows the pieces of potato in the solutions.



0 5 . 5 Give **two** variables that were kept constant in the investigation.

[2 marks]

1 _____

2 _____



Table 3 shows results for one piece of potato.

Table 3

Mass of potato at the start in grams	9.9
Increase in mass of potato in grams	0.4

0 5 . 6 Calculate the percentage increase in mass of potato.

Use **Table 3** and the equation:

$$\text{Percentage increase in mass} = \frac{\text{increase in mass of potato}}{\text{mass of potato at the start}} \times 100$$

Give your answer to the nearest whole number.

[3 marks]

Percentage increase in mass (nearest whole number) = _____ %

Question 5 continues on the next page

Turn over ►



The student repeated the experiment.

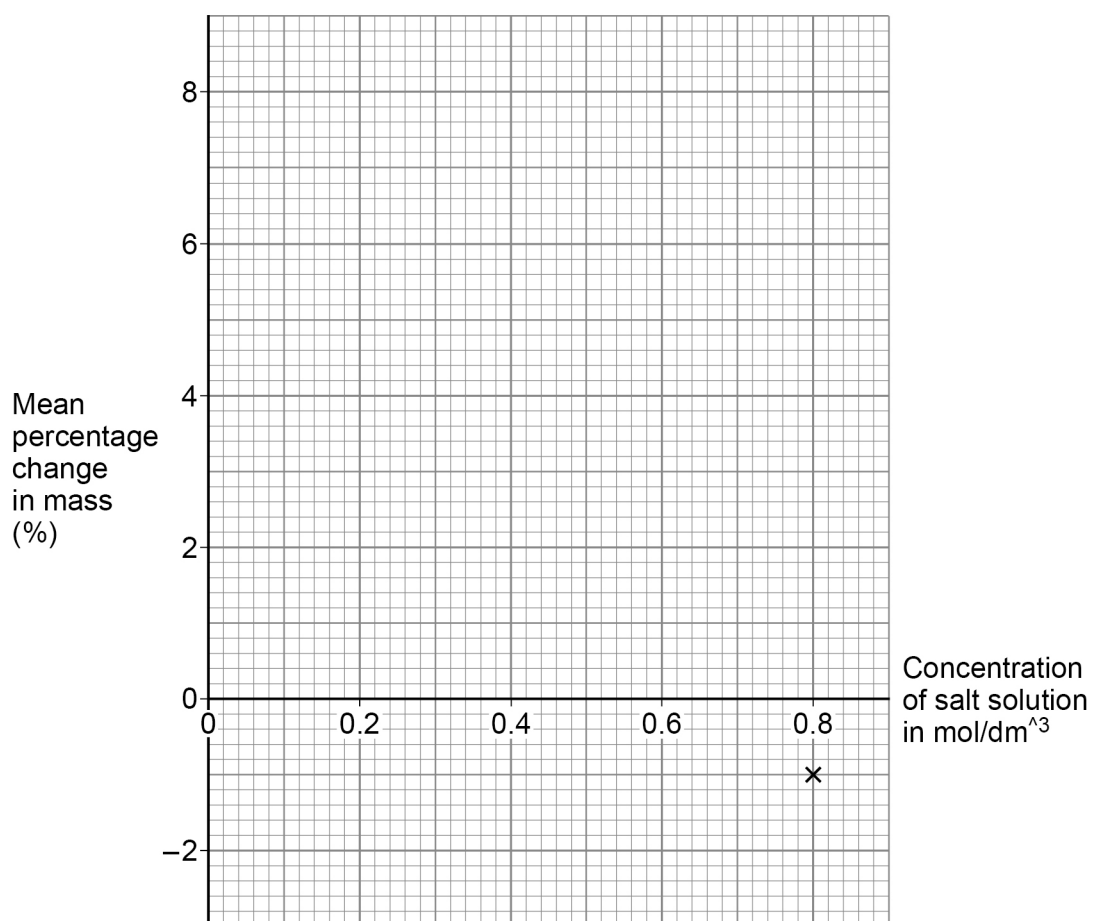
Table 4 shows the results.

