

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 Extension

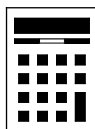
E

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	
TOTAL	



N 0 V 2 3 9 2 0 4 B E 0 1

IB/G/Nov23/E7

9204/BE

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

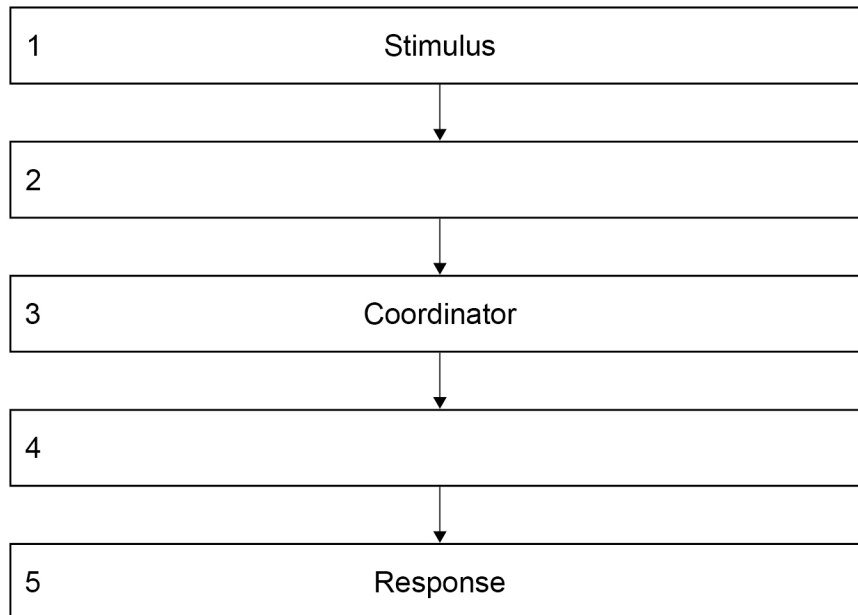
0 1

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

0 1 . 1

Figure 1 shows the nervous pathway from a stimulus to a response.

Figure 1



Complete **Figure 1**.

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

Do **not** refer to neurones.

[2 marks]

0 1 . 2

The brain is a coordinator.

Complete the sentence.

The part of the brain that monitors blood temperature is

The _____ centre.

[1 mark]



Heart rate increases during exercise.

0 1 . 3

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

[2 marks]

1 _____

2 _____

0 1 . 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 1 continues on the next page

Turn over ►



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

0 1 . 5

Explain why the body sweats more when a person exercises.

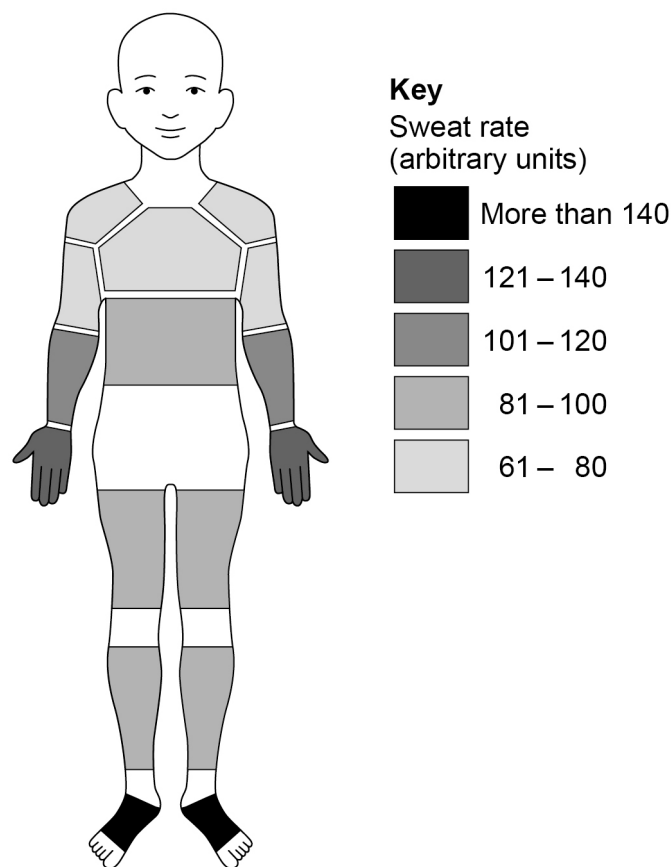
[2 marks]

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

Figure 2



0 1 . 6 What **two** conclusions can be made from the results in **Figure 2**.

