

Paper Reference(s)     **1SC0/1BH**

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

**Combined Science**  
**Paper 1: Biology 1**  
**Higher Tier**

**Tuesday 14 May 2019 – Afternoon**

**Time: 1 hour 10 minutes plus your additional  
time allowance**

**INSTRUCTIONS TO CANDIDATES**  
**Write your centre number, candidate number,**  
**surname, other names and your signature in the**  
**boxes below. Check that you have the correct**  
**question paper.**

<b>Centre No.</b>					
<b>Candidate No.</b>					
<b>Surname</b>					
<b>Other names</b>					
<b>Signature</b>					
<b>Paper Reference</b>	<b>1</b>	<b>S</b>	<b>C</b>	<b>0</b>	<b>/ 1 B H</b>

- Use **BLACK** ink or ball-point pen.
- 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.

## **MATERIALS REQUIRED FOR EXAMINATION**

**Calculator, ruler**

## **ITEMS INCLUDED WITH QUESTION PAPERS**

**Nil**

## **INFORMATION FOR CANDIDATES**

- 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 TO CANDIDATES**

- 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)**

**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 scientist obtained a mass of 0.0062 nanograms of DNA from a diploid human cell.**

**Calculate the mass of DNA the scientist should obtain from a haploid human cell.**

**Give your answer in picograms. (2 marks)**

**(1 nanogram = 1000 picograms)**

**\_\_\_\_\_ picograms**

**(Question continues on next page)**

**(Turn over)**

- (b) A student used the method shown in Figure 1 to compare the mass of DNA extracted from strawberry fruit cells and from kiwi fruit cells.