Table 4

Concentration of salt solution in mol/dm ³	Mean percentage change in mass (%)
0.0	+7
0.2	+5
0.4	+3
0.6	+1
0.8	-1

Figure 9 is an incomplete graph of the results.

Figure 9



0 5 . 7

Complete **Figure 9**.

You should:

- plot the data from **Table 4**
- draw a line of best fit.

[3 marks]

0 5 . 8

Which concentration of salt solution is the same as the concentration in the potato cells?

Use **Figure 9**.**[1 mark]**Tick (✓) **one** box.0.6 mol/dm³☐0.7 mol/dm³☐0.8 mol/dm³☐

13**Turn over for the next question****Turn over ►**

There are no questions printed on this page

*Do not write
outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



0	6
---	---

The human body is made of different types of cells.

0	6	.	1
---	---	---	---

Name the part of a cell that contains chromosomes.

[1 mark]

0	6	.	2
---	---	---	---

Explain why human body cells have an even number of chromosomes.

[2 marks]

0	6	.	3
---	---	---	---

Cell division provides new cells for growth.

Give **one other** reason why an adult still needs to produce new cells.

[1 mark]

0	6	.	4
---	---	---	---

Muscle cells are specialised cells.

Name **one other** specialised cell in the human body.

[1 mark]

Question 6 continues on the next page

Turn over ►



0 6 . 5

Human embryos and adult bone marrow produce cells called stem cells.

What is a human stem cell?

[2 marks]

Scientists are researching ways to use stem cells in the treatment of some disorders.

0 6 . 6

Stem cells may be obtained from an embryo that has been produced by therapeutic cloning.

Suggest **one** reason why some people are concerned about therapeutic cloning.

[1 mark]

0 6 . 7

Damaged joints can be healed by injecting stem cells into the patient.

Stem cells may be obtained from a donor.

Give the reason why the donor must be a close genetic match to the patient.

[1 mark]



0	6	.	8
---	---	---	---

Scientists develop new stem cell treatments.

Suggest **two** reasons why new treatments need to be tested before they are used with patients.

[2 marks]

1 _____

2 _____

11

Turn over for the next question

Turn over ►



0 7

Peas are produced by pea plants.

Pea shape is determined by a gene with two different forms, **R** and **r**.

0 7 . 1

What term is used for the different forms of a gene?

[1 mark]

Tick (✓) **one** box.

Alleles

☐

Gametes

☐

Hormones

☐

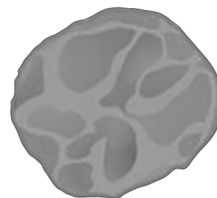
Pea shape can be round (**R**) or wrinkled (**r**).

Figure 10 shows a round pea and a wrinkled pea.

Figure 10



Round



Wrinkled

A farmer crossed two parent pea plants that had round peas.

Some of the offspring plants produced wrinkled peas.

07.2

Complete **Figure 11** to show the cross between the two plants with round peas.**[2 marks]****Figure 11**

	R	
R		
r	Rr	rr

07.3

The farmer decided to use tissue culture from a plant with round peas to produce offspring.

Tissue culture produces new plants by asexual reproduction.