[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 1 . 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 2

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

0 2**. 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 2**. 2**

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

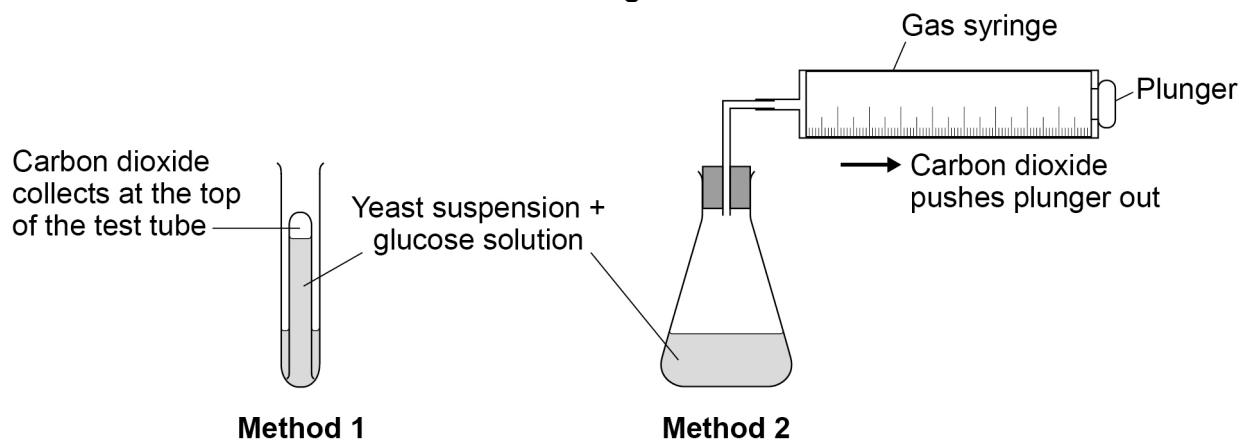
[2 marks]



A glucose solution is added to a yeast suspension.

Figure 3 shows two methods that can be used to collect the carbon dioxide produced during respiration.

Figure 3



0 2 3

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

[1 mark]

