

Paper Reference(s) **1BI0/1H**

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

Biology

Paper 1

Higher Tier

Tuesday 14 May 2019 – Afternoon

**Time: 1 hour 45 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.**

Centre No.					
Candidate No.					
Surname					
Other names					
Signature					
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- 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 100.
- 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 student had solutions of four different foods labelled W, X, Y and Z.**

Each solution was tested for starch and protein.

The colour of the solutions after the tests are shown in Figure 1.

solution	colour after testing for starch	colour after testing for protein
W	orange	purple
X	blue/black	purple
Y	blue/black	blue
Z	orange	blue

Figure 1

(Question continues on next page)

(Turn over)

(i) Which solution contains starch but NOT protein? (1 mark)

☐ **A solution W**

☐ **B solution X**

☐ **C solution Y**

☐ **D solution Z**

(Question continues on next page)

(ii) Describe how a solution of food can be tested for reducing sugars. (2 marks)

(Question continues on next page)

(b) Figure 2 shows a calorimeter.

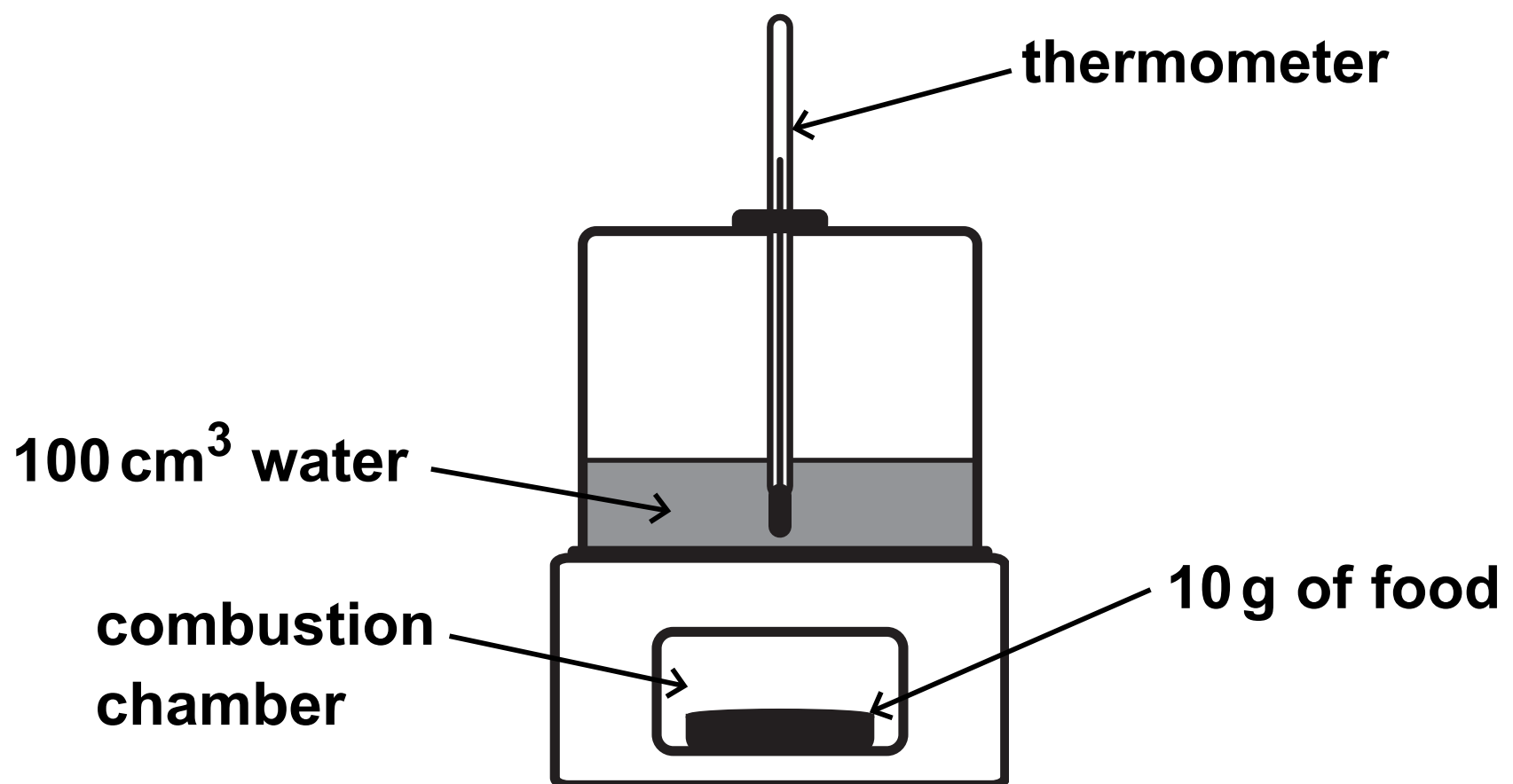


Figure 2

Describe how this calorimeter can be used to find the energy content of 10 g of food. (3 marks)

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 1 = 6 MARKS)

(Questions continue on next page)

- 2 (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)

- (b) A student used the method shown in Figure 3 to compare the mass of DNA extracted from strawberry fruit cells and from kiwi fruit cells.

