

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Centre Number		Candidate Number	
Pearson Edexcel Level 1/Level 2 GCSE (9–1)			
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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Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross ☐.

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)

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(Total for Question 1 = 9 marks)



- 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.

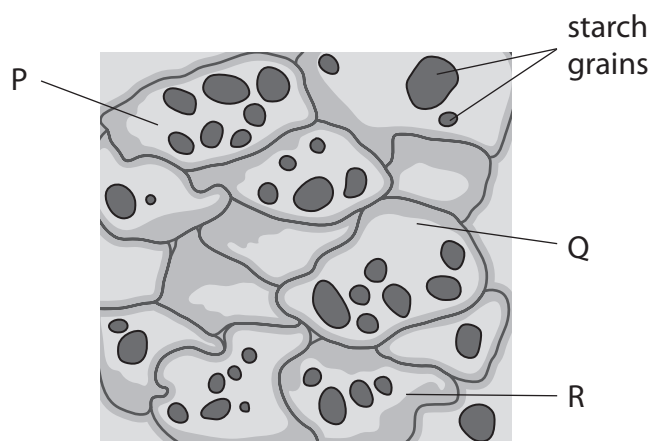


Figure 3

- (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



- (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)

.....%



(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)

(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 cm³ 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)

(ii) State how this variable could be controlled.

(1)



(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



(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)



P 6 2 0 9 1 A 0 1 1 2 0

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

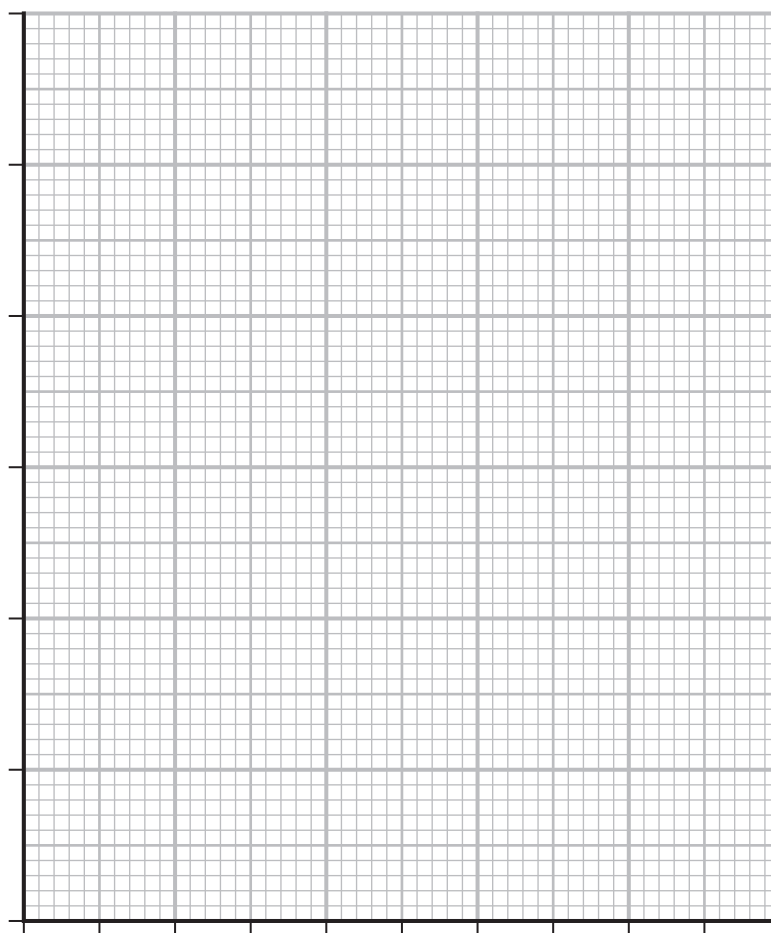
temperature in °C	time taken for blood to clot in seconds
5	90
15	70
25	55
35	40
45	110

Figure 7

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

(3)

time taken for
blood to clot
in seconds



temperature in °C



(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.