Question 2 continues on the next page

Turn over ►



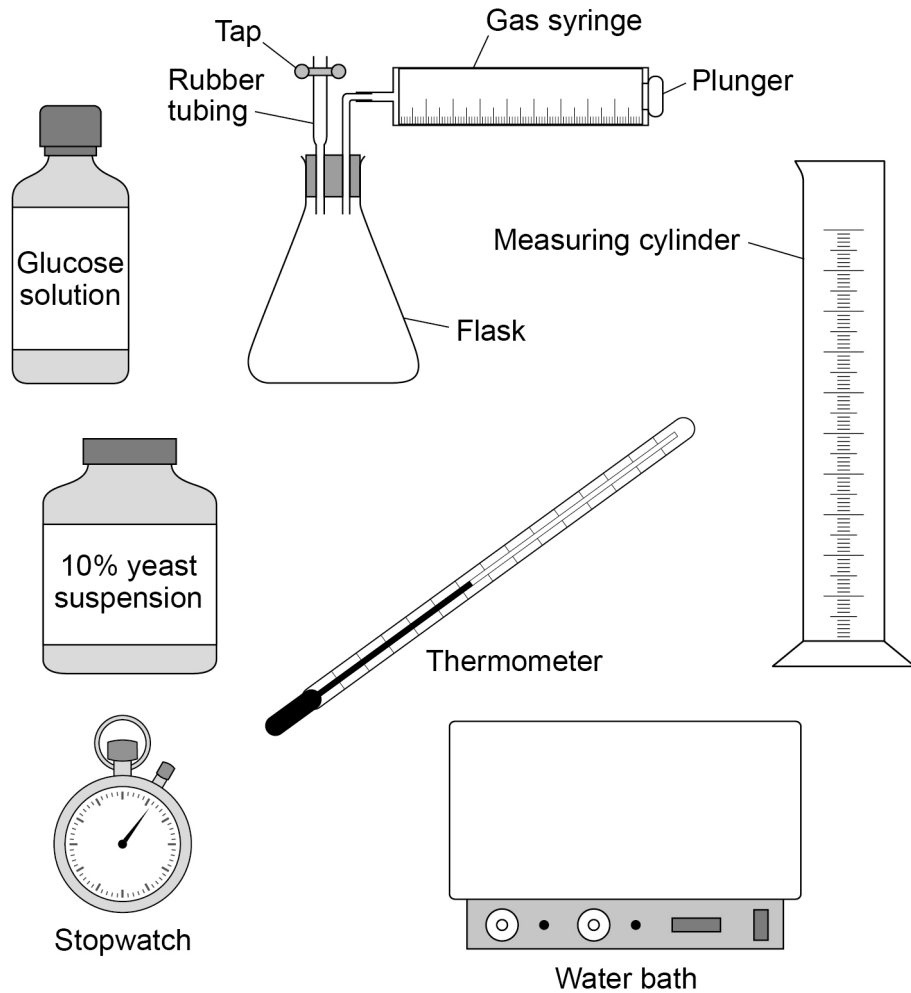
0 2 . 4

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

Figure 4 shows some apparatus that could be used.

[6 marks]

Figure 4





Respiration is controlled by enzymes.

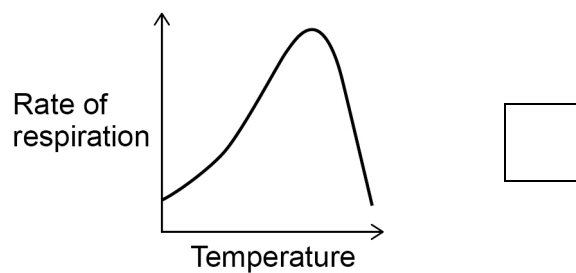
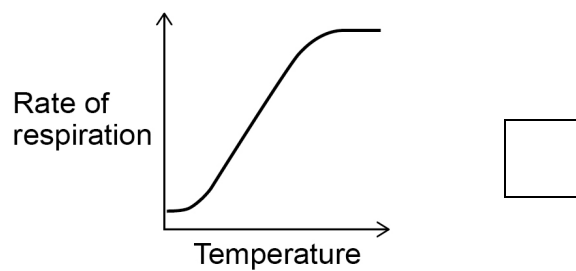
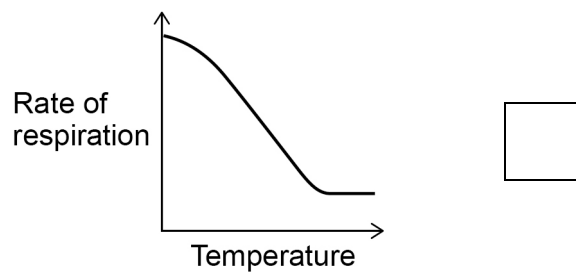
0 2 . 5

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 ►



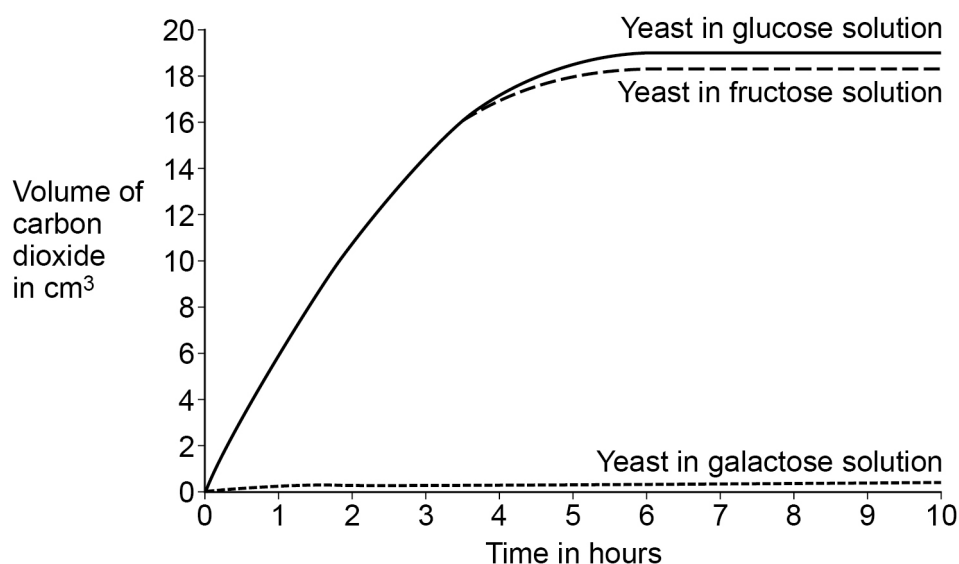
Glucose, fructose and galactose are types of sugar.

