Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCSE

Biology/Additional Science

Unit B2: The Components of Life

Higher Tier

Monday 5 November 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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P 4 1 7 5 1 A 0 1 2 0

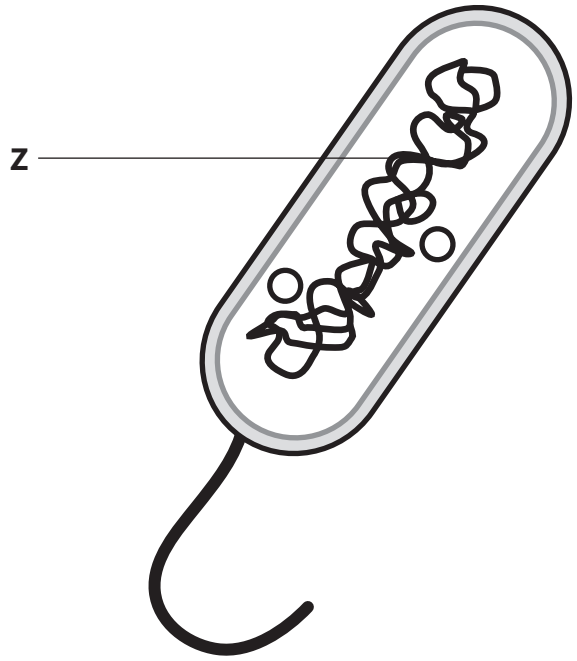
PEARSON

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 ☒.

Genetically modified (GM) organisms

1 The diagram shows a bacterial cell.



(a) What is the part of the bacterial cell labelled **Z**?

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

(1)

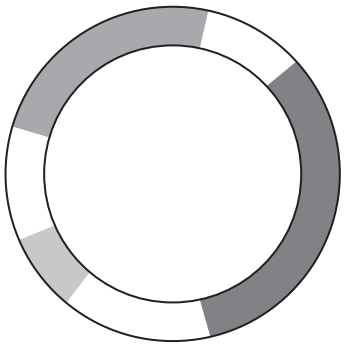
☒ **A** chromosomal DNA

☒ **B** flagellum

☒ **C** nucleus

☒ **D** ribosome

(b) The diagram shows a plasmid from a bacterial cell.



(i) Name **two** structures other than DNA, that bacterial cells have but animal cells do not.

(2)

(ii) Describe how the plasmid can be used to genetically modify a bacterial cell to contain a human gene.

(3)

(iii) Suggest how a named product from genetically modified (GM) bacteria can benefit humans.

(2)

(Total for Question 1 = 8 marks)

DNA

2 A DNA molecule consists of two strands coiled to form a double helix.

(a) Describe how the two strands of a DNA molecule are linked together.

(2)

.....

.....

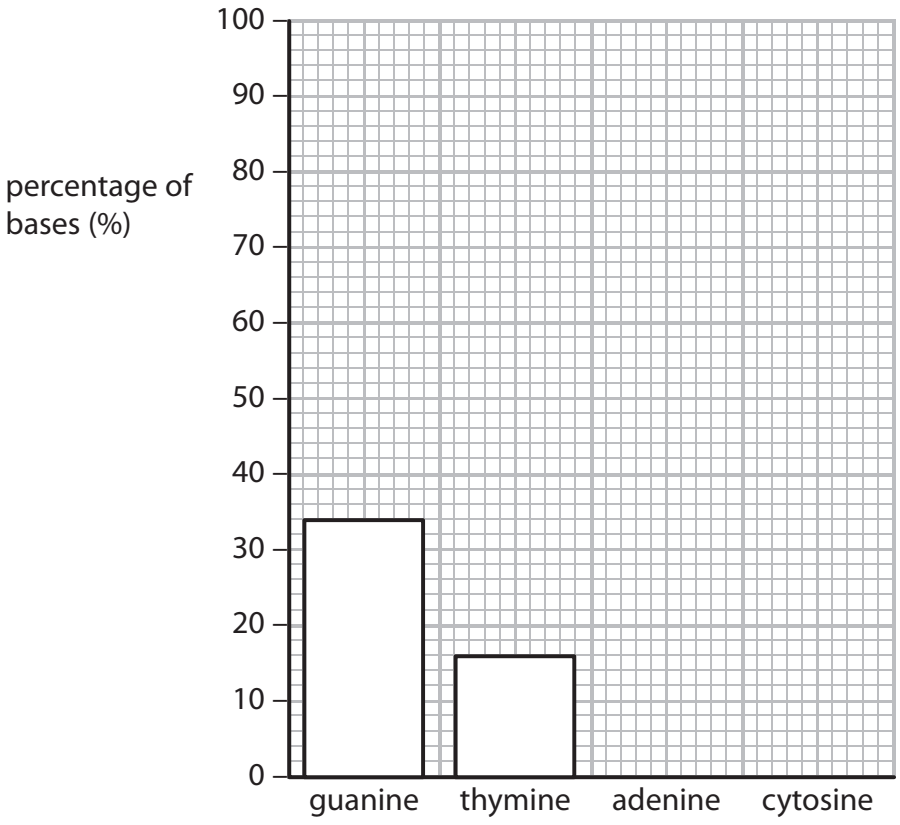
.....