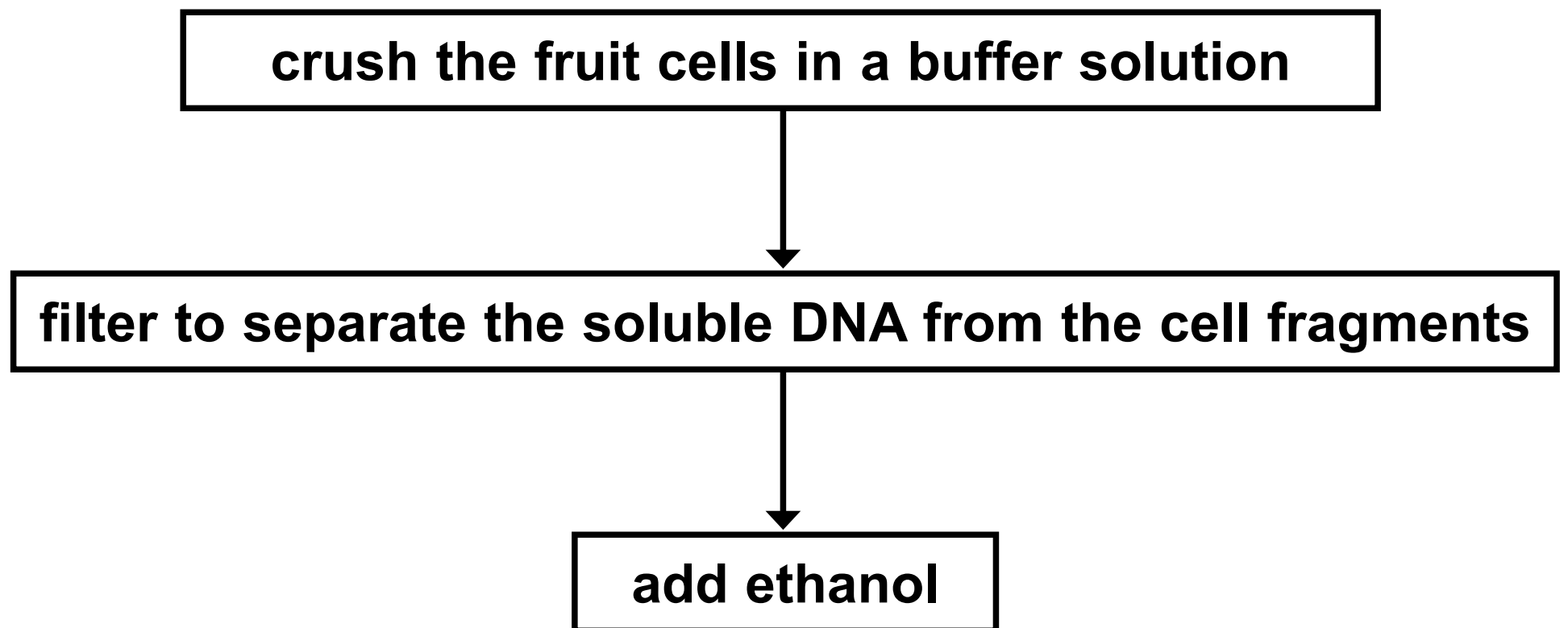


Figure 3

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

(Question continues on next page)

- (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 _____

2 _____

(Question continues on next page)

(iii) The student repeated the experiment.

Give ONE reason why. (1 mark)

(Question continues on next page)

(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 2 = 9 MARKS)

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(Turn over)

- 3 (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)

(Continue your answer on next page)

(Turn over)

(Question continues on next page)

(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 3 = 7 MARKS)

(Questions continue on next page)

- 4 (a) The effect of age on focusing distance was investigated.

Volunteers of different ages had their eyes tested.

Each volunteer was asked to read words from a book. The book was moved closer to their eyes.

When the words became out of focus, the distance was recorded.

Figure 4 shows the results.

age of volunteers	distance (mm)			mean distance (mm)
	person 1	person 2	person 3	
40	256	261	257	258
45	282	275	280	279
50	292	301	297	?
55	311	309	307	309

Figure 4

(Question continues on next page)

(Turn over)

- (i) Calculate the mean distance for the volunteers aged 50.

Give your answer to three significant figures.
(3 marks)

_____ mm

- (ii) Give ONE conclusion that can be made from the data in Figure 4. (1 mark)

(Question continues on next page)

(Turn over)

(iii) Give TWO improvements that are needed in this investigation before a valid conclusion can be made. (2 marks)

1 _____

2 _____

**(b) Which part of the eye detects coloured light?
(1 mark)**

☐ **A iris**

☐ **B lens**

☐ **C cones**

☐ **D cornea**

(Question continues on next page)

(Turn over)

- (c) Figure 5 shows light rays entering the eye of a person with normal vision.