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

Each solution contained 10 g of sugar.

Figure 5 compares the volumes of carbon dioxide produced by the yeast.

Figure 5



0 2 . 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	2	.	7
---	---	---	---

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

Use **Figure 5**.

[2 marks]

1 _____

2 _____

14

Turn over for the next question

Turn over ►



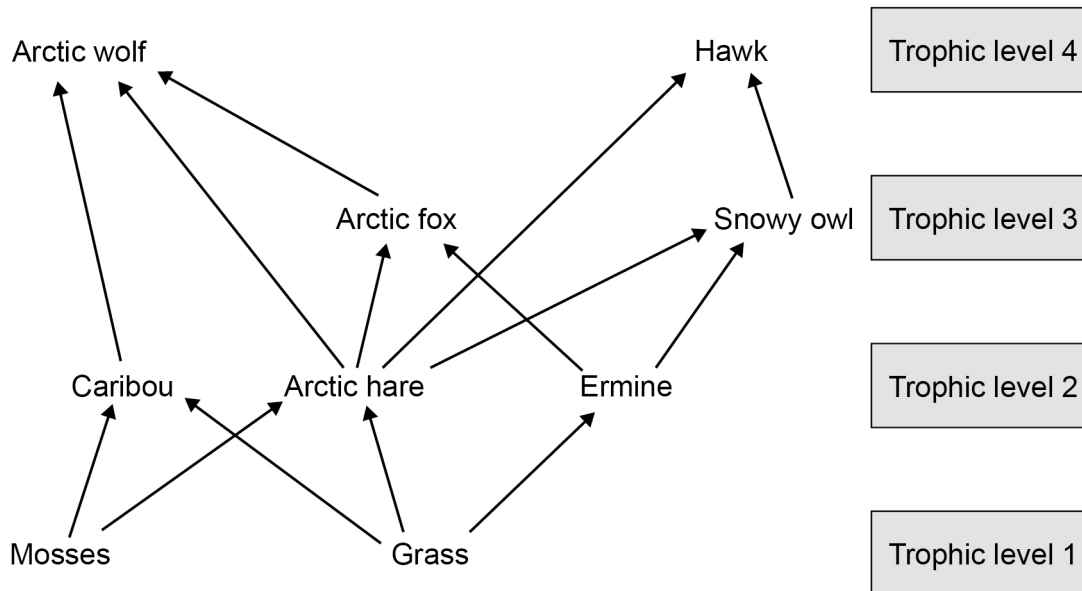
0 3

Arctic hares live in a habitat that changes during the year.

Figure 6 shows part of a food web from the habitat of the arctic hare.

The food web has four trophic levels.

Figure 6



0 3

1

Draw a labelled pyramid of biomass for the **four** trophic levels in **Figure 6**.

[2 marks]



0 3 . 2

Explain what happens to the population size of the arctic fox when the population size of the arctic hare decreases.

[2 marks]

Arctic hares have adaptations to help them survive in a cold environment.

0 3 . 3

Complete **Table 1** to match each adaptation to the type of adaptation.

[3 marks]

Tick (✓) **one** box in each row.

Table 1

Adaptation	Type of adaptation		
	Behavioural adaptation	Functional adaptation	Structural adaptation
Body covered in thick fur			
Good sense of smell			
Huddle in groups			
Large heavily padded feet			

Question 3 continues on the next page

Turn over ►



The habitat of the arctic hare is:

- very cold in the winter months, October to March
- warmer in the summer months, April to September.

The coat colour of arctic hares changes twice a year.

Figure 7 shows arctic hares in different stages of colour change.

Figure 7



0 3 . 4

Explain how the changes in coat colour help the arctic hare survive in its habitat throughout the year.