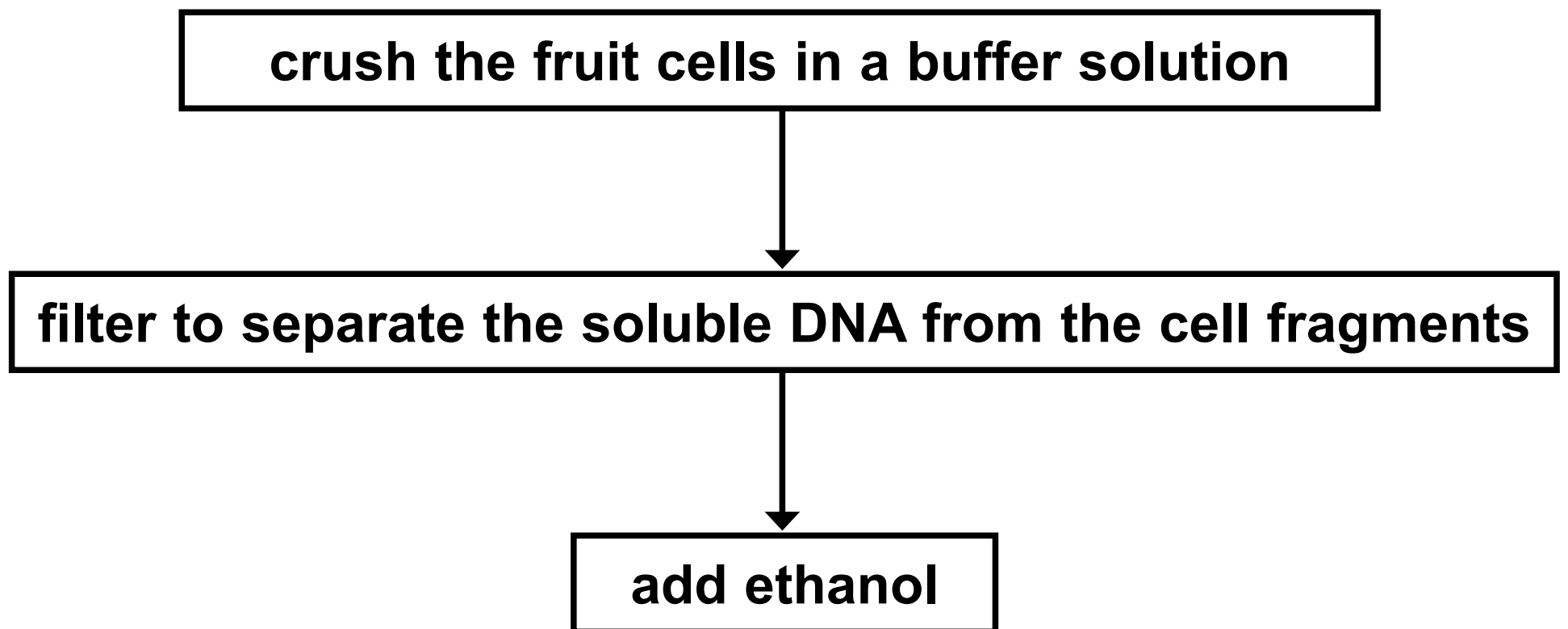


Figure 1

- (i) State why ethanol is used. (1 mark)

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- (ii) State TWO variables the student needs to control when using this method to compare the mass of DNA from these two fruits.  
(2 marks)

1 \_\_\_\_\_

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2 \_\_\_\_\_

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**(iii) The student repeated the experiment.**

**Give ONE reason why. (1 mark)**

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**(c) Mitosis and meiosis are processes that produce new cells.**

**Compare the outcomes of mitosis and meiosis.  
(3 marks)**

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**(TOTAL FOR QUESTION 1 = 9 MARKS)**

**(Questions continue on next page)**

**(Turn over)**

**2 (a) Clostridium tetani is a bacterium that can be found in soil.**

**It causes the infection tetanus.**

**Children are vaccinated against tetanus.**

**Explain why these children do not get tetanus if the bacteria enter their body through a cut in the skin. (3 marks)**

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**(Turn over)**



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**(b) Colistin is an antibiotic used to treat infections in the bloodstream.**

**Some bacteria are resistant to Colistin.**

**Explain how these bacteria have become resistant to Colistin. (4 marks)**

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**(TOTAL FOR QUESTION 2 = 7 MARKS)**

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**(Questions continue on next page)**

**3 (a) Organisms can be classified by the five kingdom or three domain method.**

**(i) What is the name of the domain that plants belong to? (1 mark)**

☐ **A Eukarya**

☐ **B Archaea**

☐ **C Monera**

☐ **D Protista**

**(ii) Plant cells contain chloroplasts.**

**What happens in a chloroplast? (1 mark)**

☐ **A**

**oxygen  
produced**

**sunlight absorbed  
by chlorophyll**

☐ **B**

**carbon dioxide  
produced**

**sunlight absorbed  
by mitochondria**

☐ **C**

**oxygen  
produced**

**sunlight absorbed  
by mitochondria**

☐ **D**

**carbon dioxide  
produced**

**sunlight absorbed  
by chlorophyll**

**(Question continues on next page)**

**(Turn over)**

- (iii) Give a reason why the three domain method of classification has been suggested. (1 mark)**

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- (b) Figure 2 shows a cyanobacterium magnified 50 000 times.

The line AB shows the diameter of the bacterial cell.