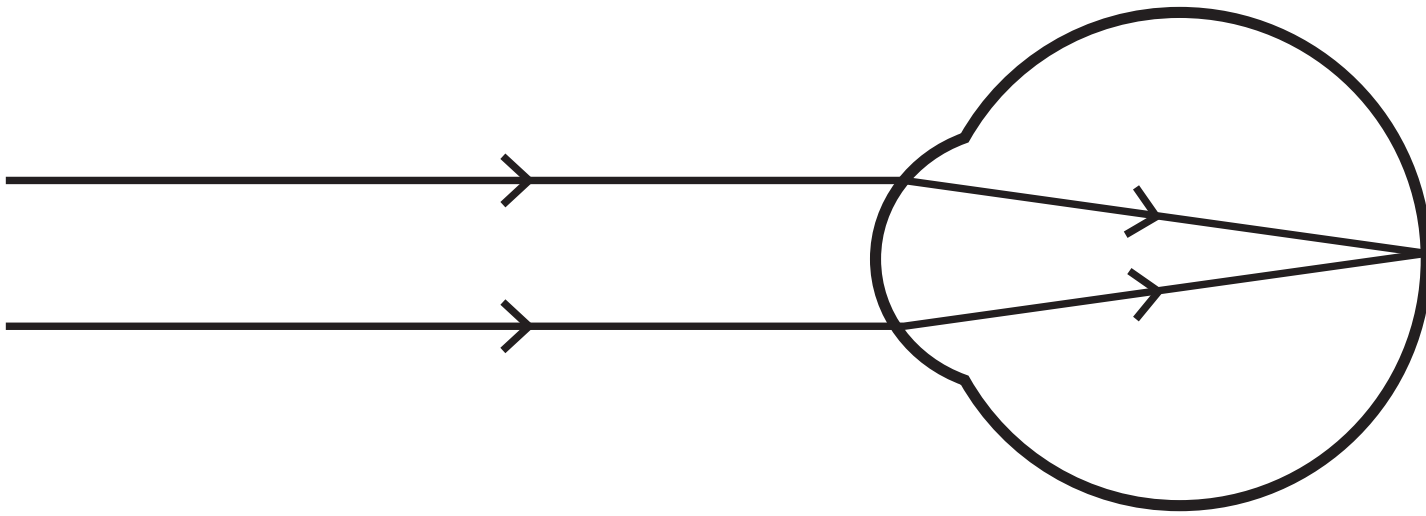


Figure 5

- (i) Describe how light rays are focused to give normal vision. (2 marks)

- (ii) Figure 6 shows light rays entering the eye of a person with an eye defect and two lenses that can be used to correct eye defects.

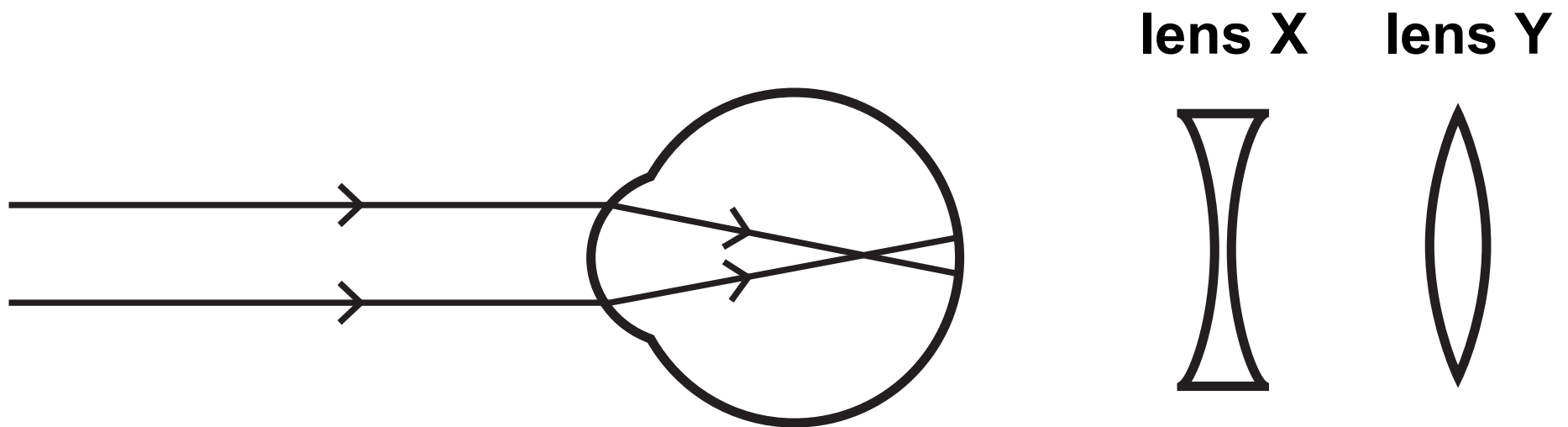


Figure 6

Explain which lens would correct the eye defect shown in Figure 6. (2 marks)

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 4 = 11 MARKS)

(Questions continue on next page)

5 (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)

<input type="checkbox"/> A	oxygen produced	sunlight absorbed by chlorophyll
<input type="checkbox"/> B	carbon dioxide produced	sunlight absorbed by mitochondria
<input type="checkbox"/> C	oxygen produced	sunlight absorbed by mitochondria
<input type="checkbox"/> 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)

(Question continues on next page)

- (b) Figure 7 shows a cyanobacterium magnified 50 000 times.

The line AB shows the diameter of the bacterial cell.

