Write your name here

Surname	Other names

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

Centre Number | | | | | |

Candidate Number | | | | |

Combined Science

Paper 1: Biology 1

Higher Tier

Tuesday 15 May 2018 – Afternoon
Time: 1 hour 10 minutes

Paper Reference
1SC0/1BH

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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1/

P 5 9 1 7 5 A 0 1 2 4

Pearson

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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) Obesity increases the risk of a person developing cardiovascular disease.

Losing weight can reduce the risk of this disease occurring.

Explain why exercise can cause weight loss.

(2)

(b) Figure 1 shows a gastric band fitted to a stomach.

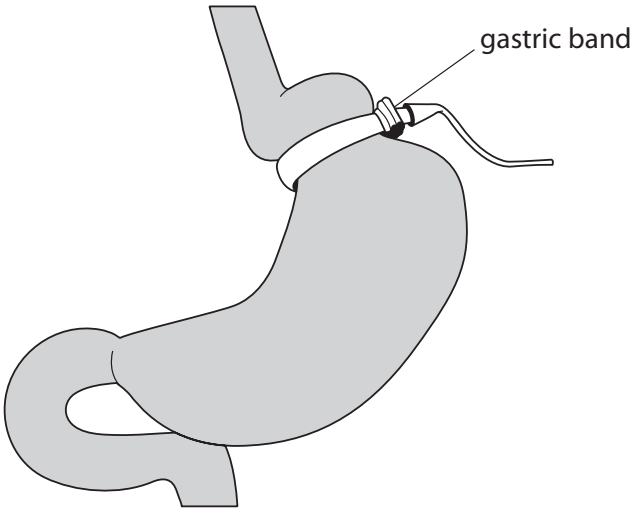

Figure 1

Explain how a gastric band helps a person to lose weight.

(2)

(c) BMI and waist : hip ratio can be used to find out if a person is obese.

Figure 2 shows some data for two males.

male	BMI	waist : hip ratio
A	27.3	0.85
B	?	0.81

Figure 2

BMI is calculated using the equation:

$$\text{BMI} = \frac{\text{mass in kilograms}}{(\text{height in metres})^2}$$

(i) Male B has a mass of 72 kg and a height of 1.81 m.

Calculate the BMI of male B.

Give the answer to 3 significant figures.

(3)

BMI = ...

(ii) Figure 3 shows the interpretation of BMI values.

BMI range	interpretation
below 18.5	underweight
18.5 – 24.9	normal
25.0 – 29.9	overweight
30.0 and above	obese

Figure 3

Males with a waist : hip ratio above 0.90 are defined as abdominally obese.

Explain what the BMI and waist : hip ratio for male A shows about his weight distribution.

(2)

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(Total for Question 1 = 9 marks)

2 (a) Figure 4 shows two potato chips.

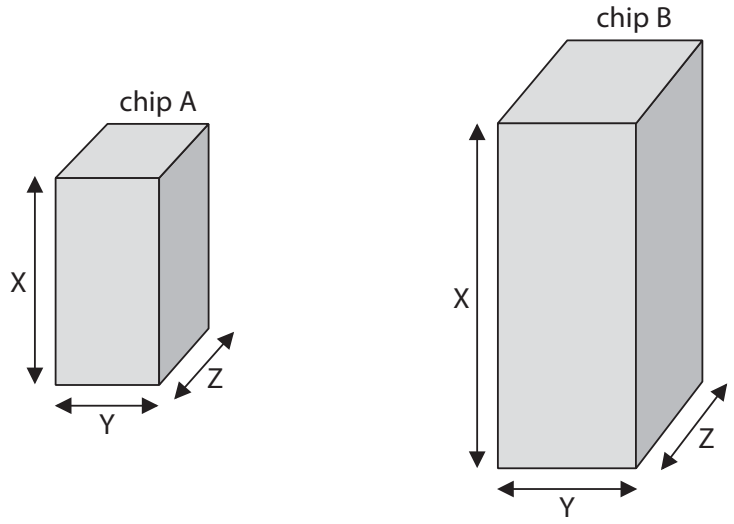

Figure 4

Figure 5 shows some information about each potato chip.

potato chip	length of X in cm	length of Y in cm	length of Z in cm	total surface area of four sides in cm^2	total surface area of top and bottom in cm^2	total surface area of chip in cm^2
A	3.0	1.5	1.5	18.0	4.5	22.5
B	5.0	2.0	2.0	?	?	?

