Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | | | | | |

Candidate Number | | | | |

Monday 1 June 2020

Afternoon (Time: 1 hour 10 minutes) | Paper Reference **1SC0/2BH**

Combined Science

Paper 4

Higher Tier

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need*.
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question*.
- In questions marked with an **asterisk** (*), marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Figure 1 shows the leaves and flowers of water lily plants (*Nymphaea odorata*) on a lake.



© Oleksandr Shymanskyi/123RF

Figure 1

(a) Water lilies have stomata on the upper surface of the leaves.

Explain why water lilies have no stomata on the lower surface of the leaves.

(2)

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(b) (i) The white petals of the water lily flowers cannot photosynthesise.

Which structure in leaf cells is the site of photosynthesis?

(1)

☒ **A** nucleus

☒ **B** vacuole

☒ **C** mitochondrion

☒ **D** chloroplast

(ii) Glucose is made by photosynthesis.

Glucose is converted to another sugar to be transported in the plant.

What is the name of this sugar?

(1)

☒ **A** glycerol

☒ **B** ribose

☒ **C** sucrose

☒ **D** starch

(iii) Describe how this sugar is transported from the leaves to the flowers of the water lily.

(2)

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(c) Figure 2 shows water lilies growing in a lake in Europe.



© lynn gladwell/123RF

Figure 2

One water lily plant was brought from America 10 years ago and planted in the lake shown in Figure 2.

Explain why this non-indigenous plant now covers the whole surface of the lake.

(3)

(Total for Question 1 = 9 marks)

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2 A slide of potato cells was viewed using a light microscope.

Figure 3 is a drawing of the slide showing starch grains in the potato cells.

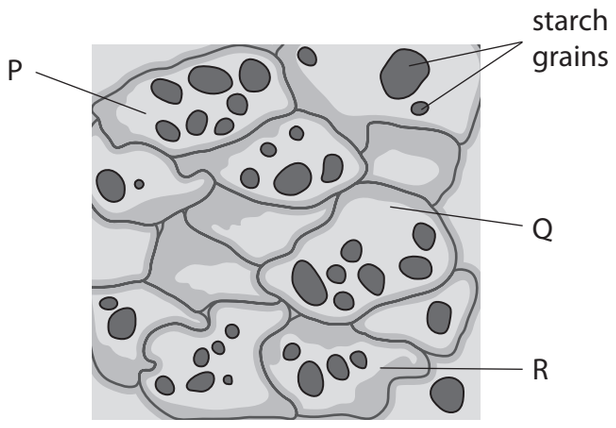


Figure 3

(a) (i) Calculate the mean number of starch grains in potato cells P, Q and R.

(1)

..... starch grains

(ii) Which structures are found in plant cells but are **not** found in animal cells?

(1)

☒ **A** cell membrane, nucleus, chloroplast

☒ **B** cell wall, cell membrane, cytoplasm

☒ **C** nucleus, large vacuole, chloroplast

☒ **D** cell wall, chloroplast, large vacuole

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(b) A scientist investigated how the length of starch grains in potatoes changed when the potatoes were stored in the dark.

Figure 4 shows a potato after being stored in the dark.



© rodimov/Shutterstock

Figure 4

Three potatoes were used in the investigation.

The length of starch grains in potato 1 were measured at the start.

The length of starch grains in potato 2 were measured after 5 weeks in the dark.

The length of starch grains in potato 3 were measured after 10 weeks in the dark.

Figure 5 shows the results.

potato	time after placing in the dark in weeks	mean length of starch grains in μm
1	0	64
2	5	50
3	10	30

Figure 5

(i) Calculate the percentage difference in the mean length of starch grains in potato 2 at 5 weeks and in potato 3 at 10 weeks.

(2)

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(ii) State **two** variables the scientist should have controlled to improve this investigation.

(2)

1 .....

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2 .....

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(iii) The starch grains in the potatoes became smaller as the starch was converted into glucose.

State why the potatoes need glucose.

(1)

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(iv) Describe how starch is broken down into glucose.

(2)

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(Total for Question 2 = 9 marks)

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3 Trypsin is a protease enzyme used in the manufacture of food for babies.

(a) (i) Which food group is digested by trypsin?

(1)

- ☒ **A** carbohydrates
- ☒ **B** lipids
- ☒ **C** fibre
- ☒ **D** proteins

(ii) The food is mashed before the trypsin is added.

Explain the advantage of mashing the food before adding the trypsin.

