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 | | | | |

Friday 7 June 2019

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

Combined Science

Paper 4: Biology 2

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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P 6 0 2 4 3 R A 0 1 1 6

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 (a) A student was investigating the populations of organisms in a garden.

Figure 1 shows the estimates of the number and biomass of some of the organisms in the garden.

organisms	number	mean biomass of each organism in grams	biomass of population in grams
cabbages (plants)	80	70	5600
earthworms	620	3.4	?
slugs	30	4.1	123
hedgehogs	1	620	620
squirrels	2	600	1200

Figure 1

(i) Calculate the biomass of the population of earthworms in the garden.

(1)

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(ii) Hedgehogs eat slugs and earthworms.
Slug pellets were used to kill the slugs.

Explain how killing the slugs would affect the population of earthworms in this garden.

(2)

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(iii) Describe a method that could be used to estimate the population of slugs in the garden.

(3)

(b) Explain how cabbages, earthworms and squirrels contribute to the carbon cycle.

(3)

(Total for Question 1 = 9 marks)

2 (a) A student investigated respiration in three different organisms.

Red hydrogencarbonate indicator was placed in each of three test tubes.

Gauze was placed in each test tube to hold the organisms.

In test tube 1 the student placed four germinating peas.

In test tube 2 the student placed four dried peas.

In test tube 3 the student placed four mealworms.

Bungs were added to each of the test tubes.

The three test tubes were left for one hour.

The equipment used is shown in Figure 2.

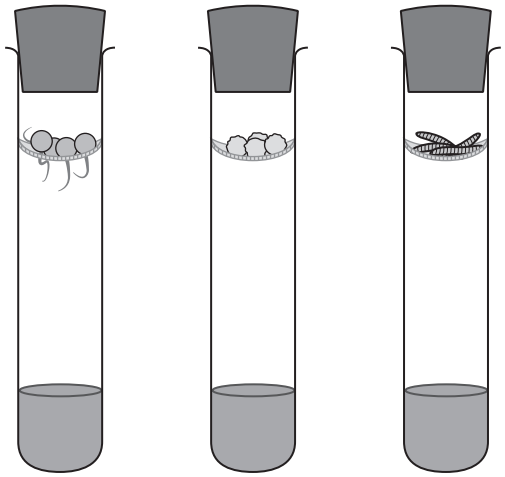

Figure 2

(i) State **two** ways this method could be improved to make the results for these three organisms more comparable.

(2)

1 .....

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2 .....

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(ii) Describe a suitable control for this investigation.

(2)

(b) Hydrogencarbonate indicator changes from red to yellow when more carbon dioxide is present.

The results for this investigation are shown in Figure 3.

organisms	colour of hydrogencarbonate indicator
germinating peas	yellow
dried peas	red
mealworms	yellow

Figure 3

(i) Explain why the result for the germinating peas is different from the result for the dried peas.

(2)

(ii) How was the carbon dioxide produced in this investigation?

(1)

☒ **A** by photosynthesis

☒ **B** when glucose is broken down in the presence of oxygen

☒ **C** when glucose is broken down in the absence of oxygen

☒ **D** by the reaction between oxygen and water

(c) Explain why cellular respiration is essential for living organisms.

(2)

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(Total for Question 2 = 9 marks)

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3 (a) (i) Water enters a plant through root hair cells.

Root hair cells have

(1)

- ☒ **A** a small surface area and thin cell walls
- ☒ **B** a small surface area and thick cell walls
- ☒ **C** a large surface area and thin cell walls
- ☒ **D** a large surface area and thick cell walls

(ii) Explain how water in the root is transported to the leaves of the plant.

(2)

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(b) How is sucrose transported from the leaves to other parts of the plant?

(1)

- ☒ **A** by osmosis through the phloem
- ☒ **B** by osmosis through the xylem
- ☒ **C** by translocation through the phloem
- ☒ **D** by translocation through the xylem

(c) Figure 4 shows the average size of stomata in a leaf during one day.