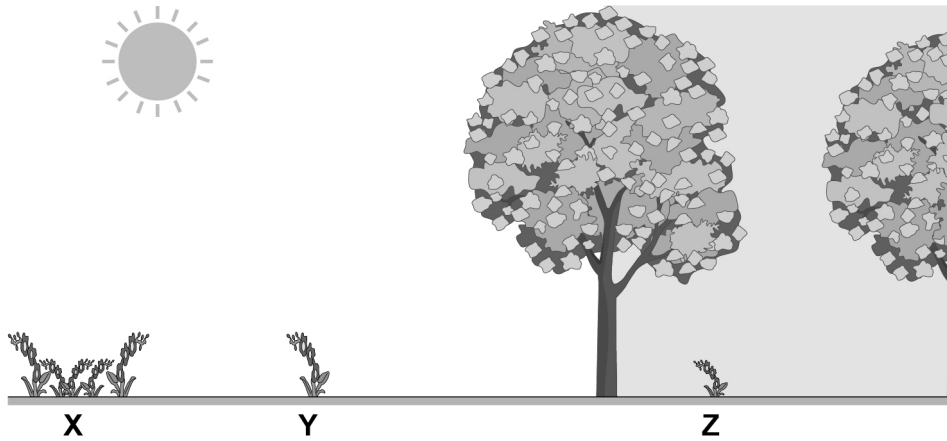
Suggest **one** advantage of using asexual reproduction to produce the new pea plants.**[1 mark]**

Question 7 continues on the next page**Turn over ►**

The growth of plants is affected by their environment.

Figure 12 shows plants in different parts of a garden, **X**, **Y** and **Z**.

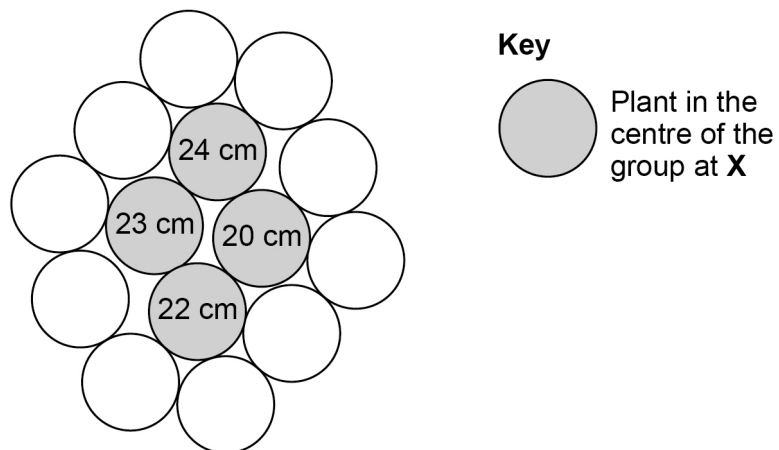
Figure 12



The group of plants at **X** are close together.

Figure 13 shows the heights of the plants in the centre of the group.

Figure 13



0 7 . 4

Calculate the mean height of the plants in the centre of the group.

[2 marks]

Mean height = _____ cm



0 7 . 5 The mean height of the plants at the **edges** of the group at **X** is 30.4 cm.

The plants in the group are competing for resources.

What is the effect of competition on the growth of the plants in the centre of the group?

[1 mark]

0 7 . 6 The plant at **Y** grows faster than the plant at **Z**.

Give **two** environmental factors that allow the plant at **Y** to grow faster than the plant at **Z**.

Use **Figure 12**.

[2 marks]

1

2

0 7 . 7 Why does adding decayed plant material to soil help plants to grow?

[1 mark]