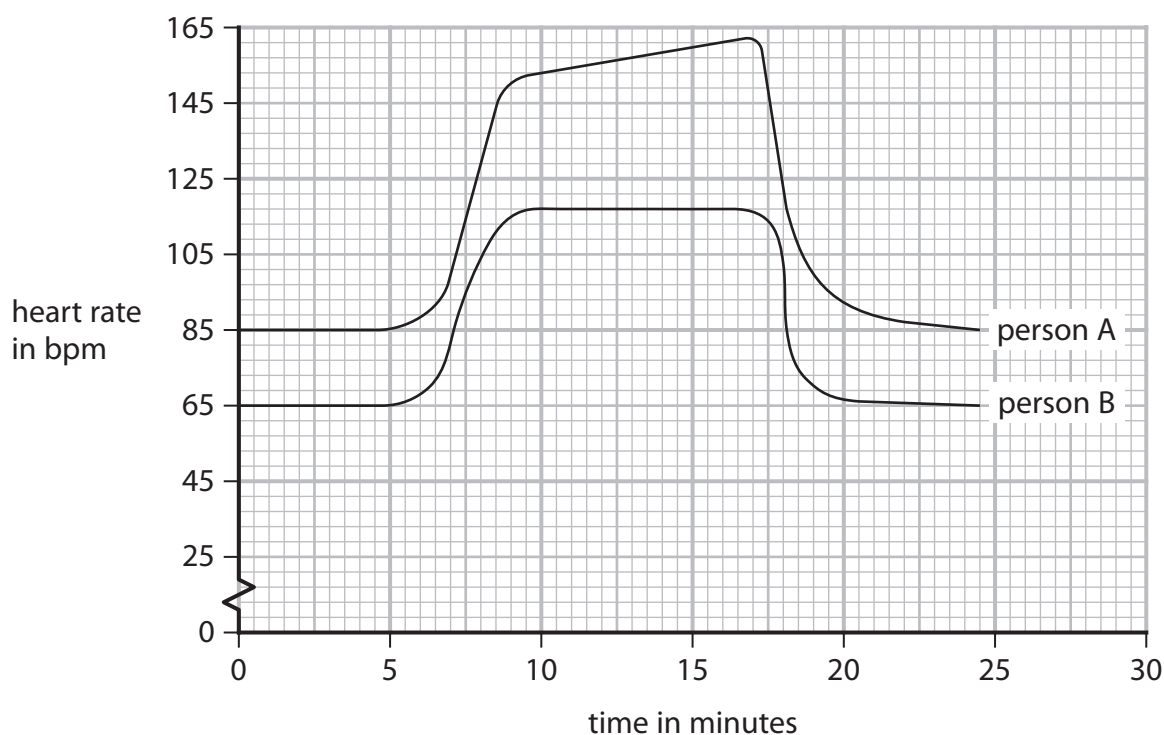


Figure 8

- (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)

(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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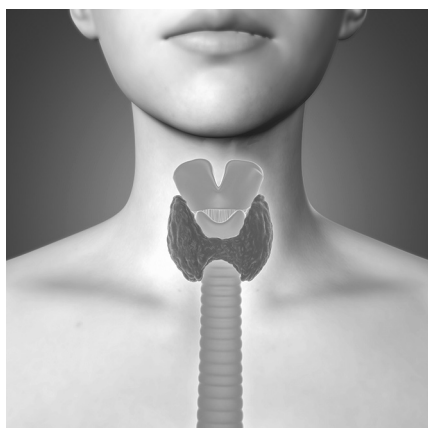
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(Total for Question 5 = 10 marks)

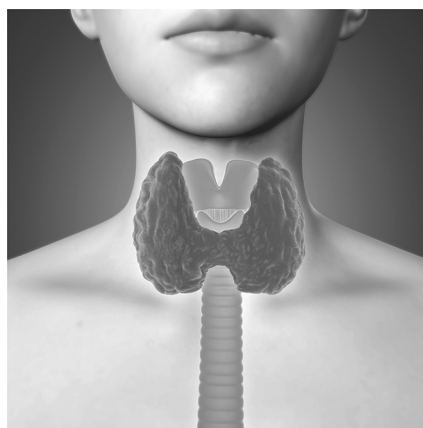


- 6 (a) Hyperthyroidism is caused by an overactive thyroid gland.

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)

- (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)

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(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS



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