Write your name here

Surname	Other names

Edexcel GCSE

Centre Number | Candidate Number

Biology/Additional Science

Unit B2: The Components of Life

Higher Tier

Tuesday 15 May 2012 – Morning **Time: 1 hour**	Paper Reference **5BI2H/01**

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.*

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.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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PEARSON

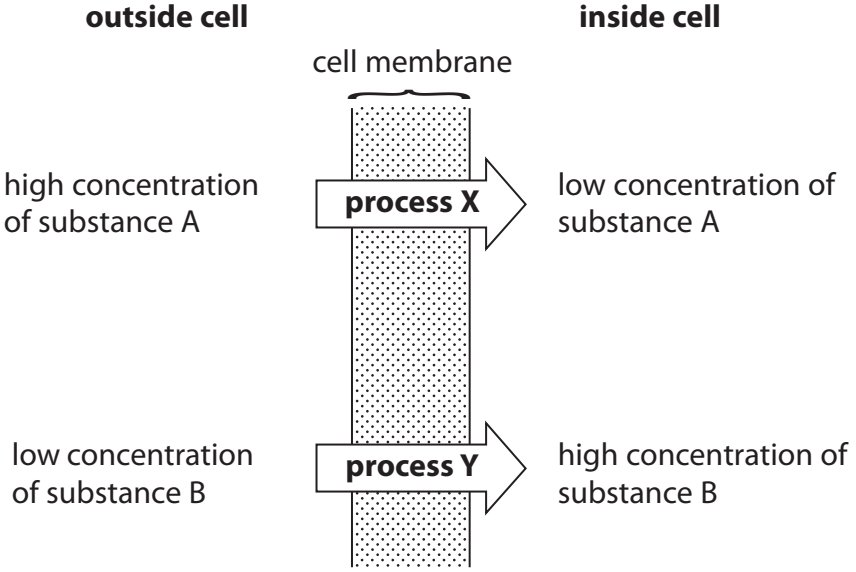
Answer ALL questions

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 ☒.

Cell transport mechanisms

1 (a) Substances in the soil are taken up by plant root hair cells.

The diagram shows the direction of movement of two substances A and B across the cell membrane of a root hair cell.



(i) Name **process X**.

(1)

.....

(ii) Name **process Y**.

(1)

.....

(iii) Mineral ions are taken up by the root hair cells of plants.

Name the type of vessel that transports these mineral ions through the plant.

(1)

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(b) A student investigated osmosis in a courgette.

The photograph shows a courgette.