10

Turn over for the next question

Turn over ►



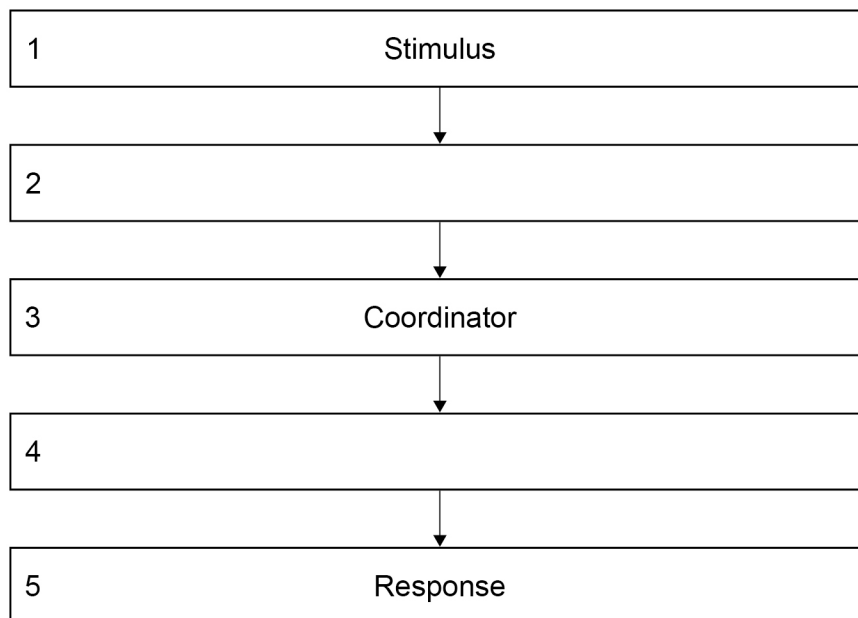
0 8

The human nervous system detects and responds to conditions inside the body.

0 8 . 1

Figure 14 shows the nervous pathway from a stimulus to a response.

Figure 14



Complete **Figure 14**.

You should write **one** word in box **2** and **one** word in box **4**.

Do **not** refer to neurones.

[2 marks]

0 8 . 2

The brain is a coordinator.

Complete the sentence.

[1 mark]

The part of the brain that monitors blood temperature is

the _____ centre.

Heart rate increases during exercise.

0 8 . 3

Give **two** reasons why an increase in heart rate allows muscles to work more efficiently during exercise.

[2 marks]

1 _____

2 _____

0 8 . 4

Maximum heart rate in beats per minute can be calculated using the equation:

$$\text{Maximum heart rate in beats per minute} = 220 - \text{age}$$

Calculate 60% of the **maximum** heart rate for an 8-year-old child.

Give your answer to 3 significant figures.

[4 marks]

60% of the maximum heart rate (3 significant figures) = _____ beats per minute

Question 8 continues on the next page

Turn over ►



Scientists investigated sweat loss from different parts of the body during exercise.

0 8 . 5

Explain why the body sweats more when a person exercises.

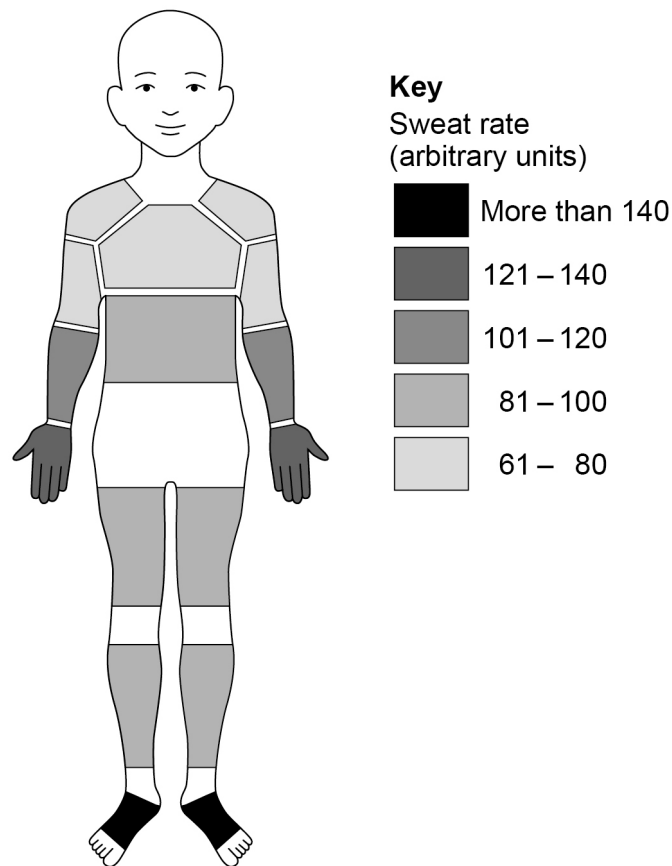
[2 marks]

Whole body sweat maps are used to compare sweat rate in different areas of the body.