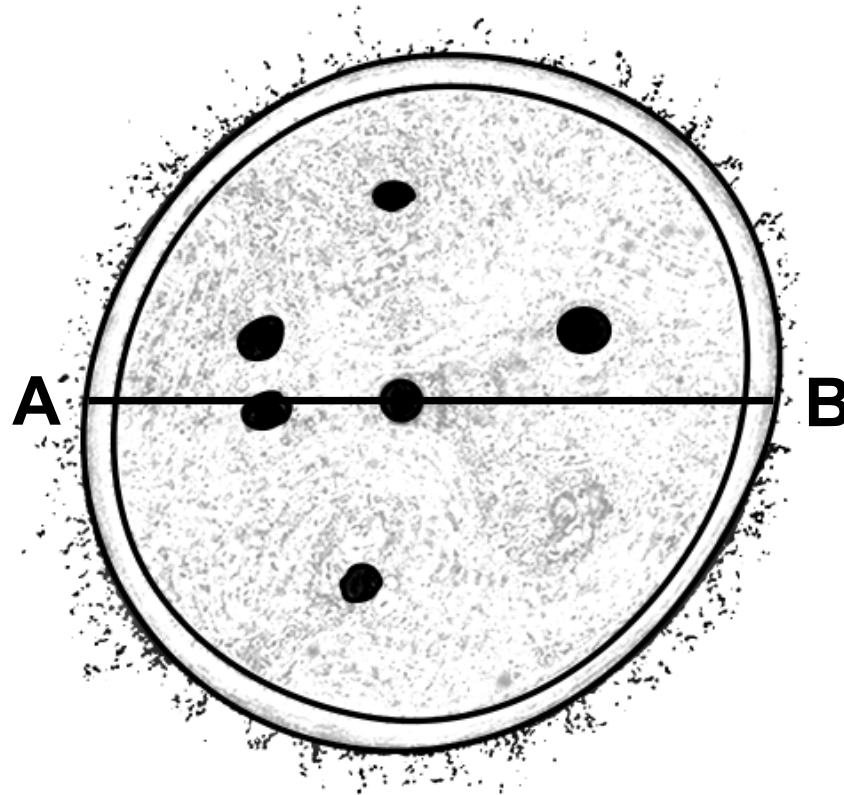


Figure 2

(Question continues on next page)

- (i) Calculate the actual diameter of the cyanobacterium.

Give your answer in micrometres ( $\mu\text{m}$ ).  
(3 marks)

\_\_\_\_\_  $\mu\text{m}$

- (ii) Bacterial cells contain plasmids.

Describe THREE other features of a bacterial cell. (3 marks)

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(c) Figure 3 shows a plasmid containing the human insulin gene.