.....

(b) The bar chart shows the percentage of guanine and thymine in a sample of DNA.

Complete the bar chart to show the percentage of adenine and cytosine in the sample.

(2)



(c) The diagram shows part of one DNA strand.

(i) Complete the empty boxes to show the mRNA strand coded for by this DNA strand.

(2)

DNA strand	G	G	C	T	A	G	T	T	G
mRNA strand									

(ii) State the maximum number of amino acids that are coded for by this DNA strand.

(1)

.....

(d) Name the structure where translation occurs.

(1)

.....

(Total for Question 2 = 8 marks)

Water loss in plants

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

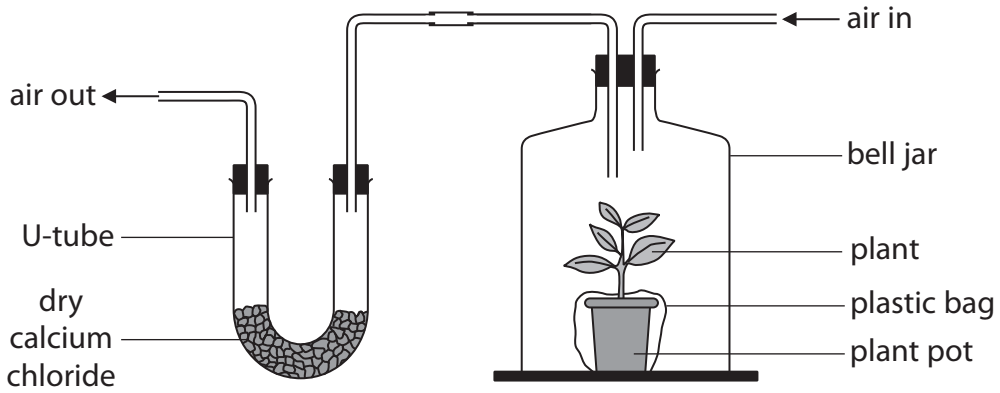
Plants lose water, into the air, by a process called

(1)

- ☒ **A** active transport
- ☒ **B** fertilisation
- ☒ **C** photosynthesis
- ☒ **D** transpiration

(b) An investigation was carried out to measure water loss from a plant, at four different temperatures.

The diagram shows the apparatus used.



The calcium chloride absorbs the water lost by the plant.

The table shows the results of this investigation.

temperature / °C	mass of calcium chloride / g	
	before investigation	after investigation
15	90	100
25	90	115
35	90	122
45	90	117

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

The maximum mass of water lost from the plant in this investigation was

(1)

☒ **A** 27 g

☒ **B** 32 g

☒ **C** 117 g

☒ **D** 122 g

(ii) Describe the effect of temperature on water loss from this plant during the investigation.

(2)

.....

.....

.....

.....

(iii) Suggest why the plastic bag was placed around the plant pot during this investigation.

(2)

.....

.....

.....

.....

(c) Explain how glucose production could be affected if this plant lost a lot of water.

(2)

(d) Describe the process that moves water from the soil into the plant.