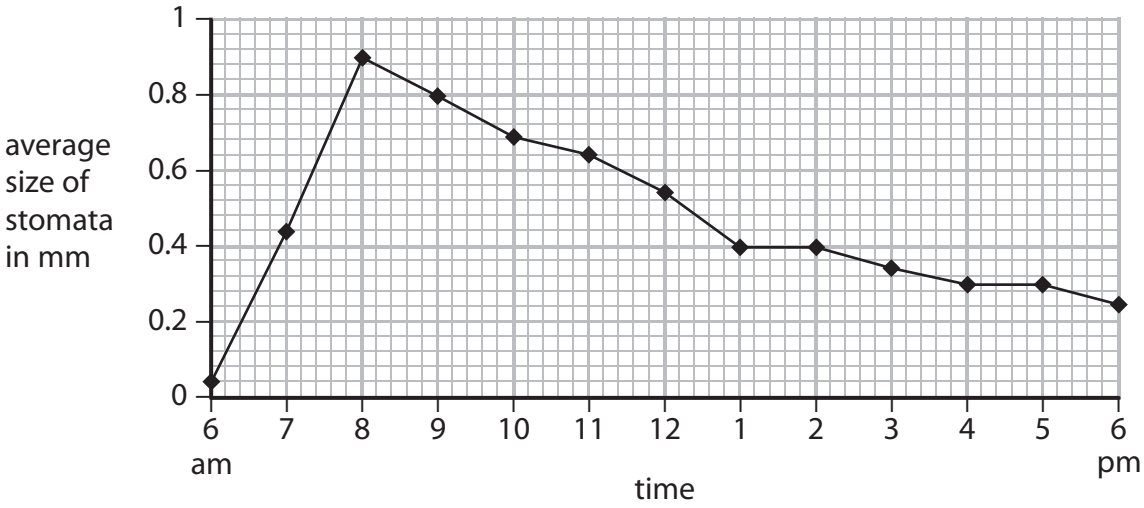

Figure 4

(i) Name the cells that change the size of stomata.

(1)

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(ii) Describe the trend shown in Figure 4.

(2)

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(iii) The temperature increased from 8 am to 1 pm.

Explain why this affected the size of the stomata.

(2)

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(Total for Question 3 = 9 marks)

4 (a) (i) Women with the condition known as polycystic ovary syndrome (PCOS) do not ovulate regularly.

Women with PCOS can be treated using clomifene therapy.

Clomifene therapy stimulates the production of FSH.

Name the endocrine gland that produces FSH.

(1)

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(ii) During this therapy, a woman takes a clomifene tablet each day for the first five days of her menstrual cycle.

Describe the changes that would happen inside the ovaries during the first five days of this treatment.

(2)

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(iii) Which hormone causes ovulation?

(1)

☒ **A** LH

☒ **B** FSH

☒ **C** testosterone

☒ **D** progesterone

(iv) During clomifene therapy, the woman has a blood test on day 20 of the menstrual cycle.

The blood test shows a high level of progesterone.

Explain the cause of this high level of progesterone on day 20 of the menstrual cycle.

(2)

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(b) Hormones are also used as a method of contraception.

Explain why taking high levels of oestrogen and progesterone in the combined contraceptive pill reduces the chance of pregnancy.

(2)

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(c) The female population of Britain is 32.6 million.

The percentage of this population taking the combined contraceptive pill is 13.2%.

The combined pill is 98.8% effective.

Calculate the maximum number of females taking the combined contraceptive pill who could become pregnant.

(3)

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(Total for Question 4 = 11 marks)

5 (a) Figure 5 shows the stroke volume at different heart rates of a person who has trained for a marathon and of a person who has not trained for a marathon.