(2)

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(b) A manufacturer of baby food wanted to find out the optimum pH for trypsin.

Equal volumes of different pH solutions were placed in six separate test tubes.

5 cm^3 of 1% trypsin solution was added to each test tube.

1.5 g of mashed food was placed in each test tube.

The time taken to digest the food was recorded.

(i) State **one** other variable that should be controlled in this investigation.

(1)

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(ii) State how this variable could be controlled.

(1)

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(c) The results are shown in Figure 6.

pH	time taken to digest the food in minutes
1	42
2	15
3	9
4	2
5	16
6	40

Figure 6

(i) Describe the trends shown in this data.

(2)

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(ii) At pH 4, the trypsin digested 1.5 g of mashed food at a rate of 0.8 g per minute.

Calculate the rate of digestion at pH 1.

Give your answer to one significant figure.

(2)

..... g per minute

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(iii) Explain the difference in the rate of reaction at pH 1 and the rate of reaction at pH 4.

(2)

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(Total for Question 3 = 11 marks)

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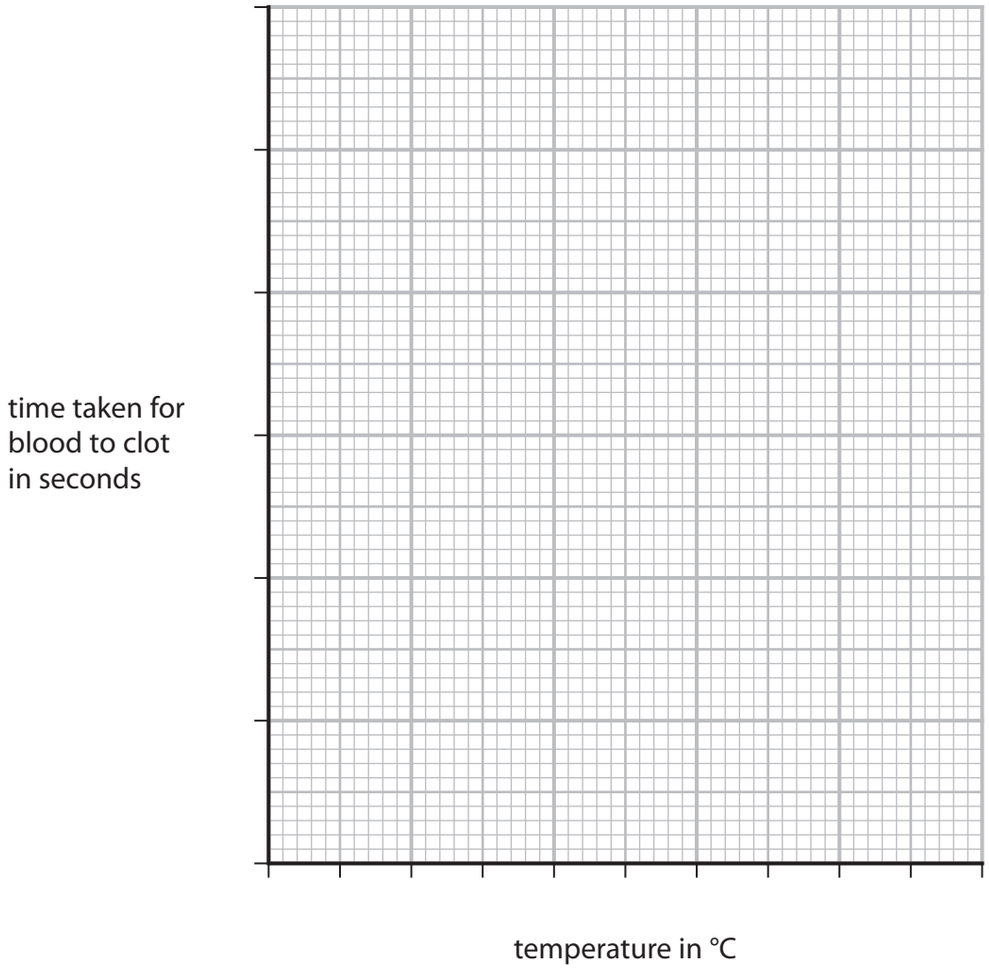
4 (a) Figure 7 shows the time taken for blood to clot at different temperatures.

temperature in °C	time taken for blood to clot in seconds
5	90
15	70
25	55
35	40
45	110

Figure 7

(i) Draw a graph to show the data in Figure 7.