The sweat produced during exercise is collected by sweat pads attached to the body.

Figure 15 shows mean sweat rates for a group of 10 children during exercise.

Figure 15



0 8 . 6

What **two** conclusions can be made from the results in **Figure 15**?**[2 marks]**Tick (✓) **two** boxes.

All children have the same sweat rate.

☐

Children do not sweat at rest.

☐

Children sweat more as they get older.

☐

Sweat rate varies in different areas of the body.

☐

The feet have the highest sweat rate.

☐

0 8 . 7

The rate of water loss from the lungs increases during exercise.

Give **one** reason why.**[1 mark]**

14

Turn over for the next question**Turn over ►**

0 9

Yeast is a microorganism that can respire both anaerobically and aerobically.

0 9 . 1

Complete the equation for **anaerobic** respiration in yeast.

Choose the answer from the box.

[1 mark]**ethanol****glycogen****lactic acid****oxygen**

glucose → _____ + carbon dioxide

0 9 . 2

Explain the difference in energy released in anaerobic respiration compared to aerobic respiration.

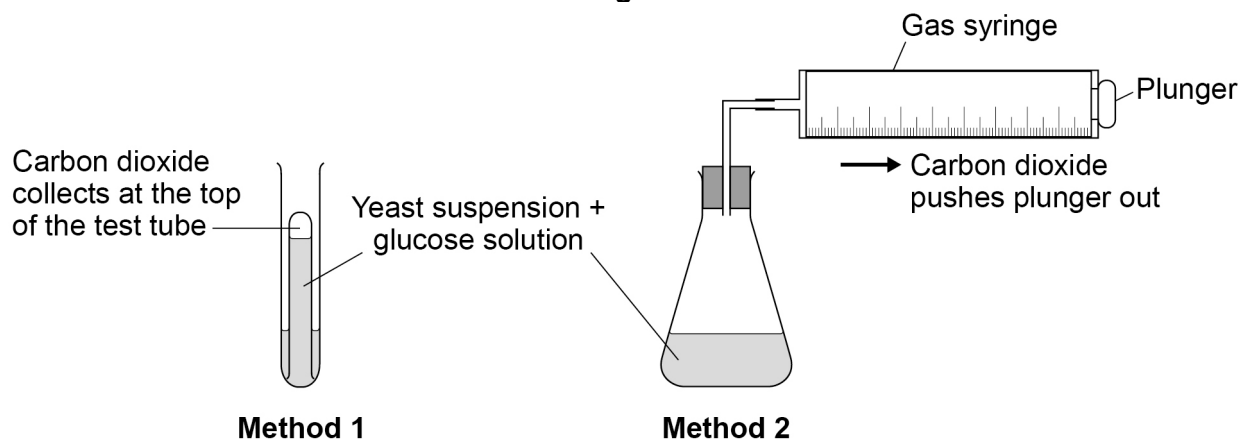
[2 marks]



A glucose solution is added to a yeast suspension.

Figure 16 shows two methods that can be used to collect the carbon dioxide produced during respiration.

Figure 16



0 9 . 3

Give the reason why **Method 2** is a more accurate measurement of the volume of carbon dioxide produced.