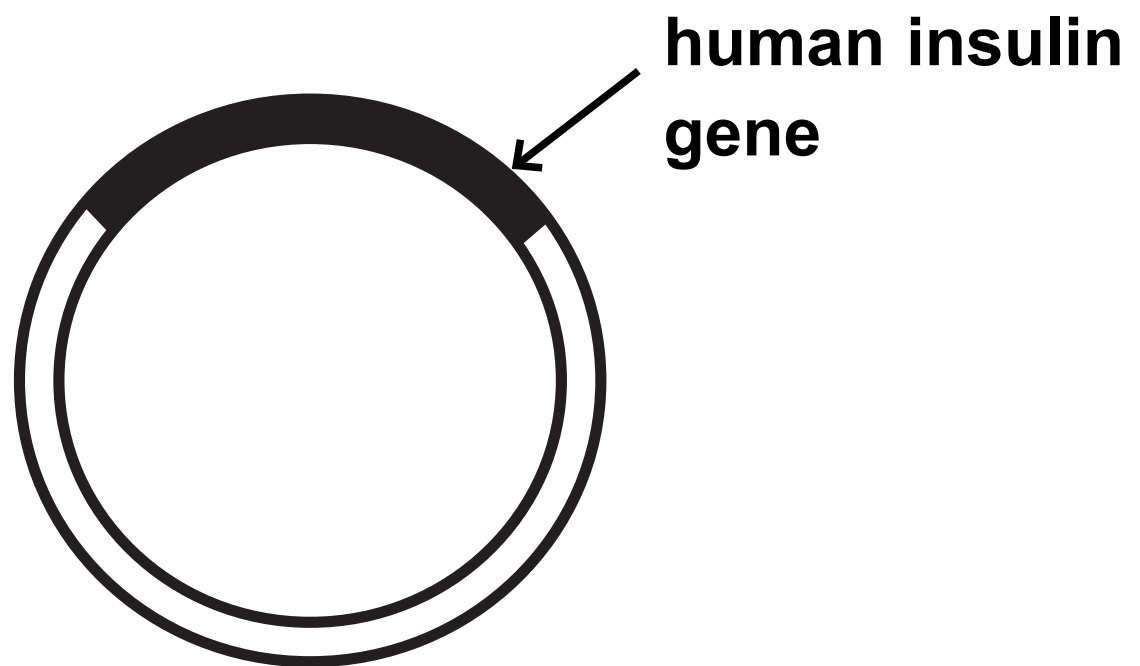


Figure 3

Explain how the human insulin gene can be inserted into a plasmid. (3 marks)

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**(TOTAL FOR QUESTION 3 = 12 MARKS)**

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- 4 (a) Lactase is an enzyme that breaks down lactose into glucose and galactose.

A student made some alginate beads containing lactase.

The student added 10 beads to 20 cm<sup>3</sup> of a solution of lactose, as shown in Figure 4.

The student timed how long it took for glucose to be produced.

The experiment was repeated using 15, 20 and 25 beads.

