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

Centre Number

Candidate Number

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.
- Good luck with your examination.

Turn over ▶

Pearson

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 an area of woodland with some small plants growing in the ground between the trees.

small plants

(Source: © Maksym Holovinov/Shutterstock)

Figure 1

(a) Name a group of organisms that break down the dead leaves and release mineral ions into the soil.

(1)

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(b) The mineral ions are absorbed from the soil into the roots of plants.

Describe how these mineral ions are transported from the roots to the leaves of the plants.

(2)

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(c) A scientist recorded the mean light intensity and the mean number of small plants per m² for six 25 m² areas of the woodland.

Figure 2 shows the results.

area of woodland	mean light intensity in lux	mean number of small plants per m²
A	1500	2.7
B	1300	1.6
C	1000	1.1
D	800	0.6
E	550	0.3
F	350	0.1

Figure 2

(i) Explain the effect of light intensity on the number of small plants per m².

(2)

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(ii) State **one** variable the scientist should have controlled to make sure the light intensity measurements could be compared.

(1)

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(d) The scientist selects an area near the edge of the woodland where many stinging nettles are growing.

This area is partly shaded by the trees.

Describe how the scientist should use a belt transect to investigate how light intensity affects the growth of stinging nettles.

(3)

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(Total for Question 1 = 9 marks)

2 (a) Figure 3 shows ciliated epithelial cells from the airways of a human as seen using a light microscope.

cell A
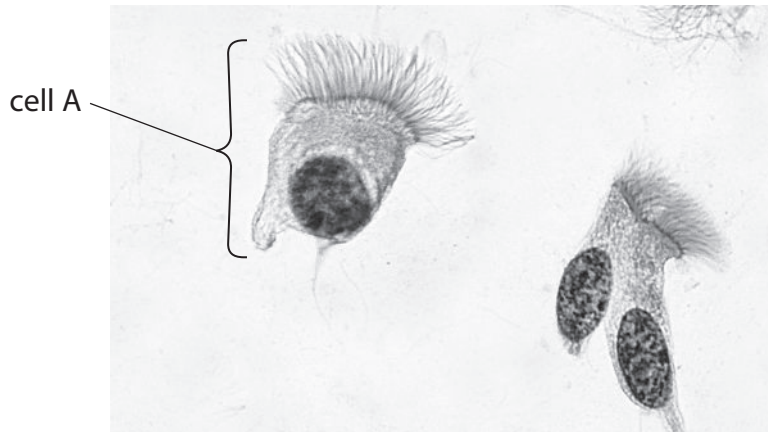
Figure 3

(i) Draw the cell labelled A in the box below.

Label **three** parts of this cell on your diagram.

(4)
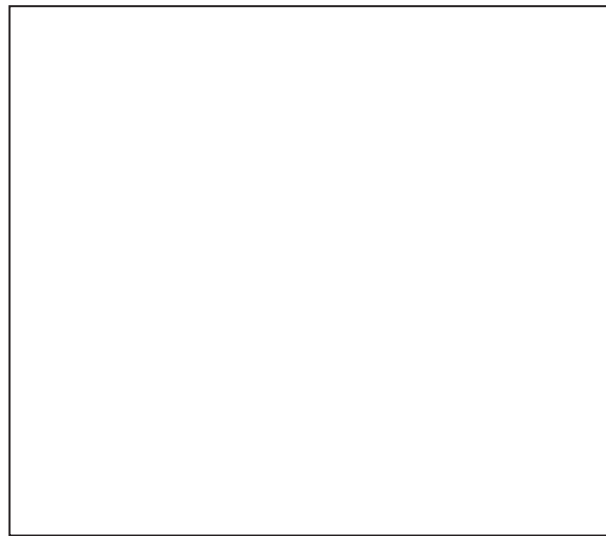
(ii) State the function of the ciliated epithelial cells in the airways of the human breathing system.

