Write your name here

Surname	Other names

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

Centre Number	Candidate Number

Combined Science

Paper 2: Biology 2

Higher Tier

Additional Sample Assessment Material for first teaching September 2016
Time: 1 hour 10 minutes

Paper Reference
1SC0/2BH

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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S 6 0 2 3 0 A 0 1 2 0

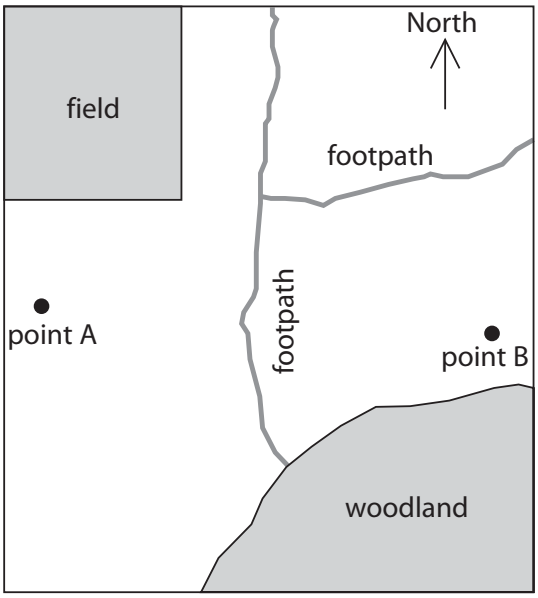
Pearson

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 investigated the distribution of poppy plants in a park.

Figure 1 shows a sketch of the park and a diagram of a poppy plant.



poppy plant

Figure 1

The student placed a 1 m^2 quadrat at 10 metre intervals between point A and point B and recorded the number of poppy plants in each quadrat.

(i) Name the technique the student used to study the distribution of poppy plants.

(1)

.....

Figure 2 shows the number of poppy plants at 10 metre intervals from point A to point B.

distance from point A in metres	number of poppy plants in the 1 m^2 quadrat
0 (point A)	12
10	10
20	11
30	8
40 (point B)	6

Figure 2

(ii) Explain the effect of the woodland on the distribution of poppy plants.

(3)

(iii) Devise a plan, that uses a quadrat, to estimate the number of poppy plants in the field.

(3)

(b) The woodland is a protected conservation area.

Explain why this woodland increases the biodiversity of the park.

(2)

(Total for Question 1 = 9 marks)

2 Figure 3 shows a peak flow meter.

A peak flow meter is used to measure the rate at which air is blown out of the lungs.

Figure 3

To use a peak flow meter a person takes a deep breath and exhales the air as hard and as fast as possible into the peak flow meter.

People with asthma can have a reduced peak flow.

A student investigated the peak flow of five people with asthma and five people without asthma.

All the people were male and the same age.

(a) Give **two** other factors the student should control when selecting the people for this investigation.

(2)

1 .....

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2 .....

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(b) The mean peak flow for people without asthma was 630 dm^3 per minute.

The mean peak flow for people with asthma was 480 dm^3 per minute.

Use the mean peak flow values to calculate the percentage decrease in peak flow for the people with asthma.

(2)

.....%

(c) Explain the effect of reduced airflow in the lungs on aerobic respiration.

(3)

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(d) Explain why people with asthma may start to respire anaerobically more quickly than people without asthma, when exercising at the same intensity.

(2)

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(Total for Question 2 = 9 marks)

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3 (a) A student is growing algae to make algal balls to investigate how light intensity affects photosynthesis.

A small culture of algae is added to a large bottle of distilled water.

Air is then bubbled through and the bottle is placed in front of a light source.

After 4 weeks, enough algae have grown for the student to make algal balls.

Figure 4 shows the apparatus used.

By permission of 'Science and Plants for Schools' – http://www.saps.org.uk/

Figure 4

(i) Why is air bubbled through the distilled water containing the algae?

(1)

☒ **A** to provide oxygen for photosynthesis

☒ **B** to provide carbon dioxide for photosynthesis

☒ **C** to provide carbon dioxide for respiration

☒ **D** to provide nitrogen for respiration

(ii) Which part of an algal cell absorbs light energy to make glucose?

(1)

☒ **A** the ribosome in the chloroplast

☒ **B** the chlorophyll in the vacuole

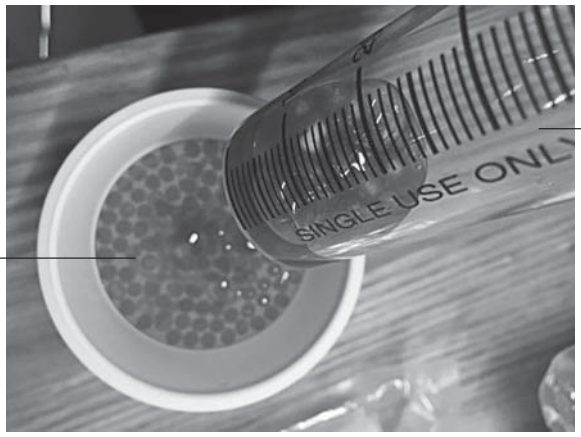
☒ **C** the chlorophyll in the chloroplast

☒ **D** the ribosome in the nucleus

(b) To make the algal balls, the algae are mixed with sodium alginate.