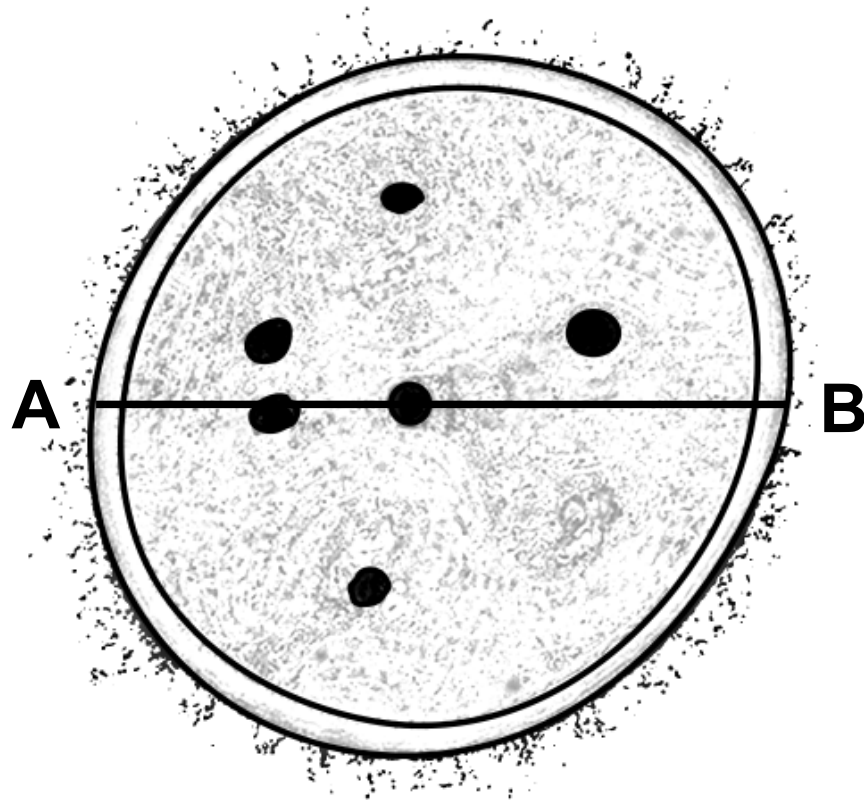


Figure 7

(Question continues on next page)

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

Give your answer in micrometres (μm).
(3 marks)

_____ μm

- (ii) Bacterial cells contain plasmids.

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

(Continue your answer on next page)

(Turn over)

(Question continues on next page)

(c) Figure 8 shows a plasmid containing the human insulin gene.

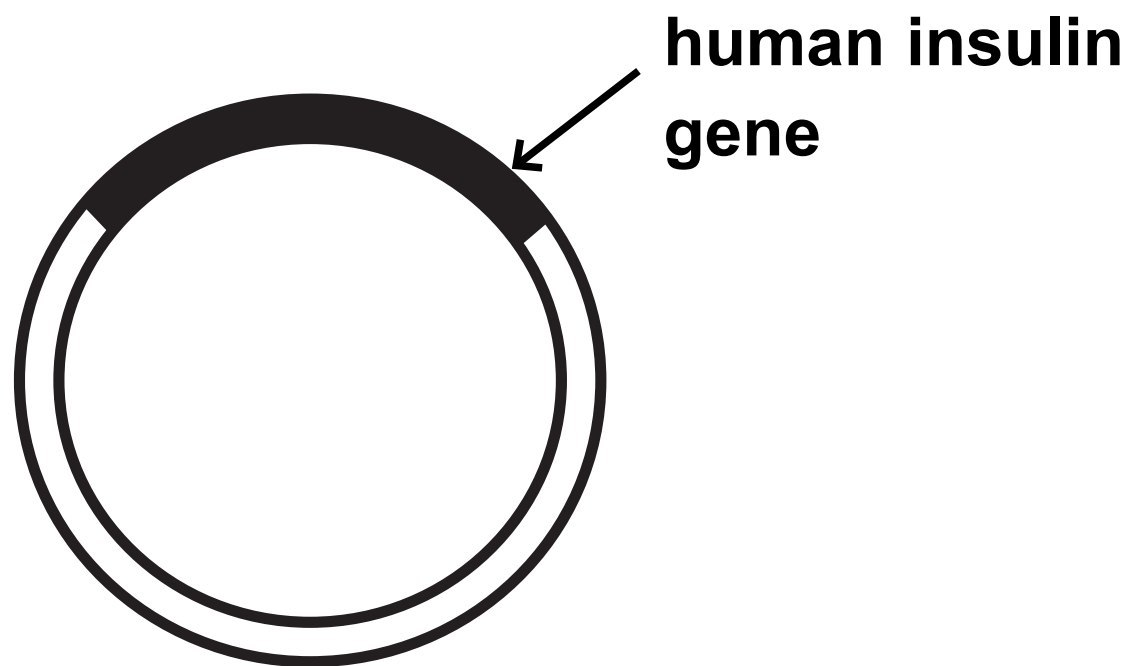


Figure 8

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

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 5 = 12 MARKS)

(Questions continue on next page)

- 6 (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 cm³ of a solution of lactose, as shown in Figure 9.