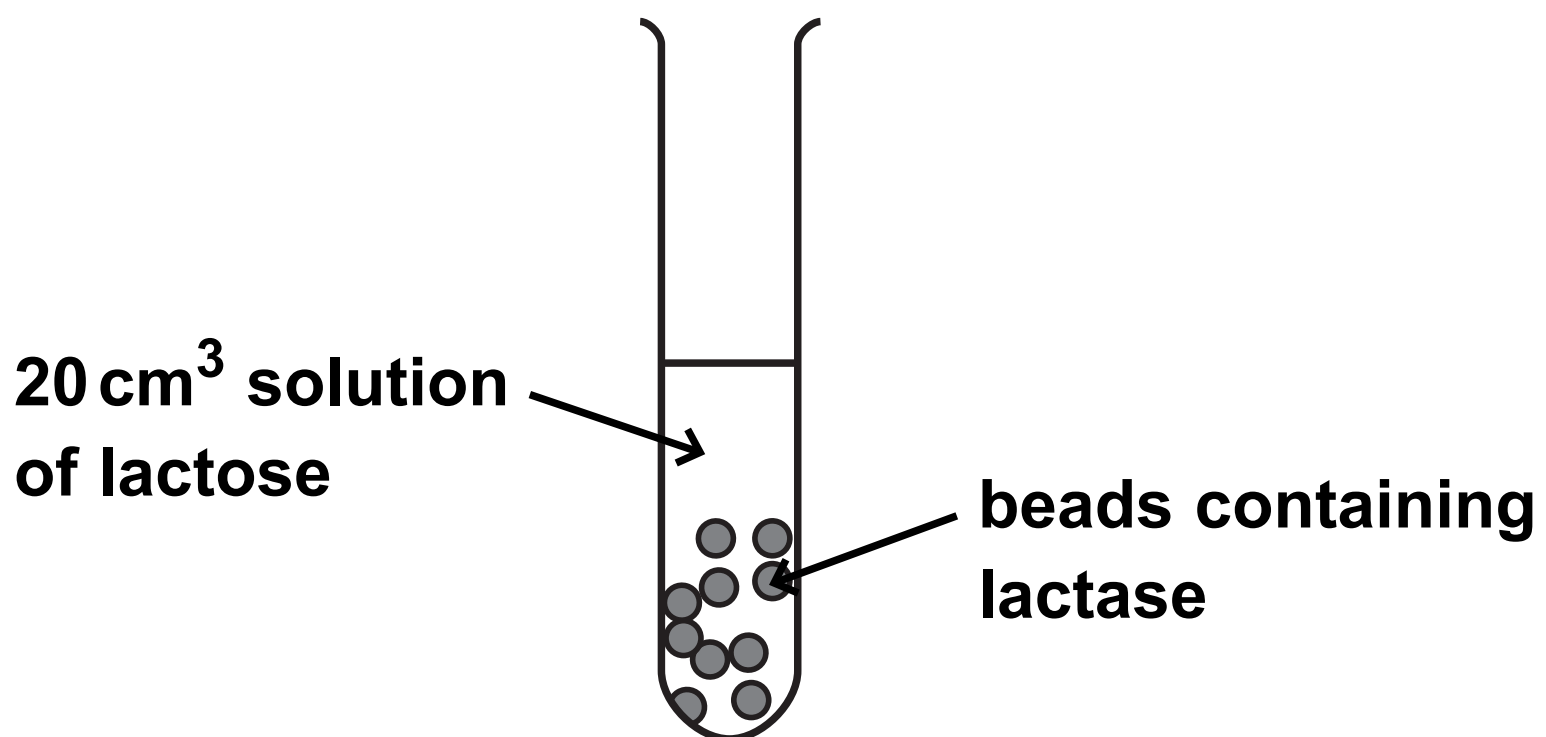


Figure 4

(Question continues on next page)

The results are shown in Figure 5.

number of beads containing lactase	time taken to produce glucose in seconds
10	240
15	210
20	150
25	120

Figure 5

(i) What is the rate of reaction for 25 beads?  
(1 mark)

☐ A  $0.008 \text{ s}^{-1}$

☐ B  $0.04 \text{ s}^{-1}$

☐ C  $0.21 \text{ s}^{-1}$

☐ D  $4.8 \text{ s}^{-1}$

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**(ii) Explain the conclusion that can be made from these results. (3 marks)**

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**(iii) Explain why the same volume of lactose solution was used for each test. (2 marks)**

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**(b) Devise a method to find the optimum temperature for the enzyme lactase. (3 marks)**

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**(TOTAL FOR QUESTION 4 = 9 MARKS)**

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**(Questions continue on next page)**

- 5 (a) LDL cholesterol is a type of cholesterol which increases the risk of heart disease.

Statins are drugs used to reduce LDL cholesterol levels.

Figure 6 shows the cholesterol levels in the blood of a man.

He started taking statins at the beginning of February and stopped taking them four months later.

LDL cholesterol level in the blood (mmol per  $\text{dm}^3$ )