The student uses a syringe to add the mixture drop by drop into calcium chloride solution, which causes the algal balls to form.

Figure 5 shows this process.



Source from: https://twitter.com/mapward/status/686680082274885632

Figure 5

(i) State why the algal balls need to be washed before being used.

(1)

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(ii) State **one** relevant safety precaution that should be used when making the algal balls.

(1)

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(c) The student placed some algal balls into each of five small glass bottles containing hydrogencarbonate indicator.

Each bottle was sealed with a lid and placed at a different distance from a light source.

Hydrogencarbonate indicator changes colour due to the amount of carbon dioxide in the solution.

The investigation was left for 50 minutes and the colour of the hydrogencarbonate solution was recorded.

Figure 6 shows this investigation.

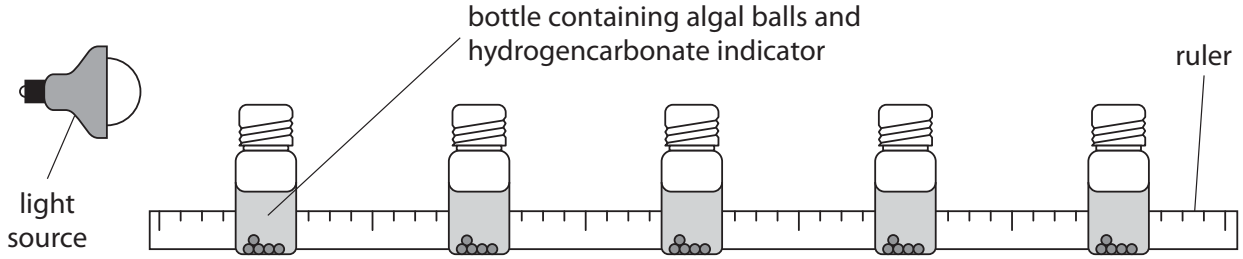

Figure 6

(i) State **two** variables the student will need to control in this investigation.

(2)

1 .....

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2 .....

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(ii) At the start of the investigation the hydrogencarbonate indicator was red in colour.

Figure 7 shows the colour of hydrogencarbonate indicator in solutions that have different pH.

colour	pH
yellow	7.6
orange	8.0
red	8.4
magenta	8.8
purple	9.2

Figure 7

Explain why the hydrogencarbonate indicator in the bottle nearest to the light source turned purple.

(3)

(Total for Question 3 = 9 marks)

4 (a) Figure 8 shows the nutritional information for two different varieties of biscuit.

Variety A

Nutrition information	Per biscuit	Per 100 g
Energy	62 kcal	446 kcal
Fat	2.1 g	15.3
of which		
monounsaturated	0.9 g	6.2 g
polyunsaturated	0.3 g	2.2 g
saturated	0.9 g	6.9 g
Carbohydrates	9.562 g	68.3 g
of which		
sugars	0 g	0.4 g
Proteins	1.113 g	7.95 g
Dietary fibre	0.53 g	3.8 g
Natrium	0.07 g	0.52 g

Variety B

Nutrition information	Per Biscuit	Per 100 g
Energy	40.8 kcal	489 kcal
Protein	0.61 g	7.30 g
Carbohydrates	5.59 g	67.10 g
(of which sugars)	1.34 g	16.10 g
Fat	1.77 g	21.20 g
Saturated fatty acids	0.89 g	10.70 g
Monounsaturated fatty acids	0.70 g	8.40 g
Polyunsaturated fatty acids	0.18 g	2.20 g
Trans fatty acids	0.00 g	0.00 g
Cholesterol	0.00 mg	0.00 mg
Dietary fibre	0.51 g	6.10 g

Figure 8

(i) State why it is better to compare the nutritional information per 100 g of biscuit rather than per biscuit.

(1)

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(ii) Explain why variety A would be a better choice of biscuit for a person with type 2 diabetes.

(2)

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(b) Explain the role of glucagon in the body.

(3)

(c) (i) Explain how chewing food helps digestion.

(2)

(ii) In the small intestine, large fat droplets are broken into smaller droplets by a substance called bile.

Explain how the smaller fat droplets are then digested and enter the bloodstream.

(3)

(Total for Question 4 = 11 marks)

5 Hormones control the menstrual cycle.

(a) (i) Which row of the table shows where the hormones LH and oestrogen are produced?

(1)

		LH	oestrogen
☒	**A**	pituitary	ovaries
☒	**B**	ovaries	pituitary
☒	**C**	ovaries	ovaries
☒	**D**	pituitary	pituitary

(ii) Figure 9 shows the body temperature and oestrogen level for a fertile woman during a 30 day menstrual cycle.