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

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

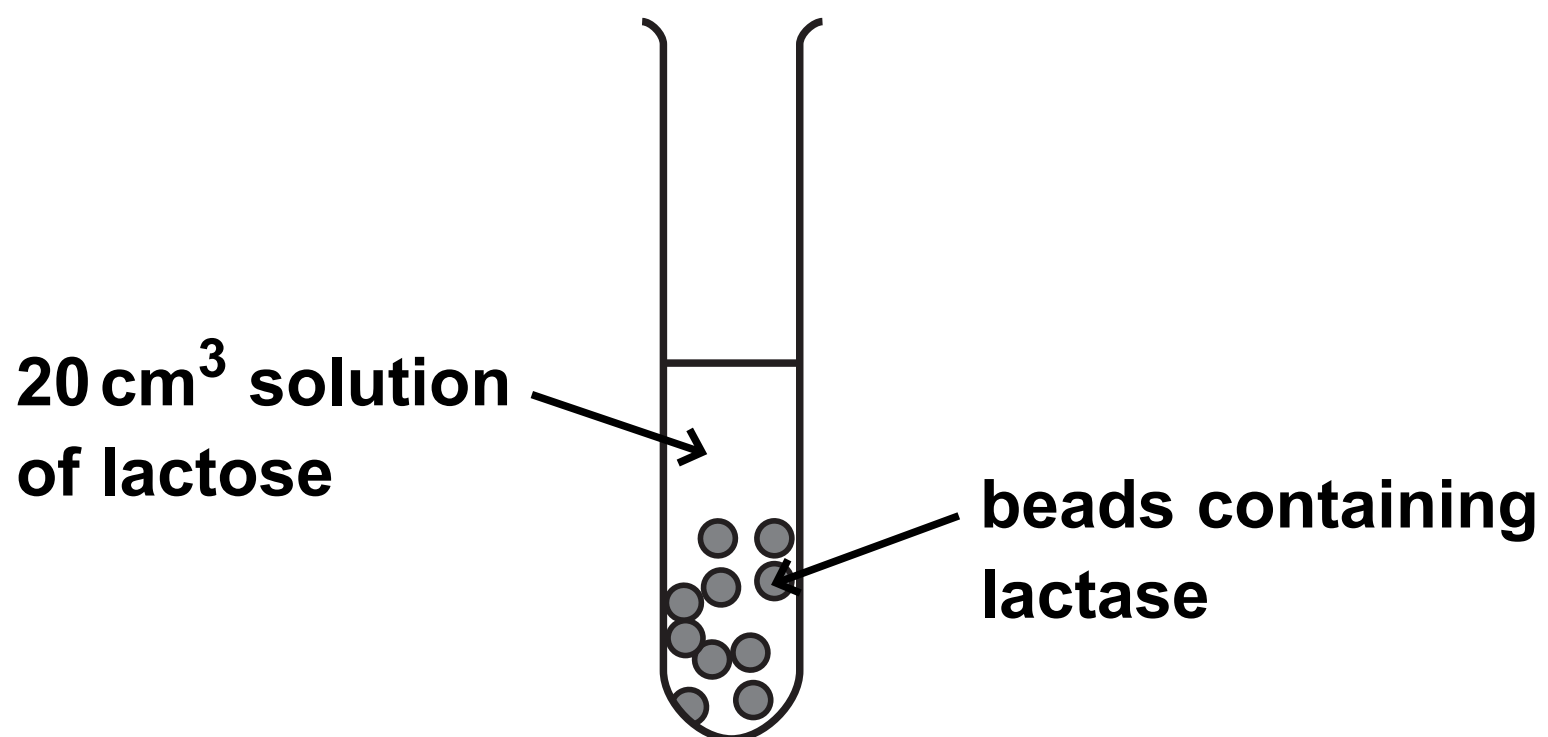


Figure 9

(Question continues on next page)

(Turn over)

The results are shown in Figure 10.

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

Figure 10

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

☐ A 0.008 s^{-1}

☐ B 0.04 s^{-1}

☐ C 0.21 s^{-1}

☐ D 4.8 s^{-1}

(Question continues on next page)

(Turn over)

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

(Question continues on next page)

(Turn over)

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

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

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 6 = 9 MARKS)

(Questions continue on next page)

7 Measles is a disease caused by a virus.

(a) Describe the lytic pathway for a virus. (3 marks)

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(Turn over)

- (b) A measles infection can cause inflammation of the brain.**

Figure 11 shows a brain.