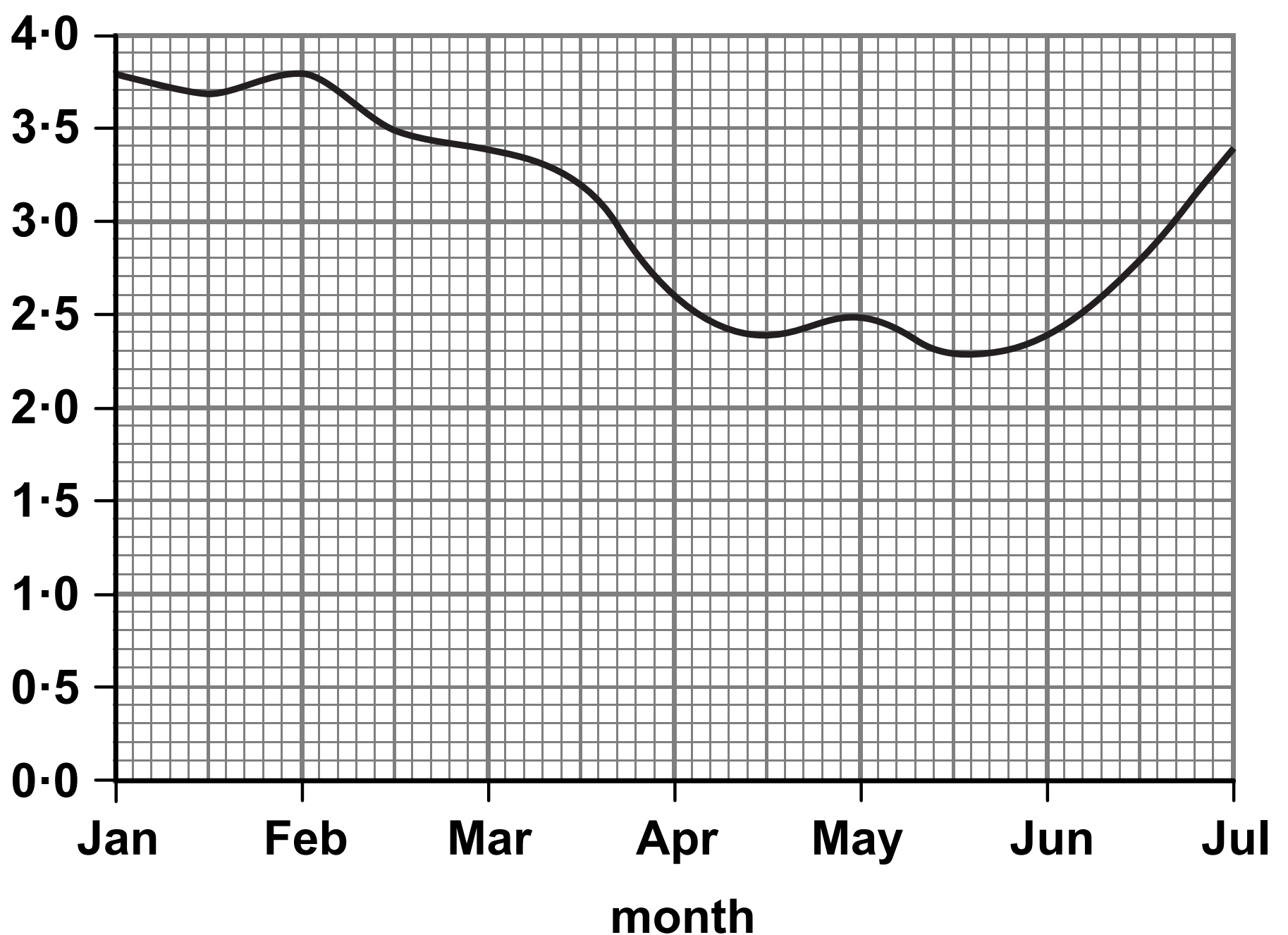


Figure 6

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(Turn over)



- (i) Describe the effect of statins on LDL cholesterol levels in the blood.

Use data from the graph to support your answer. (2 marks)

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- (ii) Use evidence from the graph to explain why statins are usually prescribed as life-long medication. (2 marks)

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**(b) Which data can be used to calculate the man's BMI? (1 mark)**