[1 mark]

Question 9 continues on the next page

Turn over ►



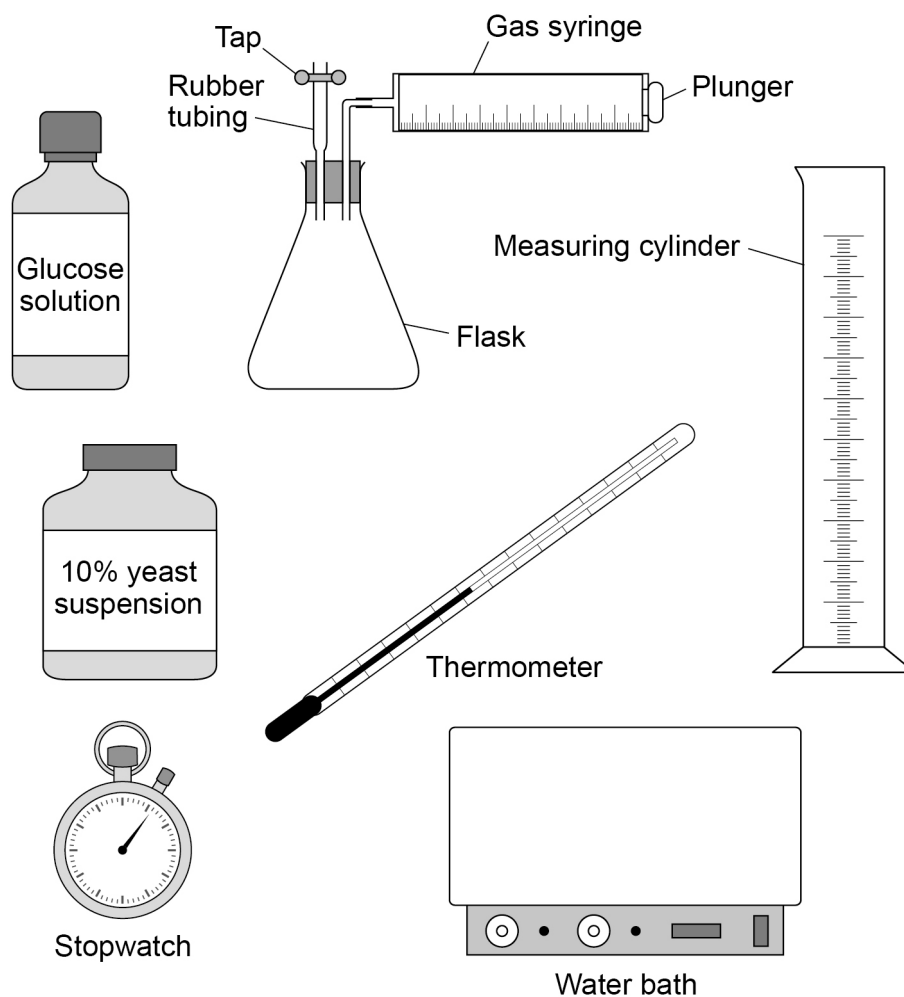
0 9 . 4

Plan an investigation to show the effect of temperature on the rate of respiration in yeast.

Figure 17 shows some apparatus that could be used.

[6 marks]

Figure 17



Respiration is controlled by enzymes.

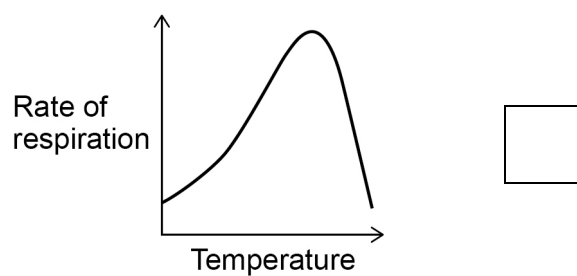
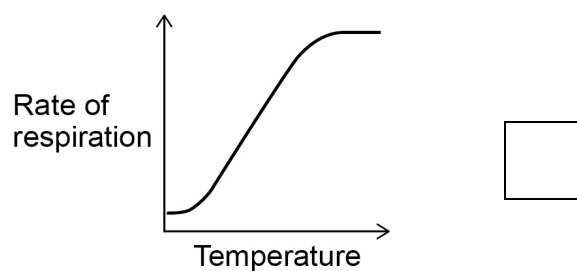
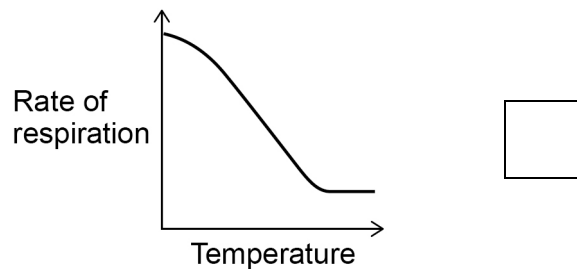
0 9 . 5