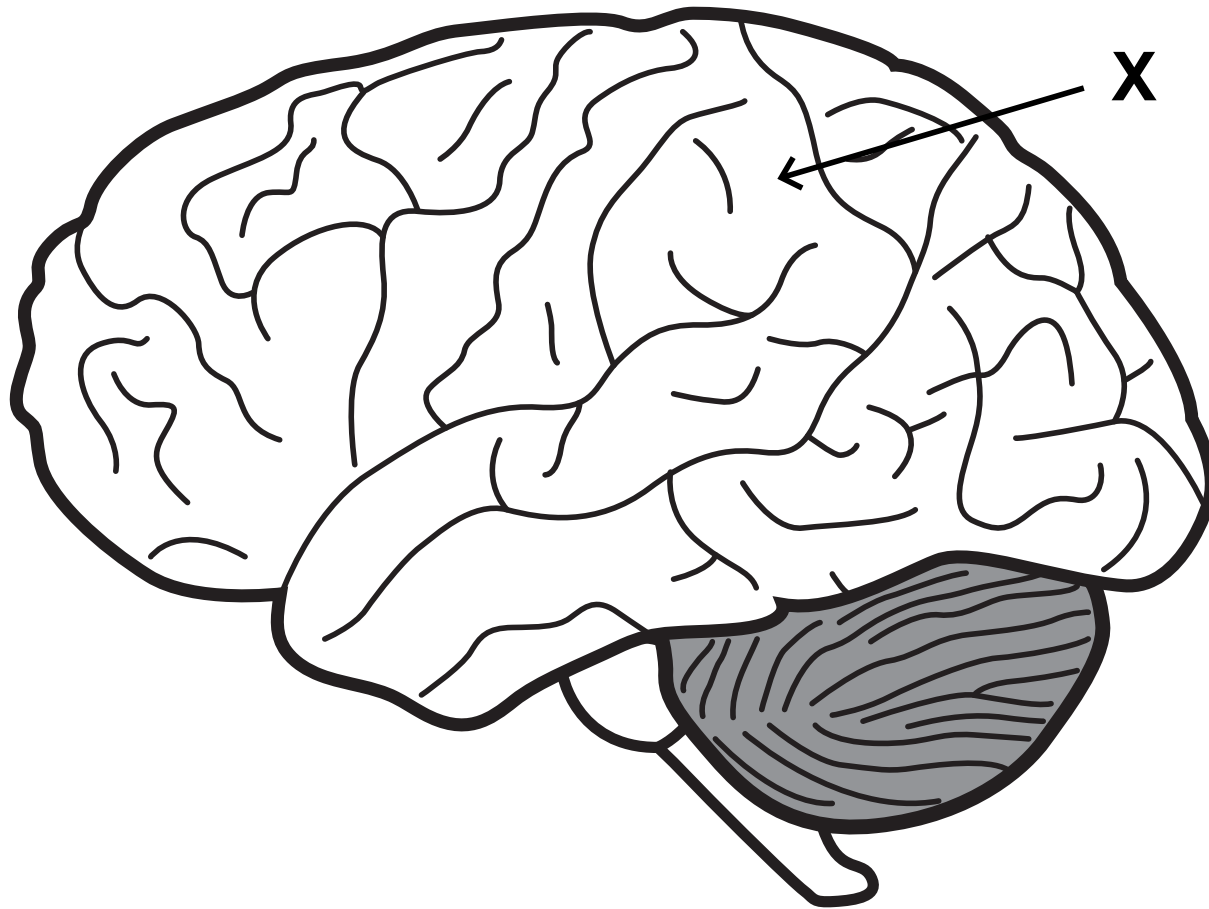


Figure 11

- (i) Name the part of the brain labelled X. (1 mark)**

(Question continues on next page)

(ii) The death rate from measles is 0.15%.

In 2015, 134 250 people died from measles.

Calculate the number of people infected with measles in 2015.

Give your answer in standard form. (3 marks)

_____ people

(Question continues on next page)

(c) Measles is prevented by immunisation.

(i) State TWO reasons why people might not be immunised against measles. (2 marks)

1 _____

2 _____

(Question continues on next page)

(Turn over)

- (ii) The spread of measles is prevented by herd immunity.

Describe herd immunity. (2 marks)

(TOTAL FOR QUESTION 7 = 11 MARKS)

(Questions continue on next page)

(Turn over)

- 8 (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 12 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 dm^3)