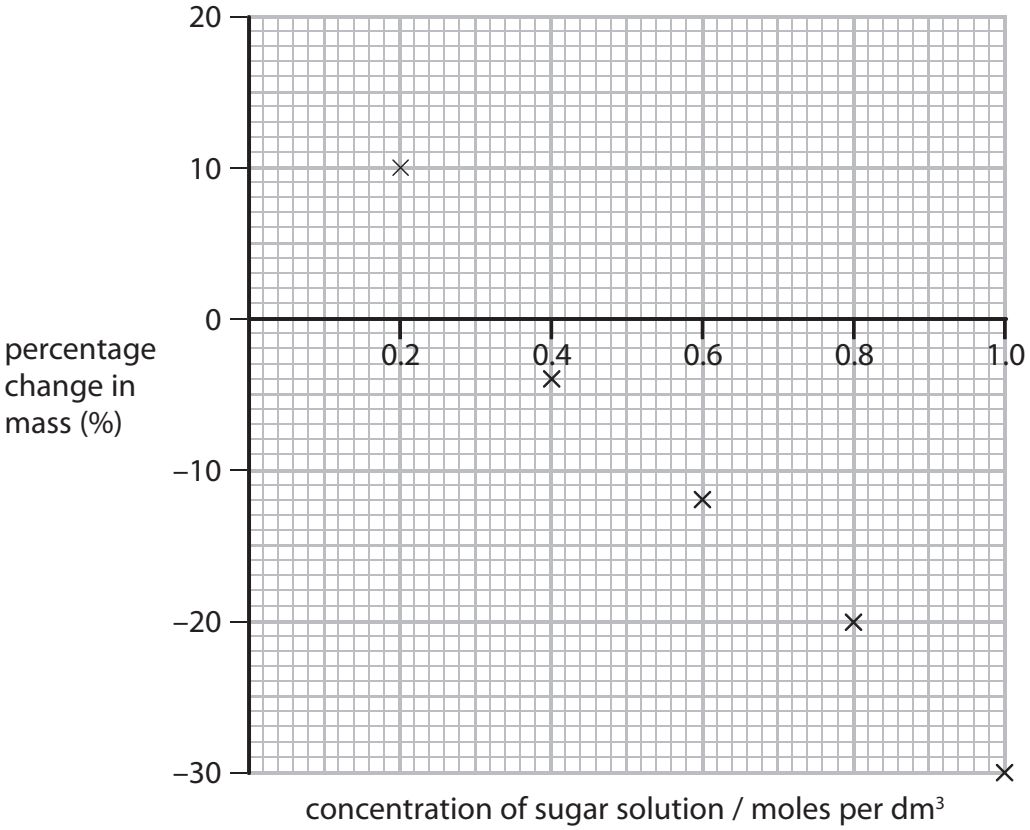


The student weighed pieces of courgette and placed them in five different concentrations of sugar solution.

After one hour she dried and reweighed the pieces of courgette.

She calculated the percentage change in mass.

The graph shows the results of this investigation.



(i) Draw a line of best fit on the graph.

(1)

(ii) Use your line of best fit to estimate the concentration of sugar solution that would result in no change in mass.

(1)

estimate = ... moles per dm^3

(iii) Explain why there was an increase in the mass of the courgette in the sugar solution at 0.2 moles per dm^3.

(3)

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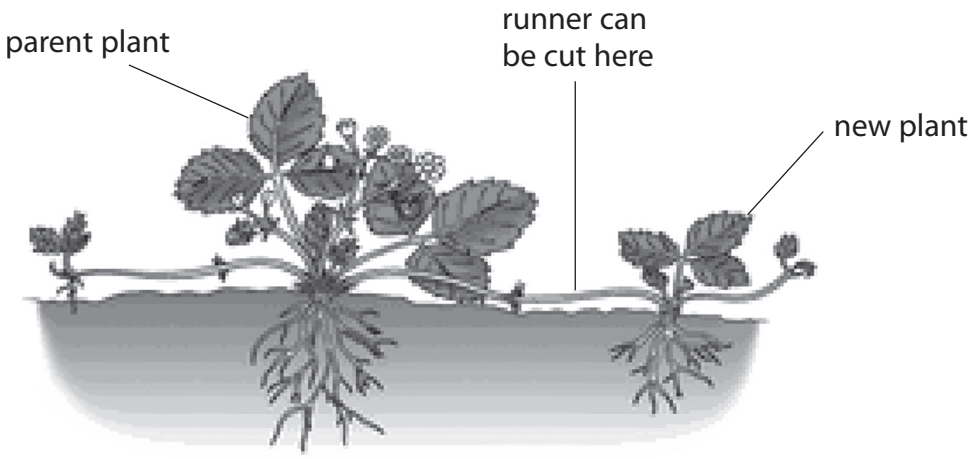
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(Total for Question 1 = 8 marks)

Producing new strawberry plants

2 Strawberry plants grow runners and new strawberry plants develop along the runners. The new plants are genetically identical to the parent plant.

The diagram shows the parent plant with new plants attached to runners.



(a) (i) Name the type of cell division that results in the production of these new plants.

(1)

.....

(ii) Farmers cut the runners and sell the new plants.

Suggest advantages of producing new strawberry plants in this way.

(2)

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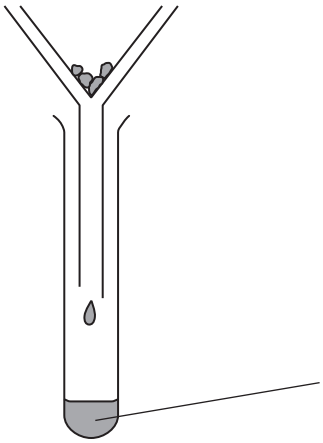
(b) Some students extracted DNA from strawberries.
The diagram shows the method used.