Figure 5

(i) Calculate the total surface area of potato chip B using the formula,

Total surface area = 2XY + 2XZ + 2YZ

(2)

total surface area = ... cm^2

(ii) The potato chips were placed in distilled water for 20 minutes.

Figure 6 shows the increase in mass of each potato chip.

potato chip	increase in mass in grams
A	0.1
B	0.3

Figure 6

Explain why potato chip B has a greater increase in mass than potato chip A.

(2)

(iii) Potato chip A is transferred from the distilled water into a concentrated salt solution.

Explain what will happen to the cells in potato chip A.

(3)

(b) The potatoes of a potato plant develop underground.

Explain **one** difference in the sub-cellular structures in a cell in the potato and those in a cell in the leaf of the potato plant.

(2)

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(Total for Question 2 = 9 marks)

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3 *Streptococcus* bacteria can cause a sore throat or skin infection.

An illness called scarlet fever can also develop during an infection with this bacterium.

(a) (i) Give **two** precautions a doctor should take when treating a patient who is infected with *Streptococcus*.

(2)

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(ii) From September 2013 to March 2014 there were 2 830 cases of scarlet fever in the UK.

From September 2014 to March 2015 there were 5 943 cases of scarlet fever.

Calculate the percentage increase of the number of cases of scarlet fever between the periods September 2014 to March 2015 and September 2013 to March 2014.

(2)

..... %

(iii) Figure 7 shows some *Streptococcus* bacteria.

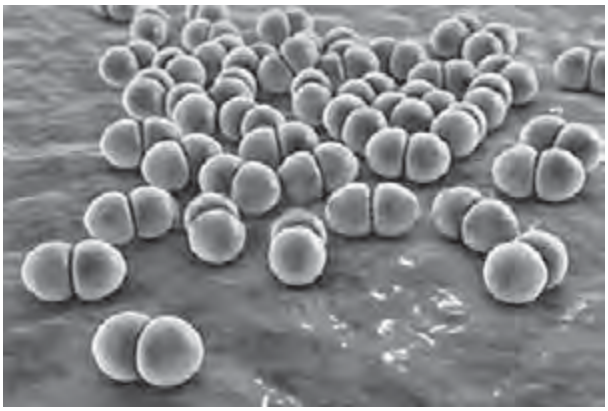

Figure 7

Some bacteria are motile, meaning they can move themselves.

Why is a *Streptococcus* bacterium not motile?

(1)

☒ **A** it does not have flagella

☒ **B** it does not have plasmids

☒ **C** it does not have ribosomes

☒ **D** it does not have acrosomes

(b) Patients with scarlet fever can be treated with antibiotics.

New antibiotics need to be tested before they can be used in patients.

Which is the correct sequence for the development of a new medicine?

(1)

☒ **A** testing in healthy volunteers → testing using cultured cells → double blind trials on patients

☒ **B** testing using cultured cells → double blind trials on patients → testing in healthy volunteers

☒ **C** testing in healthy volunteers → double blind trials on patients → testing using cultured cells

☒ **D** testing using cultured cells → testing in healthy volunteers → double blind trials on patients

(c) Most cases of scarlet fever occur in children.

Adults have usually developed immunity to a toxin that the *Streptococcus* bacteria produce during infection.

Explain how an adult develops immunity to the toxin.

(3)

(Total for Question 3 = 9 marks)

4 (a) In 2012, two scientists were awarded the Nobel prize for their research on stem cells.

They showed that adult cells could be reprogrammed to become cells with the properties of embryonic stem cells.

Describe the possible benefits of this research.

(3)

(b) Figure 8 shows four stages of mitosis, labelled P, Q, R and S.

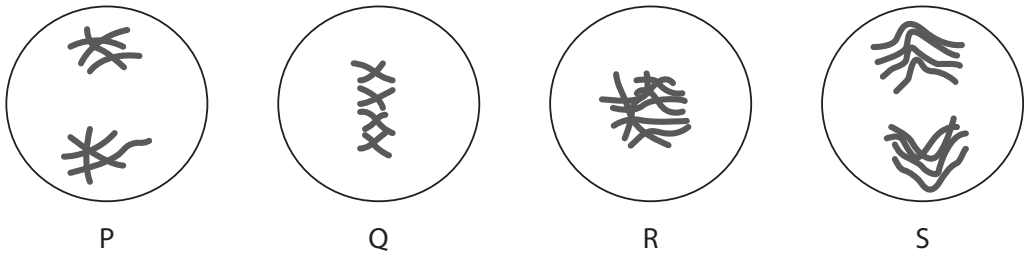

Figure 8

(i) Which is the correct order for these stages?