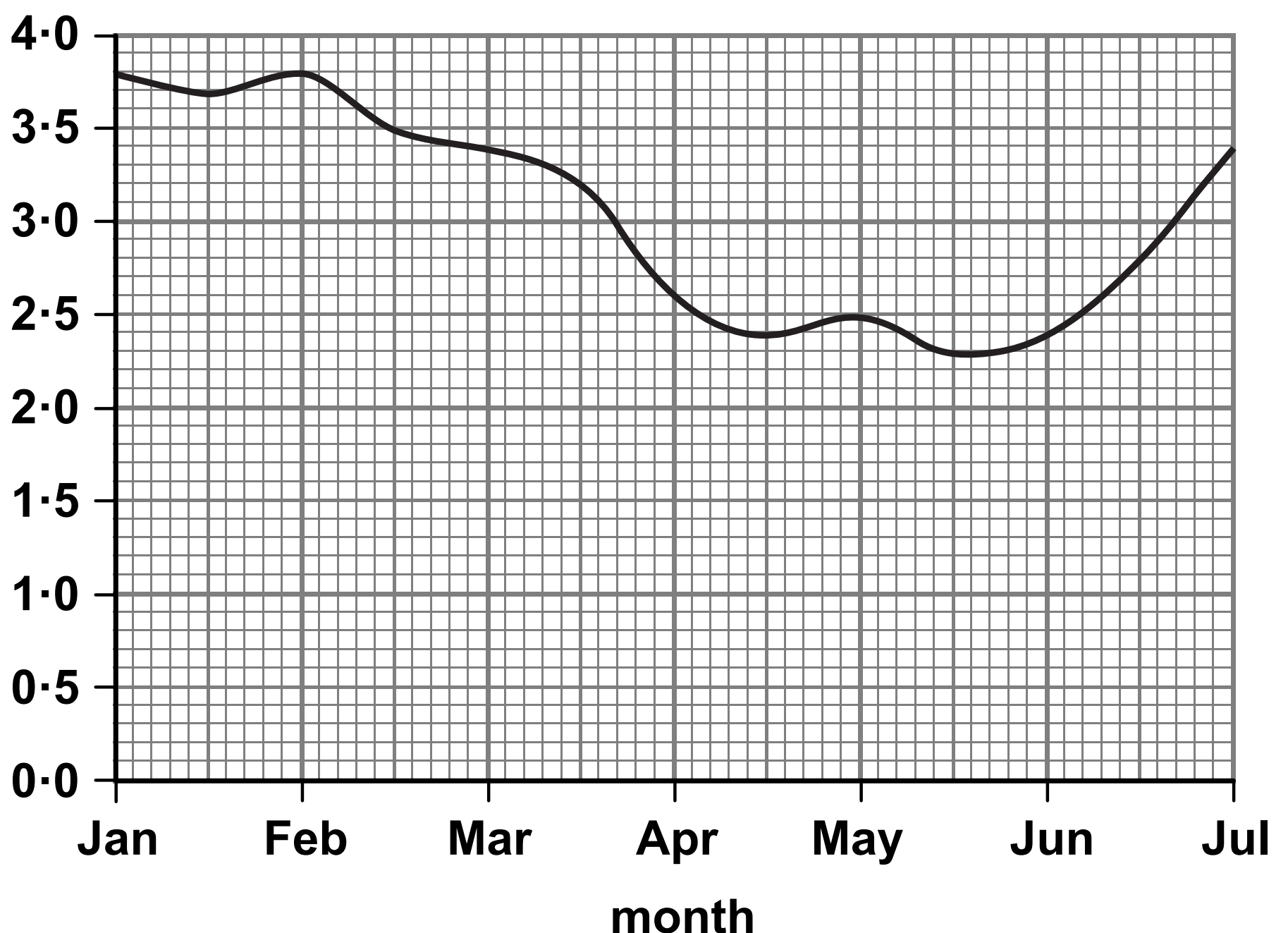


Figure 12

(Question continues on next page)

(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)

(Question continues on next page)

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

(Question continues on next page)

**(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 13 shows the number of people diagnosed with gonorrhoea in the UK.

number of people diagnosed with gonorrhoea

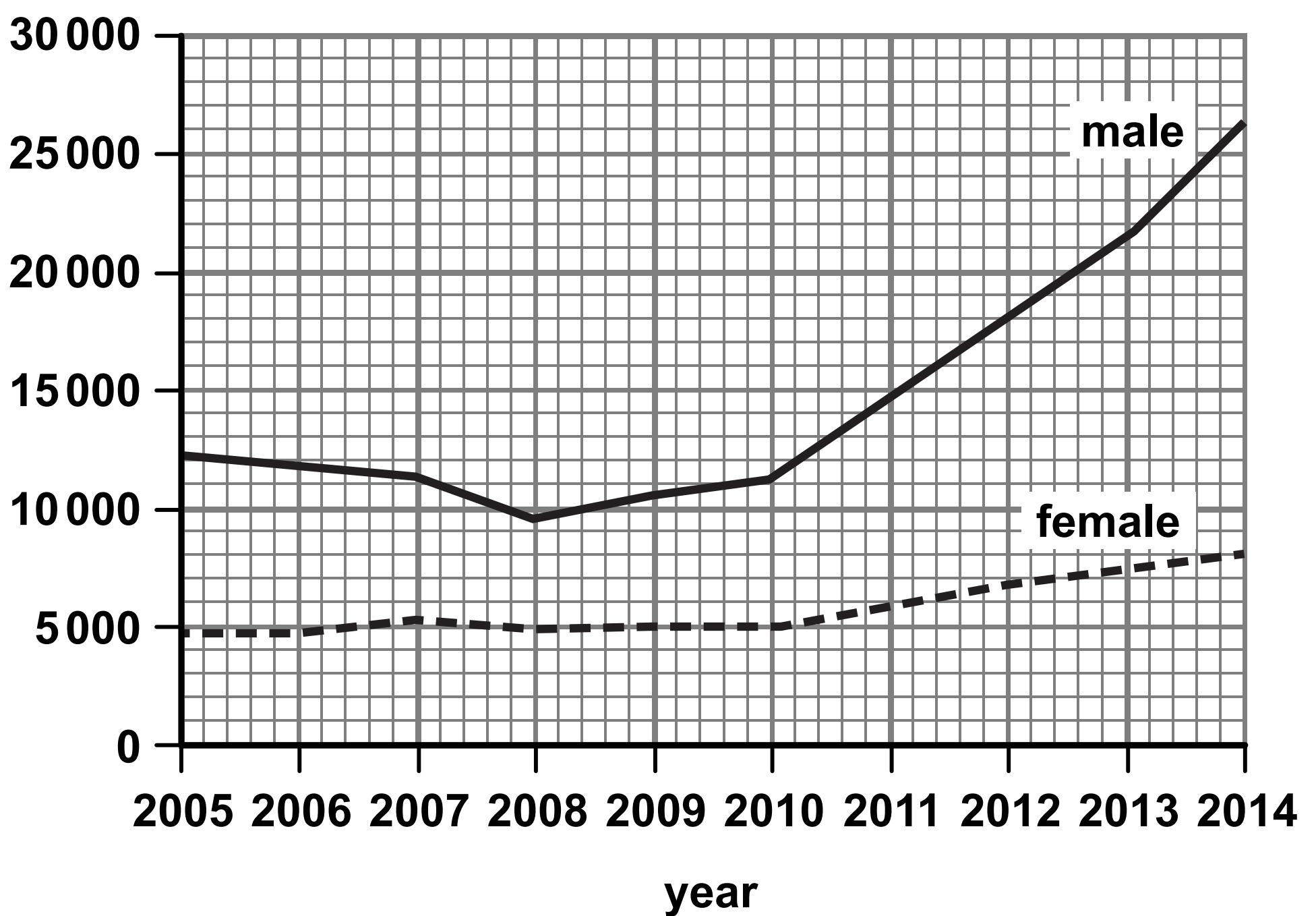


Figure 13

(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)

[illegible]

(Continue your answer on next page)

(Turn over)

[illegible][illegible]

[illegible][illegible]

[illegible][illegible]

(TOTAL FOR QUESTION 8 = 11 MARKS)

(Questions continue on next page)

9 Transcription and translation are stages in the synthesis of proteins.

(a) (i) Which enzyme is involved in the process of transcription? (1 mark)

- ☐ **A DNA ligase**
- ☐ **B lysozyme**
- ☐ **C RNA polymerase**
- ☐ **D restriction endonuclease**

(ii) Describe how a mutation in the non-coding region of the DNA can prevent a gene being transcribed. (2 marks)

(Question continues on next page)

(Turn over)

(b) A gene coding for a protein has two alleles.