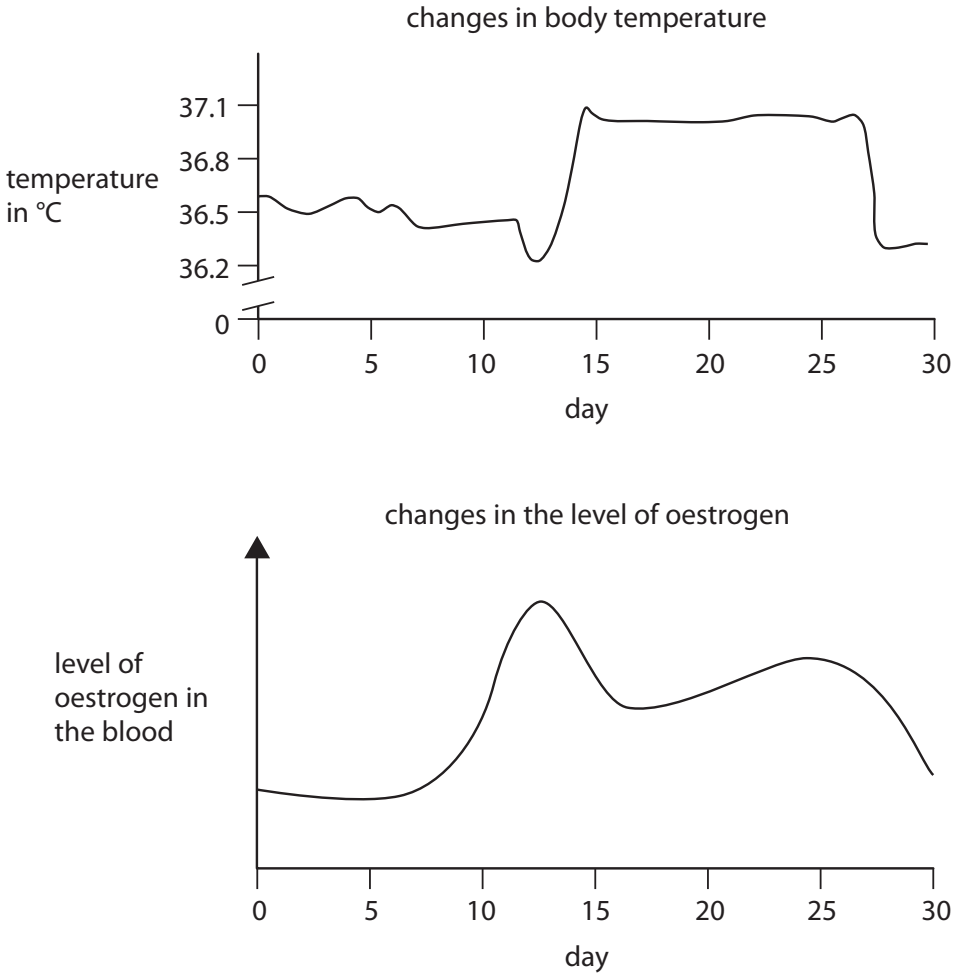

Figure 9

Describe the correlation between body temperature and oestrogen levels from day 5 to day 25.

(2)

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(iii) Explain how monitoring a woman's body temperature can be used to increase her chance of becoming pregnant.

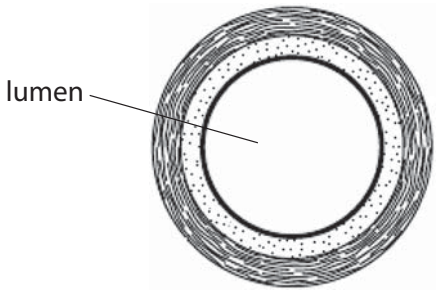
(2)

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

(6)

(Total for Question 5 = 11 marks)

6 (a) Figure 10 shows a cross-section of a blood vessel.



magnification ×8

Figure 10

(i) The diameter of the lumen in Figure 10 is 25.0 mm

What is the actual diameter of the lumen of this blood vessel?

(1)

☒ **A** 3.1×10^{-2} m

☒ **B** 3.1×10^{-3} m

☒ **C** 2.0×10^{-2} m

☒ **D** 2.0×10^{-3} m

(ii) Which blood vessel delivers deoxygenated blood to the heart?

(1)

☒ **A** aorta

☒ **B** pulmonary artery

☒ **C** pulmonary vein

☒ **D** vena cava

(iii) Capillary walls are much thinner than the wall of the blood vessel in Figure 10.

The lumen of a capillary is also much smaller.

Explain how each of these features of the capillary helps it to function efficiently.

(2)

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(b) The percentage of blood flowing through body organs was measured at rest and during vigorous exercise.

The results are shown in Figure 11.

body organ	blood flow at rest (%)	blood flow during vigorous exercise (%)
brain	18	4
heart	5	5
kidneys	20	1
liver	25	1
skin	7	1
muscles	15	87
other	10	1

Figure 11

(i) The volume of blood in a human is 4.7 litres.

Calculate the increase in the volume of blood flow through the muscles during vigorous exercise.

(3)

.....litres

(ii) Explain why this increase in the volume of blood to the muscles is required during vigorous exercise.

(4)

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(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS

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