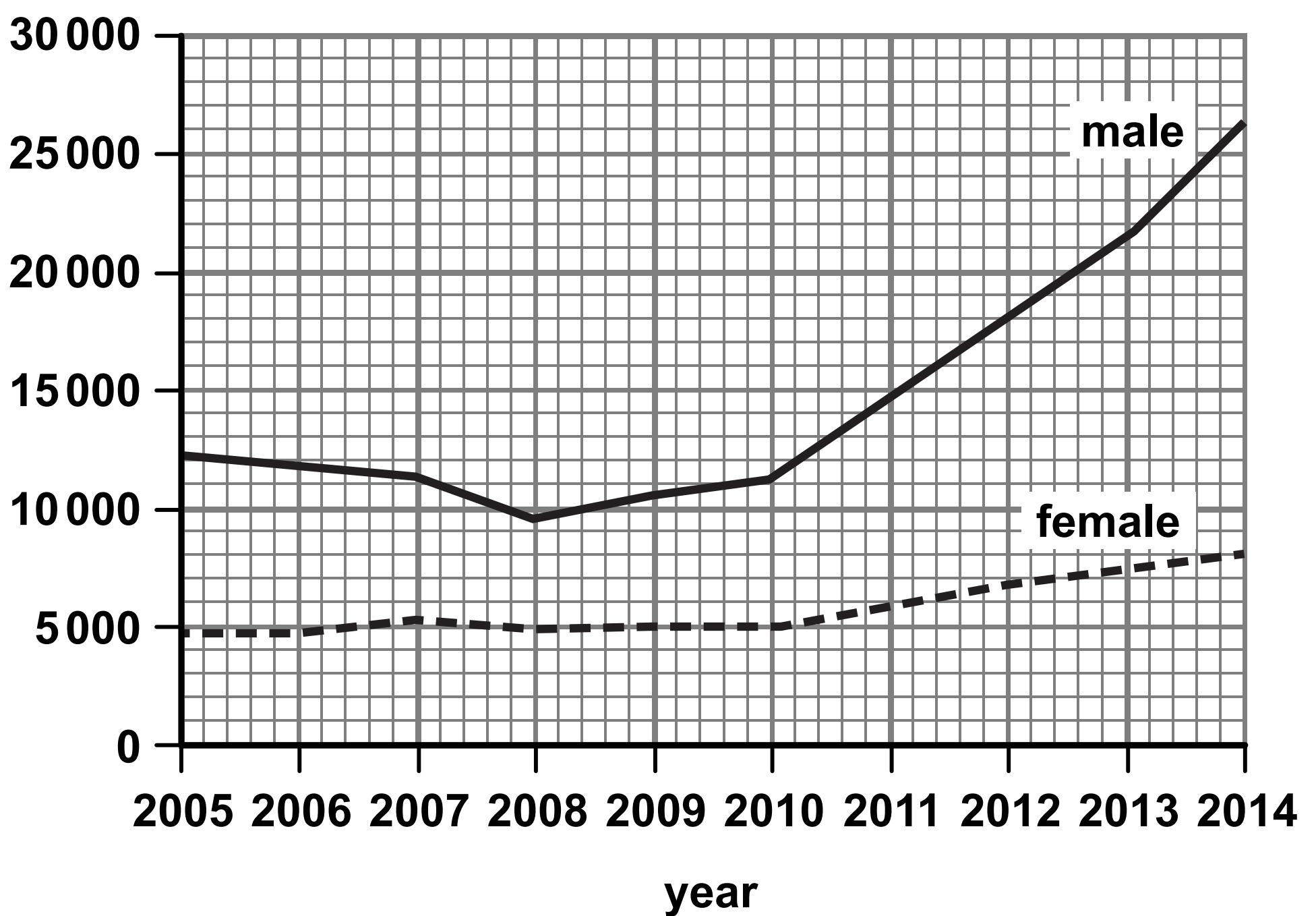
- ☐ **A waist circumference and height**
- ☐ **B waist circumference and hip circumference**
- ☐ **C mass and height**
- ☐ **D mass and hip circumference**

**(Question continues on next page)**

**\*(c) Gonorrhoea is a sexually transmitted bacterial infection.**

**Figure 7 shows the number of people diagnosed with gonorrhoea in the UK.**

**number of people diagnosed with gonorrhoea**



**Figure 7**

**(Question continues on next page)**

**(Turn over)**

**Explain how gonorrhoea is transmitted and how the number of people infected can be reduced.**

**Use data from the graph to justify why it is necessary to reduce the number of people infected. (6 marks)**

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**(TOTAL FOR QUESTION 5 = 11 MARKS)**

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- 6 (a) Figure 8 shows the number of neurones in the brain of different animals.

animal	number of neurones in the brain
lobster	$1.0 \times 10^5$
frog	$1.6 \times 10^7$
rat	$2.0 \times 10^8$
human	$8.6 \times 10^{10}$

Figure 8

- (i) Calculate the difference between the number of neurones in the brain of the rat and the brain of the frog.

Give your answer in standard form. (2 marks)

\_\_\_\_\_ neurones

(Question continues on next page)

(Turn over)

- (ii) Most neurones in the brain are unmyelinated whereas motor neurones are myelinated.