(2)

(Total for Question 3 = 10 marks)

Digestive enzymes

4 The table shows some of the enzymes involved in the digestion of starch, protein and fat, in three parts of the digestive system.

part of digestive system	substance digested	enzyme	products of digestion
mouth	starch	P	simple sugars
stomach	protein	R	molecule W
small intestine	fat	S	molecules Y and Z
	starch	Q	simple sugars

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

(i) Enzyme Q is produced by the

(1)

☒ **A** large intestine

☒ **B** liver

☒ **C** oesophagus

☒ **D** pancreas

(ii) Molecules Y and Z are

(1)

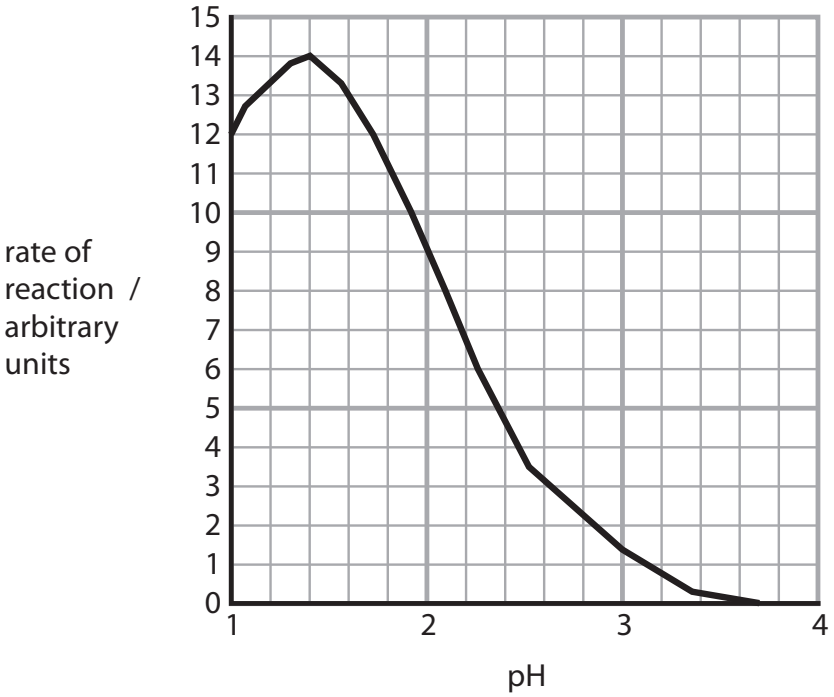
☒ **A** fatty acids and glucose

☒ **B** fatty acids and glycerol

☒ **C** lactic acid and glucose

☒ **D** lactic acid and glycerol

(b) The graph shows how pH affects the rate of the reaction catalysed by enzyme R.



(i) Name enzyme R.

(1)

.....

(ii) The rate of reaction can be determined by measuring how quickly molecule W is formed.

Name molecule W.

(1)

.....

(iii) Calculate the difference in the rate of the reaction between pH 1 and pH 2.

(2)

answer = ... arbitrary units

(iv) Suggest why this enzyme works better at pH 1 than at pH 2.

(2)

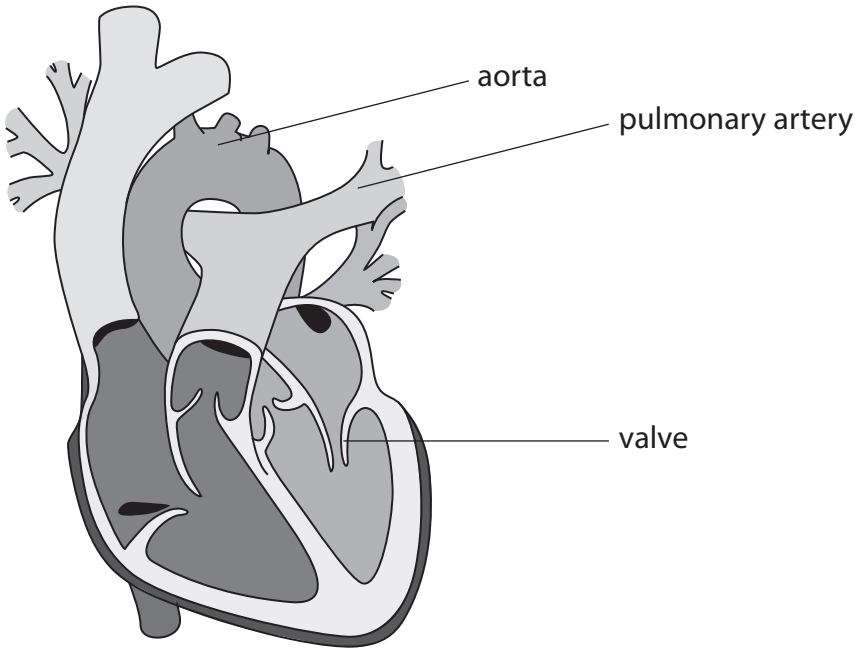
(c) Explain the roles of bile in digestion.