(1)

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(b) Figure 4 shows equipment used to investigate the rate of respiration in maggots.
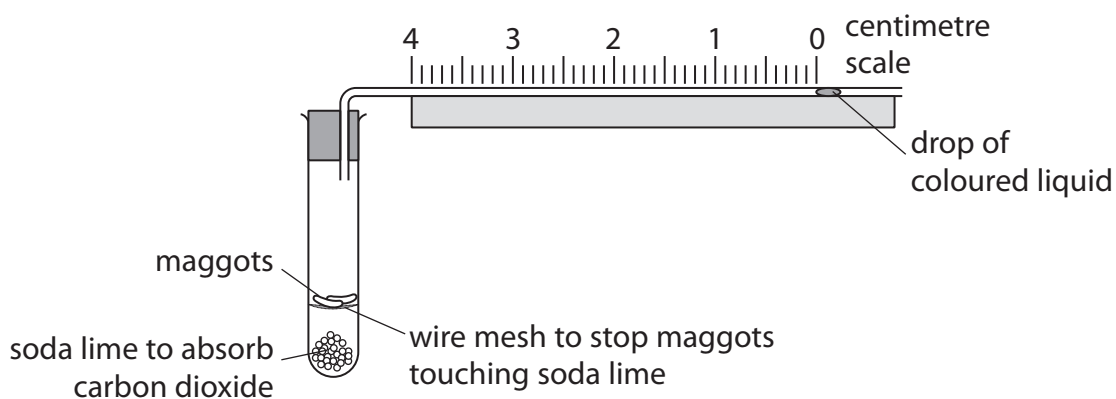
Figure 4

As the maggots respire, the drop of coloured liquid moves towards the test tube.

Figure 5 shows the position of the drop of coloured liquid after ten minutes.
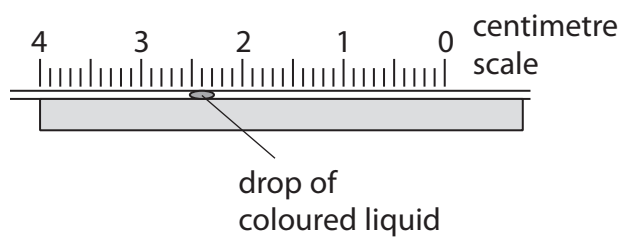
Figure 5

(i) Use information from Figures 4 and 5 to calculate the mean rate of respiration of the maggots in mm per minute.

(2)

.... mm per minute

(ii) Describe a control for this investigation.

(2)

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(Total for Question 2 = 9 marks)

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3 Figure 6 shows the structure and actual size of red blood cells (erythrocytes).

7.5 μm

top view of red blood cell

2.5 μm

red blood cells   side view of red blood cell (cut)
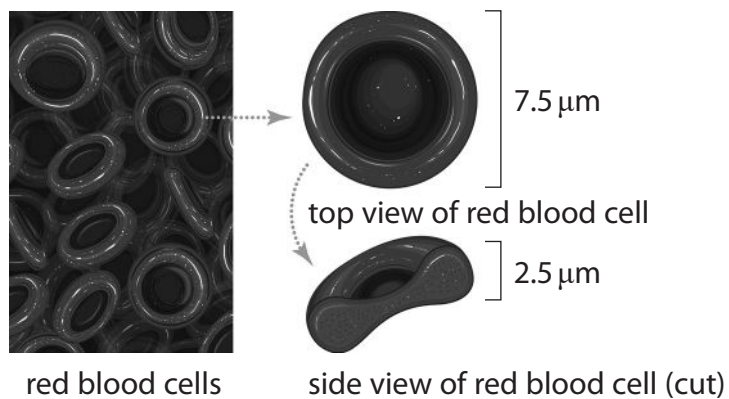
(Source: © N.Vinoth Narasingam/Shutterstock)

Figure 6

(a) (i) Calculate the image size of the top view of this red blood cell if this cell is magnified 400×.

Give your answer in mm.

(2)

.... mm

(ii) Explain how the shape of a red blood cell is related to its function.

(3)

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(iii) State the role of haemoglobin inside the red blood cell.

(1)

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(b) Some blood transfusions contain red blood cells.

Red blood cells are stored in a solution containing 5.0% glucose and 0.9% salt.

Explain why red blood cells cannot be stored in pure water.

(3)

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(Total for Question 3 = 9 marks)

4 (a) Methods of contraception include use of hormones and barrier methods.

   (i) Which form of contraception is a barrier method?

   (1)

   ☒ **A** oral contraception

   ☒ **B** female condom

   ☒ **C** rhythm (calendar) method

   ☒ **D** contraceptive implant

   (ii) State why a barrier method of contraception may be used in addition to a hormonal method.

   (1)

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....

(b) The combined contraceptive pill contains the hormones oestrogen and progesterone.

   (i) State the endocrine gland that releases oestrogen.