**Explain why myelination is needed on motor neurones but not on neurones in the brain.  
(3 marks)**

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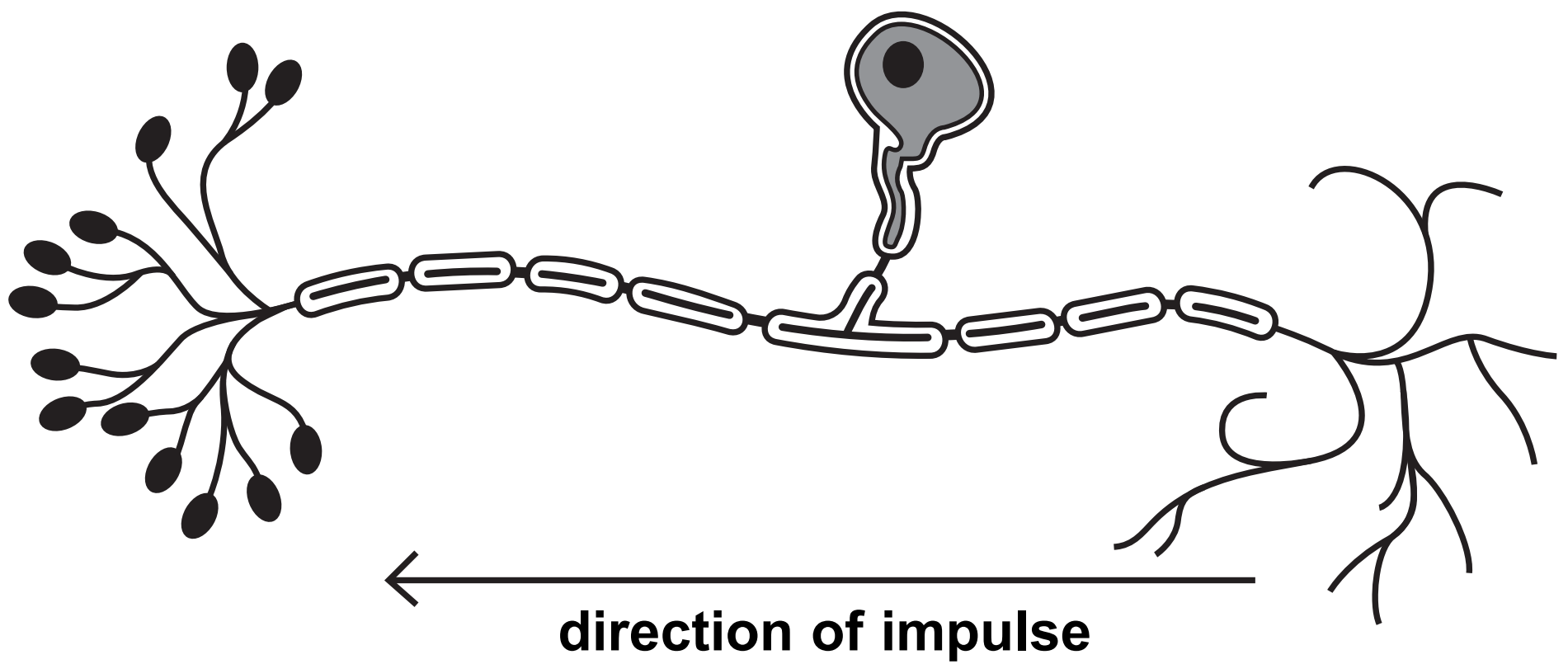
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**(b) Figure 9 shows a sensory neurone.**



**Figure 9**

- (i) Label the axon on Figure 9. (1 mark)**
- (ii) Describe the role of sensory neurones. (2 marks)**

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**(c) Explain how impulses are transmitted at synapses.  
(4 marks)**

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**(TOTAL FOR QUESTION 6 = 12 MARKS)**

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**TOTAL FOR PAPER = 60 MARKS**  
**END**