(2)

(Total for Question 4 = 10 marks)

The heart

5 The diagram shows a human heart.



(a) (i) Draw an arrow onto the diagram to show where oxygenated blood enters the heart.

(1)

(ii) Suggest how the blood flowing through the pulmonary artery would be different from the blood flowing through the aorta.

(2)

(iii) Describe the role of the valve labelled on the diagram.

(2)

.....

.....

.....

.....

(b) Heart disease can significantly reduce cardiac output.

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

Cardiac output is the volume of blood leaving the

(1)

☒ **A** atrium every heart beat

☒ **B** atrium every minute

☒ **C** ventricle every heart beat

☒ **D** ventricle every minute

*(ii) A reduced cardiac output would affect the performance of an athlete.

Explain the effects that a reduced cardiac output would have on the muscle cells of an athlete.

(6)

(Total for Question 5 = 12 marks)

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Question 6 is on the next page

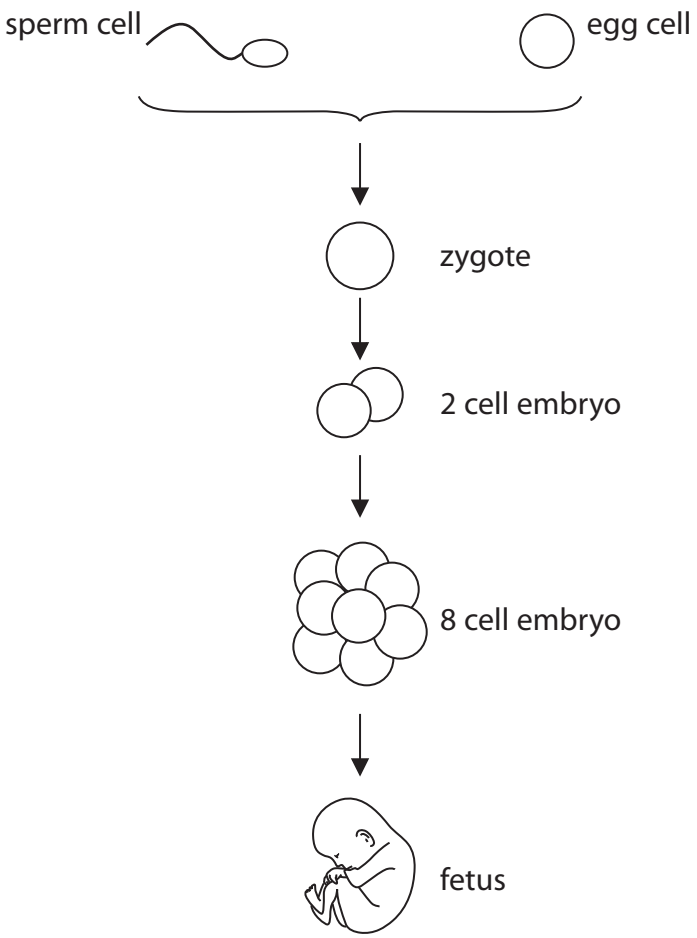
Reproduction

6 (a) Sperm cells and egg cells are needed for human sexual reproduction.

Describe in detail the type of cell division that produces sperm cells.

(4)

*(b) The diagram shows some of the stages that occur in the formation of a human fetus.



Using the diagram and your own knowledge, describe the processes that take place in the formation of the fetus from a sperm cell and an egg cell.

(6)

(c) State **two** differences between sexual reproduction and asexual reproduction.

(2)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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