(1)

☒ **A** Q → R → S → P

☒ **B** R → Q → S → P

☒ **C** R → S → Q → P

☒ **D** Q → S → R → P

(ii) The stage of mitosis labelled S in figure 8 is

(1)

☒ **A** anaphase

☒ **B** prophase

☒ **C** telophase

☒ **D** metaphase

(iii) Interphase is part of the cell cycle.

Describe what happens during interphase.

(2)

(c) Figure 9 shows a root tip with cells in different stages of mitosis.

The image was magnified 400×.

Figure 9

Explain how a magnification of 400× can be obtained using the lenses on a light microscope.

(2)

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(Total for Question 4 = 9 marks)

5 Potato cells contain the enzyme catalase.

This enzyme catalyses the breakdown of hydrogen peroxide into oxygen and water.

Figure 10 shows what happened when a student placed a potato disc in a 5% hydrogen peroxide solution.

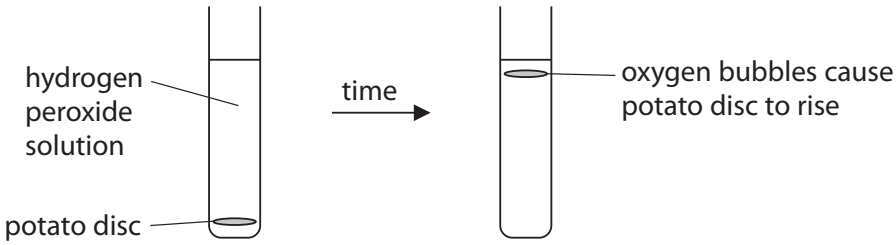

Figure 10

The student measured the time taken for the potato disc to rise.

The student repeated the investigation using 10%, 15% and 20% concentrations of hydrogen peroxide solution.

(a) (i) Which term describes the hydrogen peroxide in this reaction?

(1)

☒ **A** product

☒ **B** substrate

☒ **C** active site

☒ **D** control

(ii) The potato discs all had the same mass.

Explain why the student used potato discs with the same mass.

(2)

(iii) State **two** other factors that need to be kept the same to improve this investigation.

(2)

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(b) Figure 11 shows the results of this investigation.

The student calculated the rate of reaction using

$$\frac{1}{\text{time in seconds}}$$

concentration of hydrogen peroxide solution (%)	time taken for disc to rise (s)	rate (s^{-1})
5	325	0.003
10	245	0.004
15	132	0.008
20	72	0.014

Figure 11

(i) State and explain a conclusion based on these results.

(4)

(ii) The student repeated the investigation with a 25% hydrogen peroxide solution and recorded a time of 75 seconds.

Calculate the rate of reaction for the 25% hydrogen peroxide solution.

(2)

..... s^{-1}

(iii) The student decided that the rate for the 25% hydrogen peroxide solution was not anomalous.

Give the reason why the result was not anomalous.

(1)

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(Total for Question 5 = 12 marks)

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6 (a) Yeast cells can be genetically modified to produce a painkiller.

This painkiller is usually obtained from opium poppies.

One method for genetically modifying a yeast cell uses a plasmid containing the desired gene.

(i) Explain how a gene can be inserted into a plasmid.

(2)

(ii) Discuss the possible benefits and risks of producing painkillers from genetically modified yeast cells rather than extracting the painkillers from poppies.

(3)

(b) Figure 12 shows the structure of a DNA nucleotide.

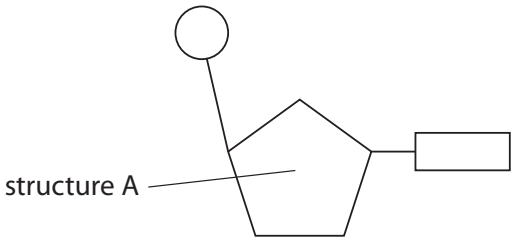

Figure 12

(i) Structure A is a

(1)

☒ **A** base

☒ **B** phosphate

☒ **C** sugar

☒ **D** polymer

*(ii) In 2003, the first complete human genome was sequenced.

The genomes of different people have small changes in the sequence of the DNA bases.

Describe how these changes in DNA sequence can affect the individuals and how sequencing a person's genome could influence their medical treatments.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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