[4 marks]

0	3	.	5
---	---	---	---

Scientists are investigating the effect of global warming on arctic hare populations.

Colour change in arctic hares begins on the same date in April every year.

Explain why arctic hares are more likely to be eaten in March and April if the temperature of their environment increases.

[2 marks]

13

Turn over for the next question

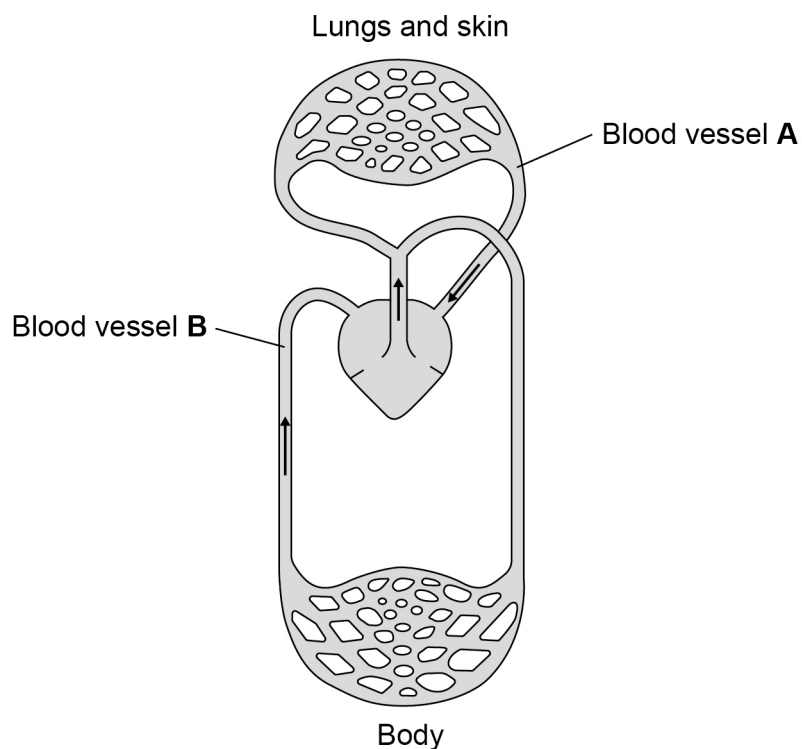
Turn over ►



0 4

Figure 8 shows the circulatory system of a frog.

Figure 8



0 4 . 1

Give **one** similarity and **one** difference between the frog circulatory system and the human circulatory system.

[2 marks]

Similarity _____

Difference _____



0	4	.	2
---	---	---	---

Explain why the composition of the blood plasma in **A** is different from the composition of the blood plasma in **B**.

Use **Figure 8**.

[2 marks]

0	4	.	3
---	---	---	---

Explain how the structure of the human circulatory system enables rapid diffusion of substances between the blood and the cells in tissues.

[3 marks]

Question 4 continues on the next page

Turn over ►



Some people develop a faulty heart valve.

Faulty heart valves do not close properly.

0 4 . 4

Explain why a person with a faulty heart valve becomes tired easily.

[3 marks]



0 4 . 5

A faulty heart valve can be replaced with either a mechanical heart valve or a biological heart valve.

Mechanical heart valves are made of metal or plastic.

Biological heart valves are made of living tissue.

Table 2 compares the different types of replacement heart valves.

Table 2

	Type of heart valve	
	Mechanical	Biological
Expected time before valve needs to be replaced in years	20–30	10–15
Risk that valve needs to be repaired	Low	Higher than mechanical valve
Risk of blood clots forming	Higher than biological valve	Low
Time drugs need to be taken for after the valve replacement	Rest of the person's life	2–3 months

A 25-year-old person needs a heart valve replacement.

Evaluate the choice of a mechanical valve replacement instead of a biological heart valve replacement for the person.

[4 marks]

14

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 5

Plants use photosynthesis to make organic molecules.

0 5 . 1

Complete the balanced symbol equation for photosynthesis

[1 mark]**0 5 . 2**

Describe how root hair cells obtain one of the molecules that is needed for photosynthesis.

[1 mark]

A scientist investigated the effect of light intensity on the rate of photosynthesis in two plants.

The two plants are different species.