The rate of respiration is measured at a range of temperatures between 0 °C and 80 °C.

Which graph shows the expected results?

[1 mark]

Tick (✓) **one** box.



Turn over ►



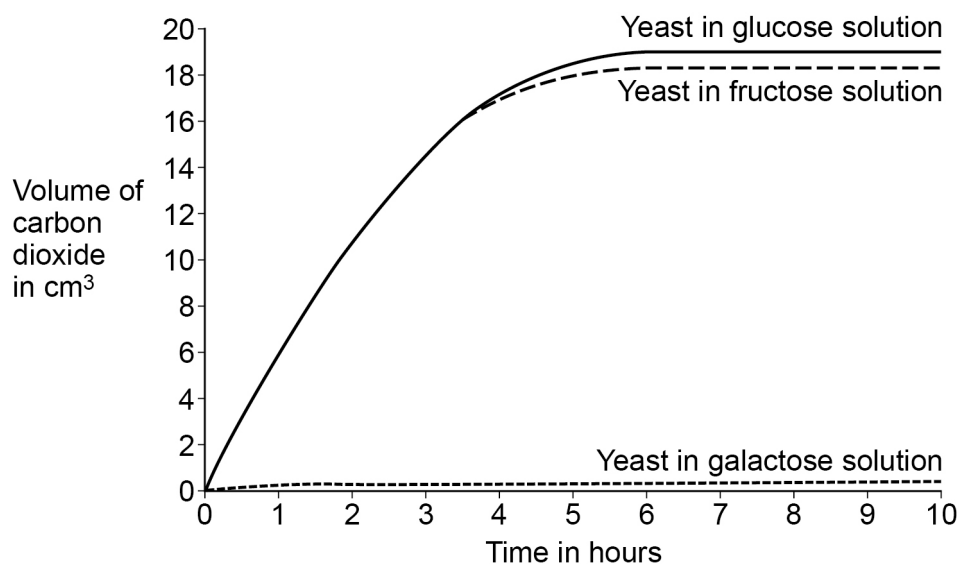
Glucose, fructose and galactose are types of sugar.

The volumes of carbon dioxide produced by yeast in three different sugar solutions were compared.

Each solution contained 10 g of sugar.

Figure 18 compares the volumes of carbon dioxide produced by the yeast.

Figure 18



09.6

The volume of carbon dioxide produced by the yeast in the glucose solution and the fructose solution stops increasing after 6 hours.

Suggest why the volume of carbon dioxide produced stops increasing.

[1 mark]



0	9	.	7
---	---	---	---

Give **two** conclusions about the use of different sugars by yeast.

Use **Figure 18**.

[2 marks]

1 _____

2 _____

14

END OF QUESTIONS



There are no questions printed on this page

*Do not write
outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



*Do not write
outside the
box*

[illegible]

*Do not write
outside the
box*

[illegible]

There are no questions printed on this page

*Do not write
outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Copyright information

For confidentiality purposes, all acknowledgements of third-party copyright material are published in a separate booklet. This booklet is published after each live examination series and is available for free download from www.oxfordaqa.com

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and OxfordAQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team.

Copyright © 2023 OxfordAQA International Examinations and its licensors. All rights reserved.