(3)



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(ii) Give **two** safety precautions that should be used when handling blood samples.

(2)

1 .....

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2 .....

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(b) (i) Which part of the blood causes blood to start clotting?

(1)

☒ **A** erythrocytes

☒ **B** lymphocytes

☒ **C** platelets

☒ **D** antibodies

(ii) Give **one** advantage of a blood clot forming.

(1)

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(c) Explain how **one** structure of a vein helps the blood return to the heart.

(2)

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(Total for Question 4 = 9 marks)

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5 Figure 8 shows the heart rate of person A and person B.

Person A does not do any regular exercise.

Person B has been running regularly for one year.

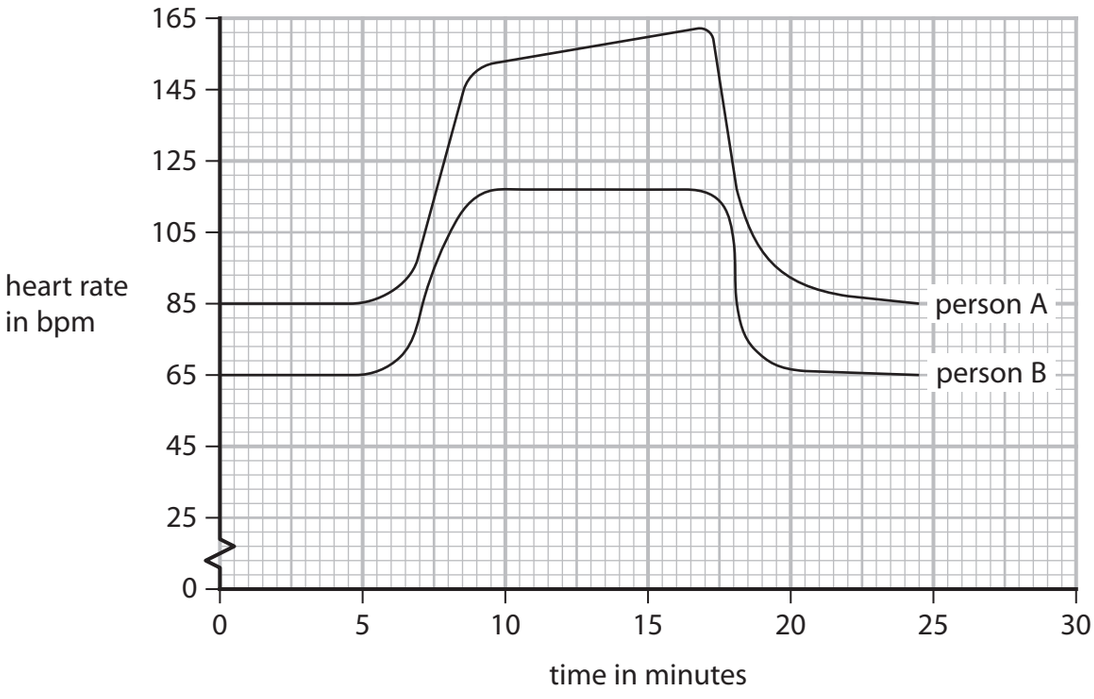


Figure 8

(a) Both people rested for the first 6 minutes, then did the same high intensity exercise for the next 12 minutes, then rested.

Compare the heart rates of person A with the heart rates of person B.

(4)

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(b) The stroke volume for person B before exercising was 61 ml per beat.

Calculate the cardiac output for person B before exercising.

Give your answer in litres per minute.

(3)

..... litres per minute

(c) The cardiac output for person A during exercise was 5.5 litres per minute.

Explain why the heart rate for person A needed to be higher than the heart rate for person B during exercise.

(3)

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(Total for Question 5 = 10 marks)

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6 (a) Hyperthyroidism is caused by an overactive thyroid gland.

Figure 9 shows a person with a normal thyroid gland and a person with hyperthyroidism.



normal hyperthyroidism

© medistock/Shutterstock

Figure 9

(i) State **one** effect of hyperthyroidism on the thyroid gland.

(1)

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(ii) The thyroid gland is part of the

(1)

☒ **A** circulatory system

☒ **B** digestive system

☒ **C** endocrine system

☒ **D** urinary system

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(b) Explain how negative feedback, involving the thyroid gland, controls metabolic rate.

(4)

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*(c) Explain how hormones control the menstrual cycle.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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