stage 1



grind strawberry in soapy water

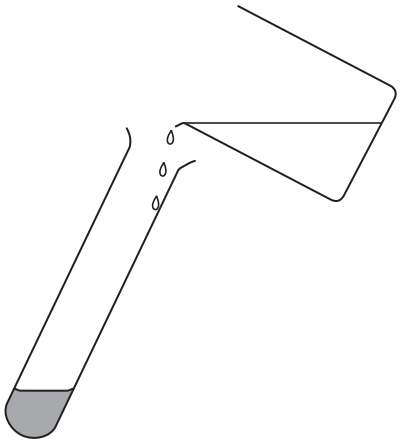
stage 2



filter mixture into a boiling tube

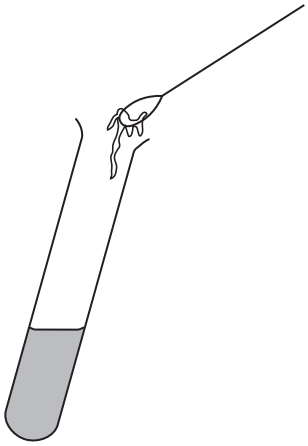
strawberry filtrate

stage 3



slowly pour ice cold ethanol into the strawberry filtrate

stage 4



remove DNA with a wire loop

Suggest the purpose of stages 1 and 3 in the DNA extraction.

(2)

stage 1 .....

.....

.....

stage 3 .....

.....

.....

(c) A short section of DNA from a strawberry is shown in the diagram.



(i) How many codons are shown in this section of DNA?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** 2

☒ **B** 3

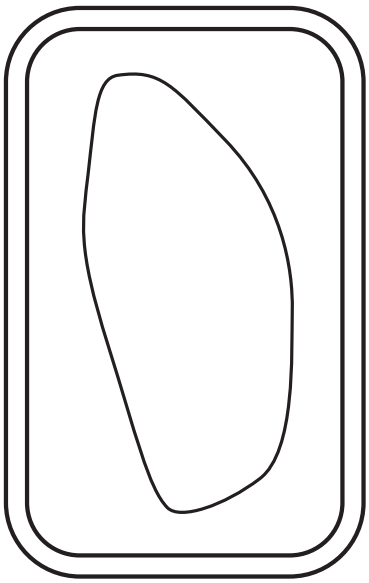
☒ **C** 4

☒ **D** 12

(ii) This DNA is found in a structure within a cell of a strawberry plant.

On the diagram of a plant cell, draw and name the structure containing DNA.

(2)



(Total for Question 2 = 8 marks)

Probiotic bacteria

3 The digestive system is made up of a number of different organs.

(a) Define the term **organ**.

(1)

.....

.....

(b) (i) How many of the statements are correct?

- The low pH of the stomach kills bacteria.
- The low pH of the stomach provides optimum conditions for pepsin activity.
- The pH of the stomach is low so that acid digests protein.

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** none

☒ **B** 1

☒ **C** 2

☒ **D** 3

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Protein is broken down to form

(1)

☒ **A** amino acids

☒ **B** fatty acids

☒ **C** glucose

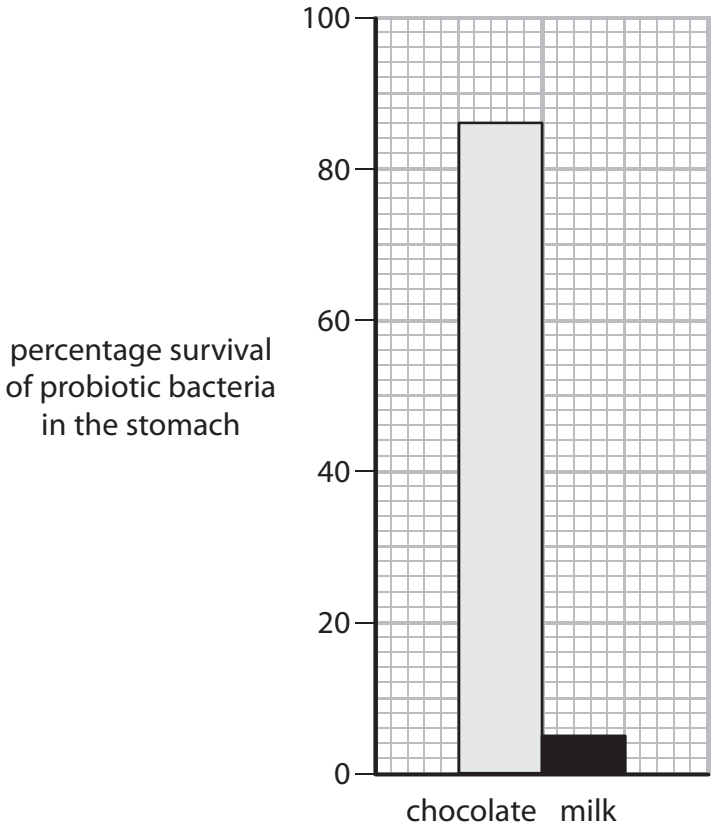
☒ **D** glycerol

(c) Explain how the structure of villi allows efficient absorption of the soluble products of protein digestion.