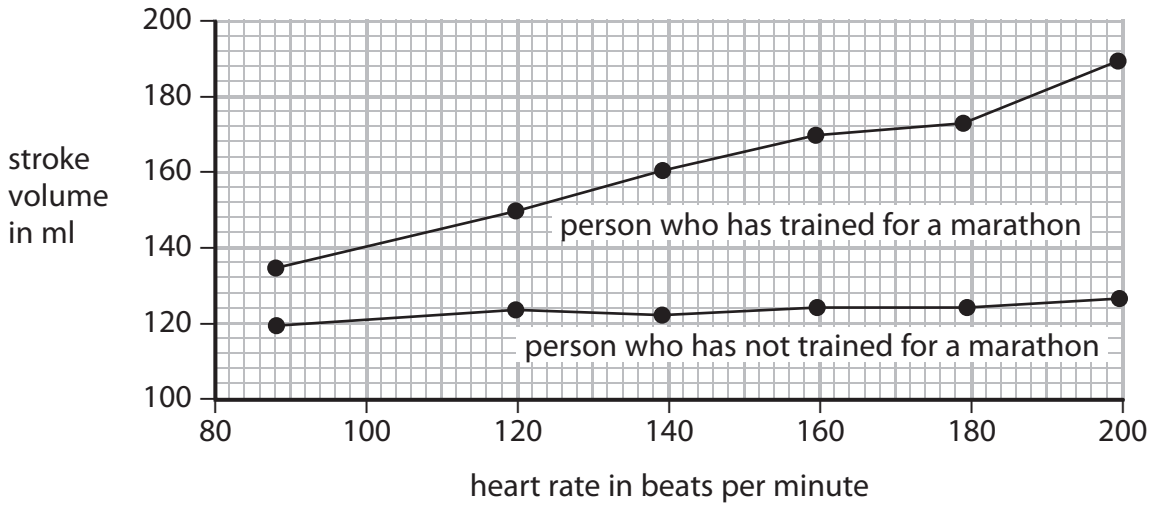

Figure 5

(i) Compare the effect of heart rate on stroke volume of the person who has trained for a marathon with the person who has not trained for a marathon.

(2)

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(ii) Calculate the cardiac output for the person who has trained for a marathon when the heart rate is 160 beats per minute.
Give the units in your answer.

(3)

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*(b) Blood from the body enters the heart through the vena cava.

Describe how this blood flows through the heart and lungs to leave the heart through the aorta.

Include references to the chambers of the heart and the relevant valves in your answer.

(6)

(Total for Question 5 = 11 marks)

6 (a) Figure 6 shows the global movement of carbon into or out of the atmosphere.

process	movement of carbon into or out of the atmosphere in gigatonnes per year
photosynthesis	120.1
respiration	119.6
ocean uptake	92.8
ocean loss	90.0
combustion of fossil fuels	6.4

Figure 6

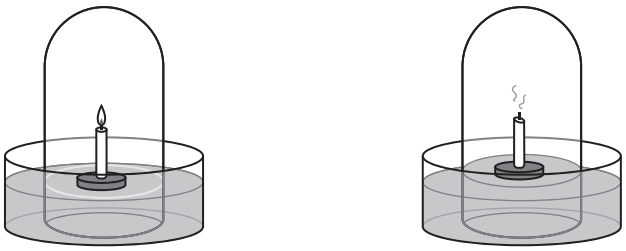
Calculate the net mass of carbon added to the atmosphere each year.

(2)

.....gigatonnes

(b) Joseph Priestley was a scientist who investigated how green plants and combustion affected the carbon cycle.

Figure 7 shows his first experiment.



candle sealed in a bell jar

candle after 3 minutes

Figure 7

(i) State why the candle was not burning after three minutes.

(1)

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(ii) Joseph Priestley continued the investigation but placed a plant inside the bell jar as shown in Figure 8.

Figure 8

He observed that the candle stayed alight for two minutes more than the candle in the bell jar in the first experiment.

Explain his observation.

(2)

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(iii) State **two** variables that would need to be controlled to compare these two experiments.

(2)

1 .....

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2 .....

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(c) Nitrogen is cycled through the environment.

Describe the roles of bacteria in the nitrogen cycle.

(4)

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(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS