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

Time 1 hour 10 minutes

Paper reference **1SC0/2BF**

Combined Science

PAPER 4

Foundation 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 ▶

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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 human blood seen using a light microscope.

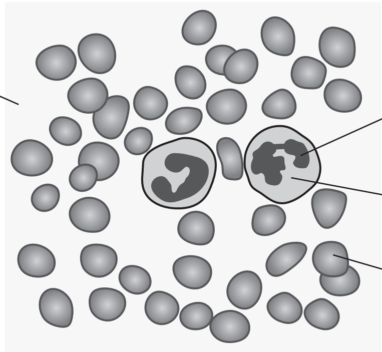

Figure 1

(a) (i) The organelle labelled X controls the activities of the white blood cell.

What is the name of organelle X?

(1)

☒ **A** mitochondrion

☒ **B** ribosome

☒ **C** chromosome

☒ **D** nucleus

(ii) Use words from the box to complete the sentences.

(2)

gas	haemoglobin	hormone
liquid	platelet	solid

Red blood cells contain the substance ....

Blood plasma is a ....

(iii) Describe **two** ways that white blood cells protect the body from disease.

(2)

1 ....

....

2 ....

....

(b) Figure 2 shows a white blood cell on a 100 μm scale.

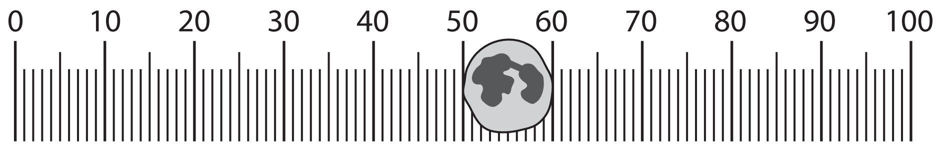

Figure 2

State the width of the white blood cell.

(1)

.... μm

(c) Figure 1 shows human blood seen using a light microscope.

Explain why using an electron microscope shows the structures in the white blood cells more clearly.

(2)

....

....

....

....

....

(Total for Question 1 = 8 marks)

2 (a) There are three levels of organisation in an ecosystem.

Which order shows the levels of organisation from lowest to highest?

(1)

- ☒ **A** community, population, organism
- ☒ **B** community, organism, population
- ☒ **C** organism, community, population
- ☒ **D** organism, population, community

(b) Figure 3 shows food webs for two gardens.

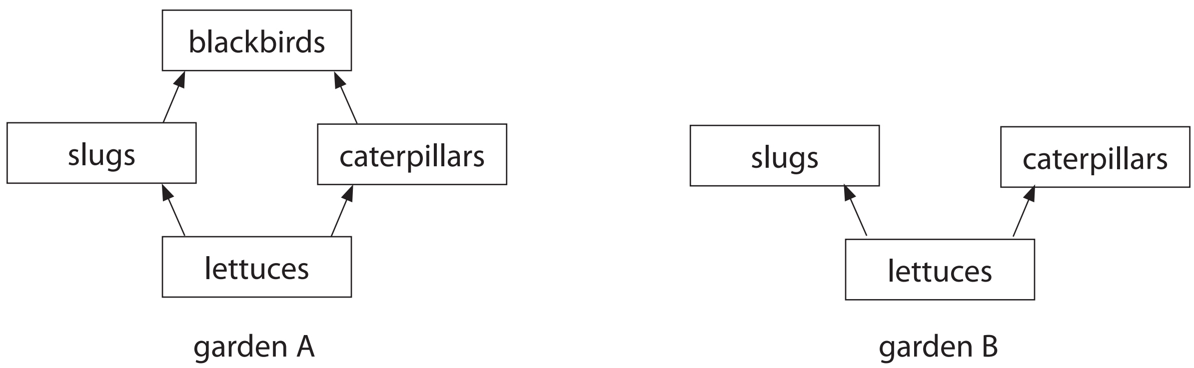

Figure 3

Slug pellets are put on the soil around the lettuce plants in garden A and garden B.

Slug pellets kill slugs.

(i) A scientist predicts that the number of caterpillars will decrease in garden A.

Give **one** reason why the number of caterpillars will decrease in garden A.

(1)

....

....

(ii) The scientist predicts that the number of caterpillars will increase in garden B.

Give **one** reason why the number of caterpillars will increase in garden B.

(1)

....

....

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(iii) Figure 4 shows the population of slugs in garden A for five years.

Slug pellets were used during the first year.

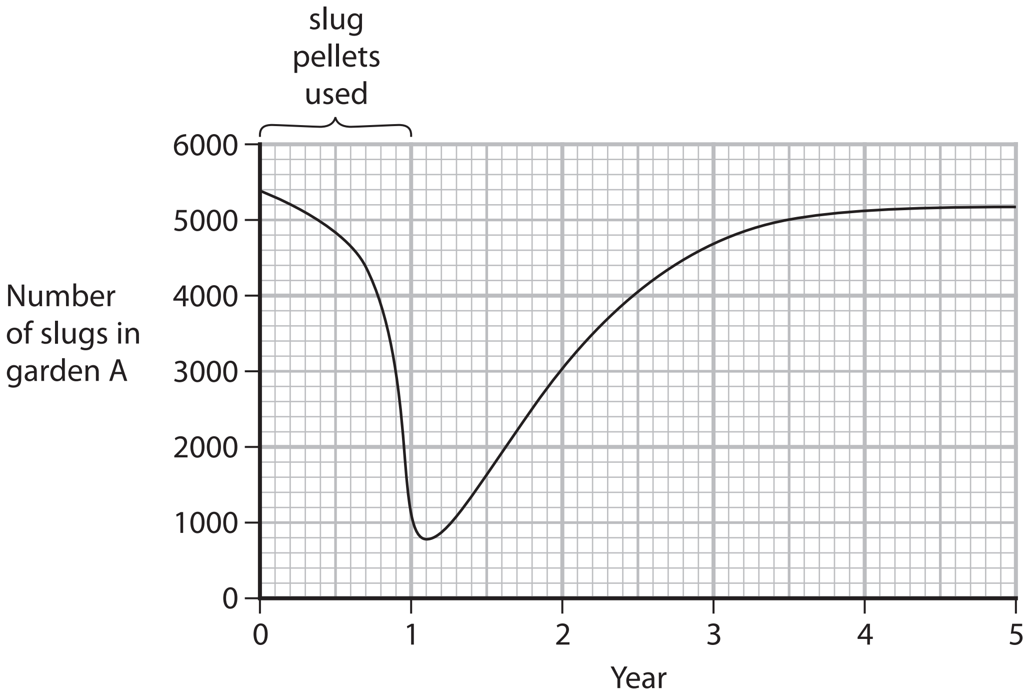

Figure 4

Describe the trend in the slug population from year 1 to year 5.

(2)

....

....

....

....

(c) (i) Flatworms from New Zealand that eat slugs are now living in the UK.

Which term describes a species from one country that is living in another country?

(1)

☒ **A** pathogenic

☒ **B** non-pathogenic

☒ **C** indigenous

☒ **D** non-indigenous

(ii) Figure 5 shows tiny white animals called mites on the skin of a slug.

The mites feed on blood.

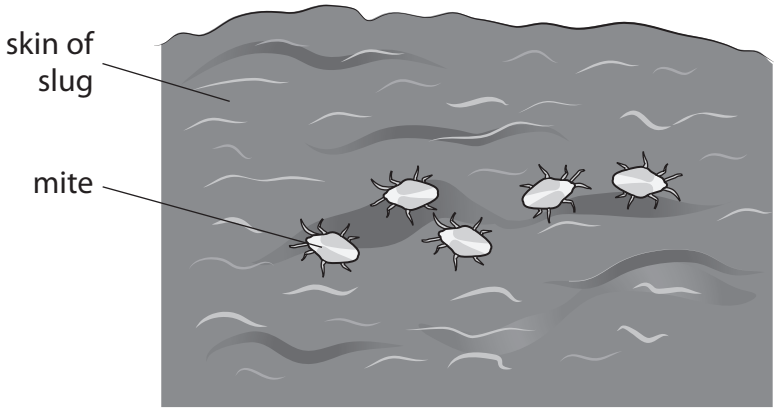

Figure 5

Explain why these mites are classed as parasites.

(2)

.....

.....

.....

.....

(Total for Question 2 = 8 marks)

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3 (a) Endocrine glands make hormones.

Which endocrine gland is situated in the head and is attached to the brain?

(1)

- ☒ **A** adrenal
- ☒ **B** pancreas
- ☒ **C** pituitary
- ☒ **D** thyroid

Diabetics cannot effectively control the concentration of glucose in their blood.

(b) Person A has type 1 diabetes.

Person B has type 2 diabetes.

Draw one straight line from each person to the cause of their type of diabetes.

(2)

person	**cause**
	does not have a pancreas
person A (type 1)	cannot digest fatty foods
	does not produce insulin
person B (type 2)	has cells that have stopped responding to insulin
	cannot transport insulin in the blood

(c) A scientist investigated how the waist to hip ratio affected the probability of developing type 2 diabetes.

The scientist chose 100 females in each of five waist to hip ratio groups and recorded if they developed type 2 diabetes.

Figure 6 shows the results.

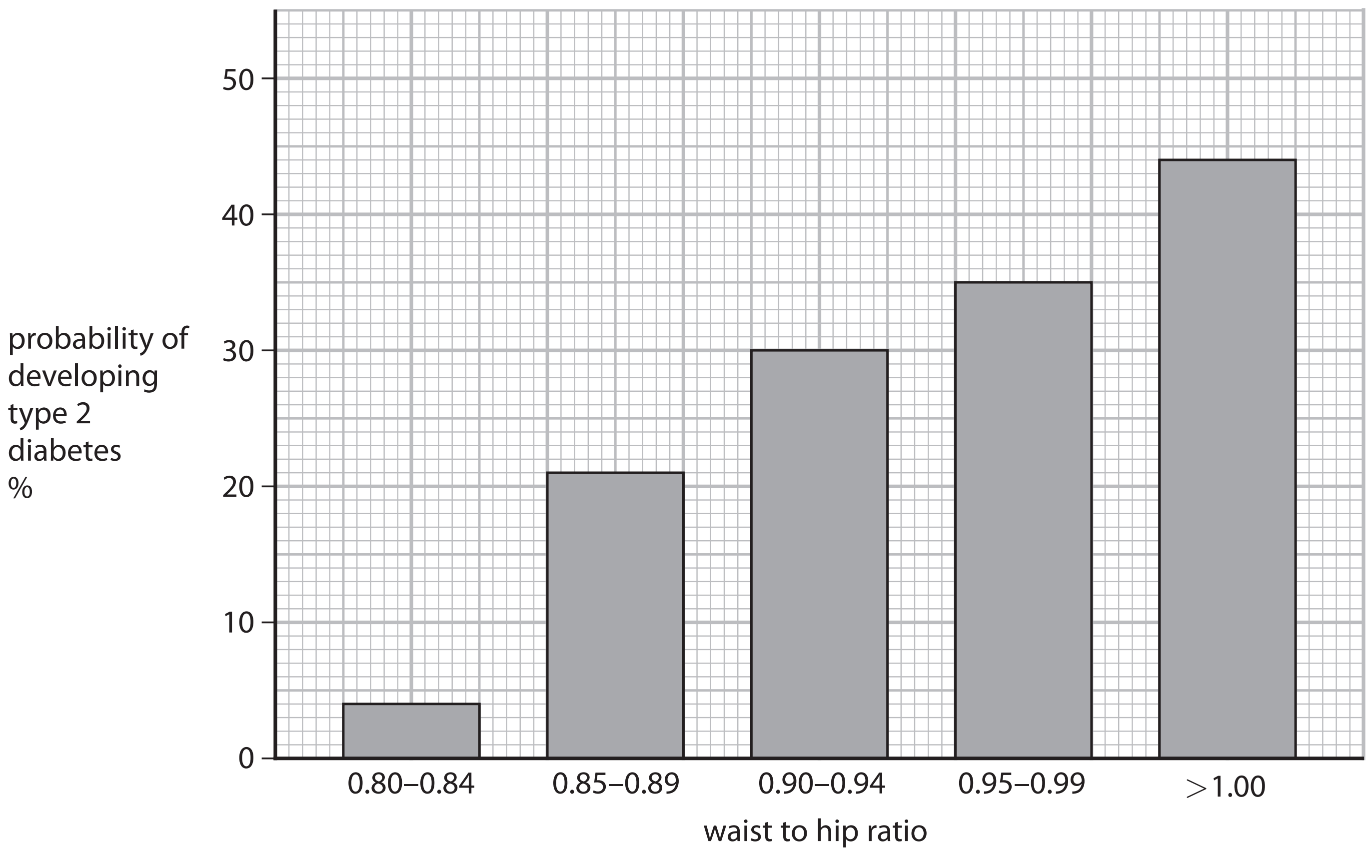

Figure 6

(i) Describe the trend shown in Figure 6.

Use data from Figure 6 in your answer.

(2)

....

....

....

....

(ii) A female has a waist measurement of 78.3 cm and a hip measurement of 90.0 cm.

Calculate the waist to hip ratio for this female and use Figure 6 to estimate the probability that she will develop type 2 diabetes.

(2)

probability .... %

(d) (i) The scientist also measured the BMI of the females.

BMI and waist to hip ratio are two factors that affect the probability of females developing type 2 diabetes.

State **two** other factors about the females in the study that would affect the probability of them developing type 2 diabetes.

(2)

1 ....

....

2 ....

....

(ii) State why an athlete may have a high BMI but still have a low probability of developing type 2 diabetes.

(1)

....

....

(Total for Question 3 = 10 marks)

4 (a) Figure 7 shows a single-celled pond organism (*Amoeba proteus*).

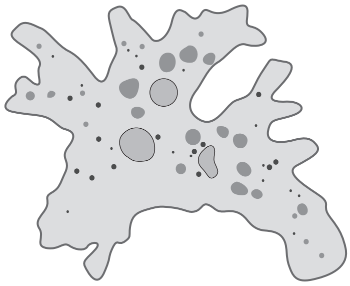

Figure 7

(i) Which row of the table allows the net diffusion of oxygen into *Amoeba proteus*?

(1)

		concentration of oxygen in water in ppm	concentration of oxygen in *Amoeba proteus* in ppm
☒	**A**	4	4
☒	**B**	10	10
☒	**C**	4	10
☒	**D**	10	4

(ii) *Amoeba proteus* uses oxygen for aerobic respiration.

Complete the equation for aerobic respiration.

(1)

glucose + oxygen → .... + ... (+ energy is released)

(b) Humans breathe faster when they exercise.

(i) Which **two** changes allow the rate of respiration in the muscle to increase?

(1)

		heart rate	amount of glucose delivered to the muscles
☒	**A**	increases	increases
☒	**B**	increases	decreases
☒	**C**	decreases	increases
☒	**D**	decreases	decreases

(ii) Figure 8 shows breathing data for a human at rest and when running at 5 metres per second on a running machine.

activity	mean number of breaths per minute	mean volume of air in one breath in dm^3	mean volume of air breathed in dm^3 per minute
at rest	5.0	0.8	4.0
running at 5 metres per second	24.7	2.7	?

Figure 8

Calculate the mean volume of air breathed per minute when running at 5 metres per second.

Give your answer to one decimal place.

(2)

.... dm^3 per minute

(iii) Devise an investigation to compare the mean number of breaths per minute for men, with the mean number of breaths per minute for women, when running at 5 metres per second on a running machine.

(4)

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(c) Whilst running, the leg muscles of an athlete tightened up, causing cramp.

Name the product of anaerobic respiration that can cause cramp.

(1)

.....

(Total for Question 4 = 10 marks)

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5 Figure 9 shows an area of woodland with some small plants growing in the ground between the trees.

(Source: © Maksym Holovinov/Shutterstock)

Figure 9

(a) The leaves of the small plants are green.

Describe how these plants make glucose.

(2)

....

....

....

....

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

(1)

....

(c) 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)

....

....

....

....

....

(d) A scientist recorded the mean light intensity and the mean number of small plants per m^2 for six $25\,m^2$ areas of the woodland.

Figure 10 shows the results.

area of woodland	mean light intensity in lux	mean number of small plants per m^2
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 10

(i) Explain the effect of light intensity on the number of small plants per m^2.

(2)

....

....

....

....

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

(1)

.....

.....

(e) 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 5 = 11 marks)

6 (a) Figure 11 shows ciliated epithelial cells from the airways of a human as seen using a light microscope.

(Source: © Jose Luis Calvo/Shutterstock)

Figure 11

(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)

....

....

....

(b) Figure 12 shows equipment used to investigate the rate of respiration in maggots.

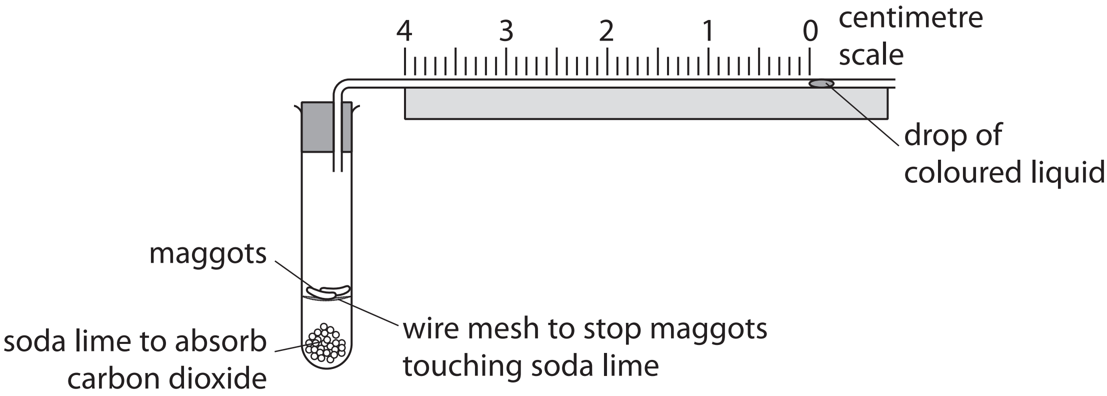

Figure 12

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

Figure 13 shows the position of the drop of coloured liquid after ten minutes.

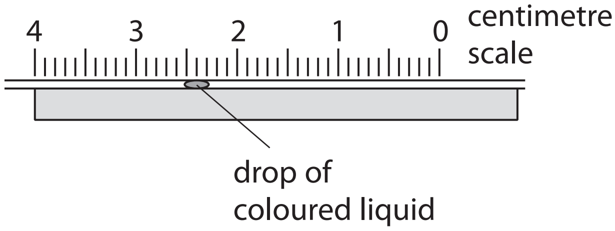

Figure 13

Use information from Figures 12 and 13 to calculate the mean rate of respiration of the maggots in mm per minute.

(2)

.... mm per minute

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*(c) Explain how alveoli in human lungs are adapted for gas exchange.

Include the names of the gases that are being exchanged.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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