(4)

(d) Probiotic bacteria are thought to be beneficial to health.
Probiotic bacteria can be consumed in chocolate and milk.

The graph shows the percentage survival of probiotic bacteria in the stomach.



(i) The total number of live bacteria in the chocolate was five million.

Calculate the number of live bacteria from the chocolate that survived in the stomach.

(2)

answer = ...

(ii) Suggest a reason for the survival differences of probiotic bacteria in chocolate compared with probiotic bacteria in milk.

(1)

.....

.....

(Total for Question 3 = 10 marks)

Fitness Training

4 The volume of blood that the heart pumps with every beat is known as the stroke volume.
Stroke volume can be used to indicate fitness level.

The table gives information about the stroke volume, heart rate and cardiac output of an athlete at rest and during exercise.

athlete	stroke volume / dm^3	heart rate / beats per minute	cardiac output / $dm^3\ min^{-1}$
at rest	0.1	53	5.3
during exercise		182	30.4

(a) Calculate the stroke volume of the athlete during exercise.

(2)

answer = ... dm^3

(b) Explain why it is important that the cardiac output of the athlete increases during exercise.

(3)

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(c) Describe how the circulatory system transports substances around the body.

(2)

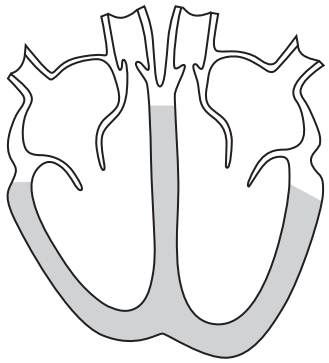
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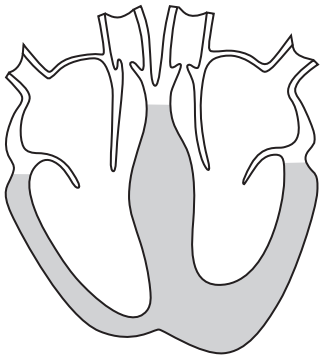
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(d) The diagrams below show a healthy heart and a heart with a condition known as hypertrophic cardiomyopathy (HCM).



healthy heart



hypertrophic cardiomyopathy

A symptom of HCM is that contraction of the heart muscle is more difficult.

Suggest the effects HCM may have on an athlete during competitive sport.

(2)

.....

.....

.....

.....

(e) Some athletes, such as sprinters, use energy from anaerobic respiration.

Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

Anaerobic respiration produces

☒ **A** carbon dioxide

☒ **B** glucose

☒ **C** lactic acid

☒ **D** oxygen

(Total for Question 4 = 10 marks)

Cloning

5 In May 2011, the Food Standards Agency stated that meat and milk produced from cloned animals should be allowed to go on sale to the public.

(a) (i) Describe the risks associated with cloning mammals.

(3)

*(ii) A cloned animal contains genetic information that is identical to its parent.

Describe the stages in the production of a cloned mammal.

(6)

(b) (i) Fertilisation takes place during sexual reproduction to produce genetically different offspring.

Complete the sentence by putting a cross (☒) in the box next to your answer.

Fertilisation occurs when

(1)

☒ **A** diploid gametes combine to produce a diploid zygote

☒ **B** diploid gametes combine to produce a haploid zygote

☒ **C** haploid gametes combine to produce a diploid zygote

☒ **D** haploid gametes combine to produce a haploid zygote

(ii) Genetically different organisms contain different DNA codes that produce different proteins.

Describe the process that takes place in the nucleus during the first stage of protein synthesis.

(2)

.....

.....

.....

.....

(Total for Question 5 = 12 marks)

Cells

6 There are many different types of cell in the human body.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

An embryonic stem cell can

(1)

☒ **A** differentiate into any type of cell

☒ **B** differentiate into only one type of cell

☒ **C** only be obtained from embryos

☒ **D** only produce haploid cells

(b) Describe how the structure of a red blood cell is related to its function.

(3)

(c) Describe the function of platelets.

(2)

*(d) Mitosis and meiosis are types of cell division.

Compare these two types of cell division.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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