Figure 14 shows the first 5 codons of an mRNA strand for these alleles.

Allele 1 – AUG CCA CAG GAG UUC

Allele 2 – AUG CCA GAG GAG UUC

Figure 14

Allele 2 has a mutation.

Figure 15 shows the key needed to predict the translated amino acid sequence of the protein.

codon	AUG	CCA	CAG	GAG	UUC
amino acid	Met	Pro	Gln	Glu	Phe

Figure 15

Explain how the mutation in allele 2 could affect the functioning of this protein. (3 marks)

(Continue your answer on next page)

(Turn over)

(Question continues on next page)

- *(c) The inheritance of different alleles affects the phenotype of an individual.**

A child is blood group O.

The child's mother is blood group A and the child's father is blood group B.

Explain how this child is blood group O.

Use the Punnett square and probability in your answer. (6 marks)

(Continue your answer on next page)

(Turn over)

[illegible][illegible]

(TOTAL FOR QUESTION 9 = 12 MARKS)

(Questions continue on next page)

- 10 (a) Figure 16 shows the number of neurones in the brain of different animals.

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

Figure 16

- (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)**

(Question continues on next page)

(b) Figure 17 shows a sensory neurone.

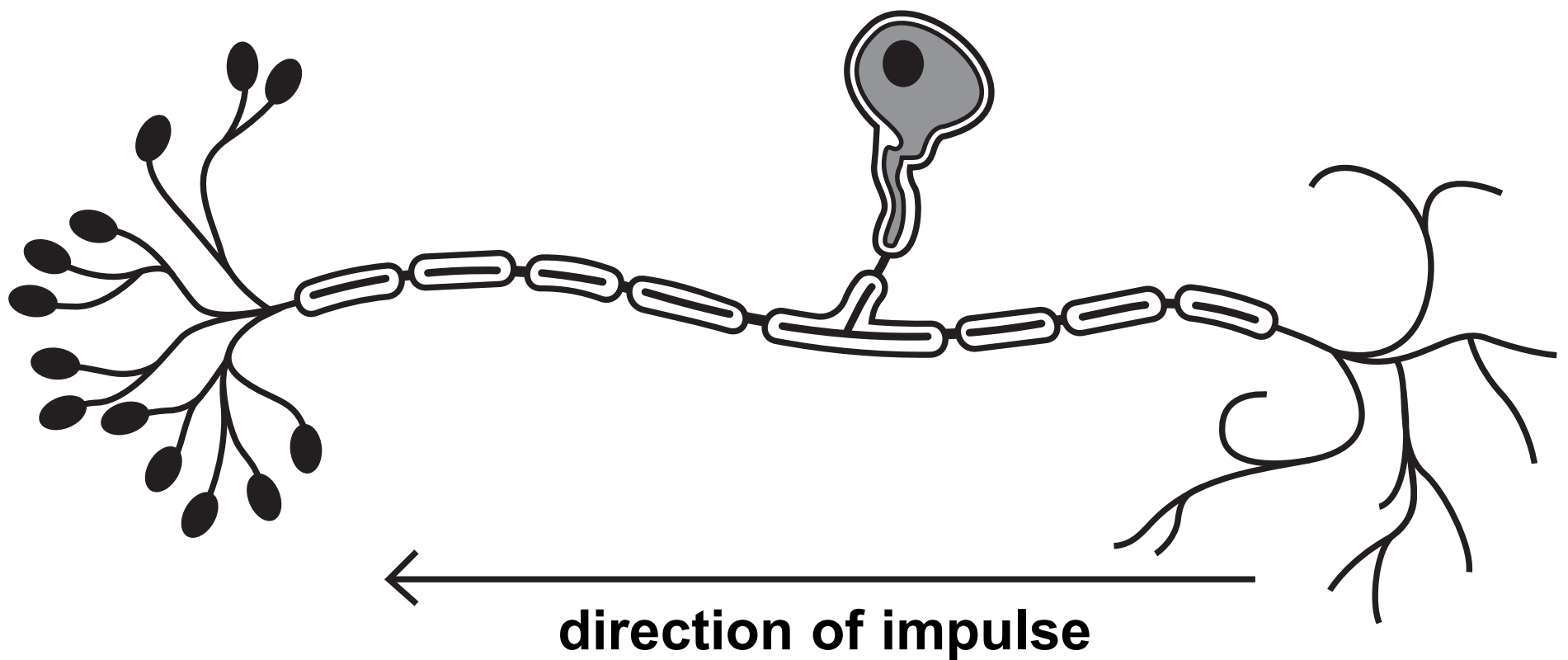


Figure 17

- (i) Label the axon on Figure 17. (1 mark)
- (ii) Describe the role of sensory neurones. (2 marks)

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

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(TOTAL FOR QUESTION 10 = 12 MARKS)

TOTAL FOR PAPER = 100 MARKS
END