   (1)

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   (ii) Explain how high levels of oestrogen and progesterone in the combined contraceptive pill work together to prevent pregnancy.

   (4)

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(c) Hormones can also be used to treat infertility.

Explain how clomifene therapy and IVF can improve female fertility.

(4)

clomifene therapy ....

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IVF ....

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(Total for Question 4 = 11 marks)

5 (a) A hospital patient was tested for diabetes.

A nurse recorded his mass and height.

Figure 7 shows these measurements.

mass in kg	height in metres
124	1.8

Figure 7

Calculate the BMI of this patient using the information in Figure 7.

(2)

BMI = ...

(b) Blood samples were taken from this patient every four hours.

The glucose concentrations were recorded in Figure 8.

time in hours	blood glucose concentration in milligrams per decilitre
0	100
4	131
8	139
12	90
16	92
20	134
24	137

Figure 8

(i) Describe the trends shown in this data.

(3)

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(ii) This patient was diagnosed as being type 2 diabetic.

Explain why the blood glucose concentration of this patient remained high from 4 hours to 8 hours.

(3)

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(iii) This patient did some exercise during these 24 hours.

Explain how the data in Figure 8 shows that this exercise occurred after 8 hours but before 12 hours.

(3)

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(Total for Question 5 = 11 marks)

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6 Exercise causes changes in the circulation of the blood.

In an investigation, the change in blood flow to different parts of the body during exercise was measured.

All the volunteers used in the study were healthy females of the same age.

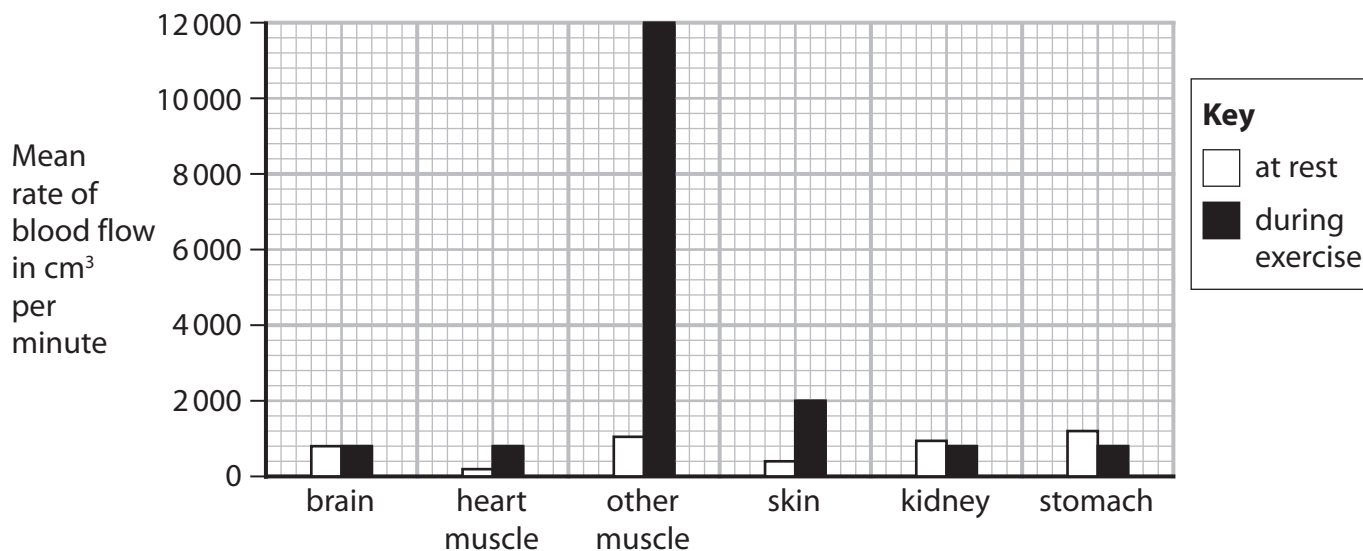Figure 9 shows the results of this investigation.

Figure 9

(a) (i) During exercise, the blood flow to the stomach changes.

Calculate the percentage change in blood flow to the stomach in response to exercise.

Give your answer to the nearest whole number

(3)

....%

(ii) Suggest **two** other variables that should be controlled in this investigation.

(2)

1 ....

2 ....

*(iii) Explain the changes in blood flow, shown in Figure 9, that are caused by exercise.

(6)

(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS

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