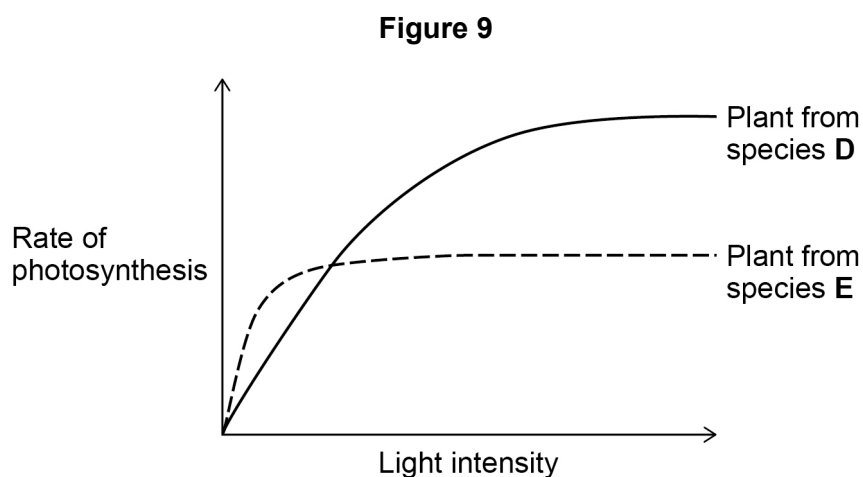
0 5 . 3Give **two** control variables the scientist should have used.**[2 marks]**

1

2

Question 5 continues on the next page**Turn over ►**

Figure 9 shows the results.



0 5 . 4 Explain the shape of the curve for the plant from species D.

[3 marks]

0 5 . 5 The scientist concludes that species E is more adapted to a shady environment than species D.

Evaluate the scientist's conclusion.

Use **Figure 9**.

[2 marks]



0 5 . 6

Suggest how the scientist could obtain evidence about the distribution of the plants in their habitat to support the conclusion.

[1 mark]

0 5 . 7

Plants use glucose to make other large molecules.

Give the name **and** function of **four** large molecules that are produced by plants from glucose.

[4 marks]

1

2

3

4

14

Turn over for the next question

Turn over ►



0 6

Fruit flies are small insects.

0 6 . 1

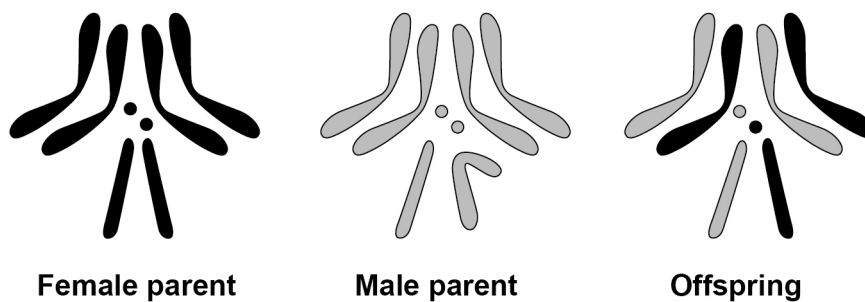
Give **two** causes of variation in a population of fruit flies.

[2 marks]

1 _____

2 _____

The body cells of fruit flies contain eight chromosomes.

Figure 10 shows the chromosomes present in the body cells of two fruit flies and their offspring.**Figure 10**

Female parent

Male parent

Offspring

0 6 . 2

What evidence from **Figure 10** shows the offspring is a female fruit fly?

[1 mark]



Figure 11 shows the processes involved in sexual reproduction.

Meiosis → Fertilisation → Mitosis → Differentiation

Describe how the processes in **Figure 11** can result in the development of **fruit fly offspring**.

You should include information from **Figure 10**.

[6 marks]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Question 6 continues on the next page

Turn over ►



Body colour in fruit flies is determined by a single gene.

Two brown fruit flies are crossed.

Some of the offspring are brown and some of the offspring are black.

0 6 . 4 Draw a genetic diagram to show the cross between the two brown fruit flies.

[3 marks]

You should:

- identify the phenotype of each offspring genotype
- use the symbols:

B = allele for brown body

b = allele for black body.



0 6 . 5 The two fruit flies produced 96 offspring.

Determine the number of the brown offspring you would expect to be **homozygous** for body colour.

Use information from your genetic diagram in Question **06.4**.

[2 marks]

Number of homozygous brown offspring = _____

0 6 . 6 Fruit flies with black bodies have poor vision.

Brown fruit flies and black fruit flies are released into a habitat that is equally suitable for both types.

Explain why the proportion of black fruit flies in the population would decrease after many generations.

[3 marks]

17

Turn over for the next question

Turn over ►

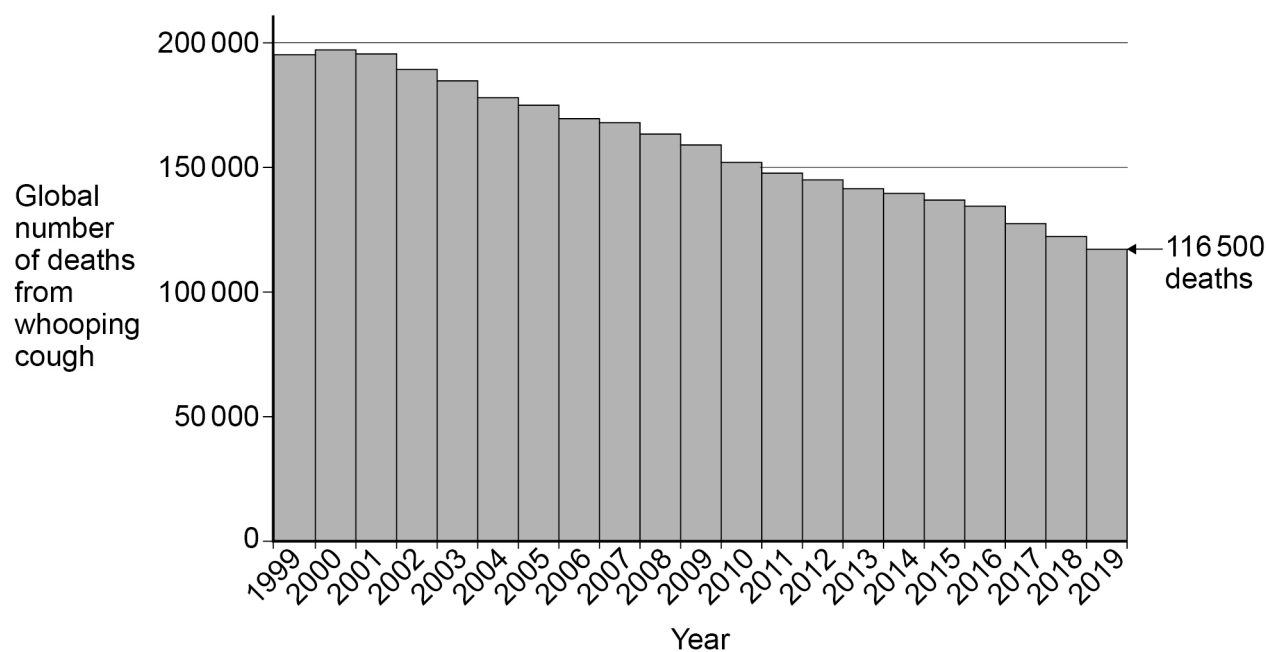


0 7

Whooping cough is a disease caused by bacteria.

Figure 12 shows the global number of deaths from whooping cough between 1999 and 2019.

Figure 12



0 7 . 1

Why are graphs like **Figure 12** useful for global health organisations?

[1 mark]



0 7 . 2 The global population in 2019 was 7700 million.

Calculate the global death rate per 100 000 from whooping cough in 2019.

Use **Figure 12**.

[3 marks]

Global death rate = _____ per 100 000

0 7 . 3 The global population is increasing.

Give the reason why death **rate** is used rather than **number** of deaths when investigating patterns of disease.

[1 mark]

Question 7 continues on the next page

Turn over ►



Vaccines are used to reduce the spread of diseases in populations.

07.4

Explain how a vaccine works to make a person immune to an infection.

[3 marks]

07.5

Explain how a vaccine reduces the spread of a disease in a population.

[2 marks]



Antibiotics are used to kill bacteria that have infected the body.

Explain why.

[4 marks]

[illegible]

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]

[illegible]

[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.

