

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

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

Biology
Paper 1
Foundation 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					
Paper Reference	1	B	I	0	/ 1 F

- 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) Figure 1 shows a pea plant with flowers.



Figure 1

(i) Name the type of reproduction involving flowers. (1 mark)

(Question continues on next page)

(Turn over)

(ii) What is the advantage of reproduction involving flowers? (1 mark)

- ☐ **A all the offspring are identical**
- ☐ **B there is variation in the offspring**
- ☐ **C there is no fertilisation**
- ☐ **D all the offspring grow faster**

(Question continues on next page)

- (b) The seeds produced by this pea plant can be round or wrinkled.

The allele for round seeds (R) is dominant to the allele for wrinkled seeds (r).

- (i) A homozygous dominant round seeded plant was crossed with a homozygous recessive wrinkled seeded plant.

Complete the Punnett square to show the genotypes of the offspring. (1 mark)

	r	r
R		
R		

- (ii) State the percentage of the offspring that will produce round seeds. (1 mark)

percentage = _____%

(Question continues on next page)

(Turn over)

**(iii) Which scientist discovered the basis of genetic inheritance by crossing pea plants?
(1 mark)**

☐ **A Charles Darwin**

☐ **B Alfred Wallace**

☐ **C Louis Leakey**

☐ **D Gregor Mendel**

(Question continues on next page)

(c) The blood group of a person is determined by their genotype.

**Describe how a person inherits the blood group AB.
(2 marks)**

(TOTAL FOR QUESTION 1 = 7 MARKS)

(Questions continue on next page)

(Turn over)

2 (a) A student investigated mitosis in the root tip of a garlic plant.

(i) Explain why the student used the tip of the root. (2 marks)

(Question continues on next page)

- (ii) The student squashed the root tip on a microscope slide to spread out the cells.

The slide was placed on the stage of a microscope.

Describe how to use the microscope to obtain a clear image of the cells. (2 marks)

(Question continues on next page)

(Turn over)

- (iii) The student could not see the chromosomes inside the cells.

State what can be added to the root tip squash to make the chromosomes visible. (1 mark)

(Question continues on next page)

(b) Figure 2 shows a root cell in a stage of mitosis.

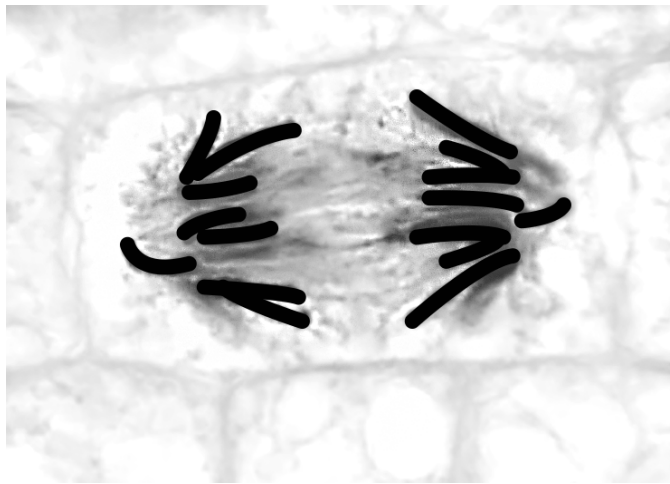


Figure 2

(i) Which stage of mitosis is shown in Figure 2?
(1 mark)

- ☐ A prophase
- ☐ B metaphase
- ☐ C anaphase
- ☐ D telophase

(Question continues on next page)

**(ii) Describe what is happening in Figure 2.
(3 marks)**

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(TOTAL FOR QUESTION 2 = 9 MARKS)

(Questions continue on next page)

(Turn over)

3 (a) Chlamydia is caused by a pathogen.

(i) Chlamydia is transmitted by (1 mark)

- ☐ **A insect vectors**
- ☐ **B sneezing**
- ☐ **C sexual intercourse**
- ☐ **D contaminated food**

(ii) The type of pathogen that causes chlamydia is a (1 mark)

- ☐ **A bacterium**
- ☐ **B fungus**
- ☐ **C protist**
- ☐ **D virus**

(Question continues on next page)

(b) Figure 3 shows the number of cases of chlamydia in the United Kingdom per 100 000 people between 1996 and 2013.

cases of chlamydia
per 100 000

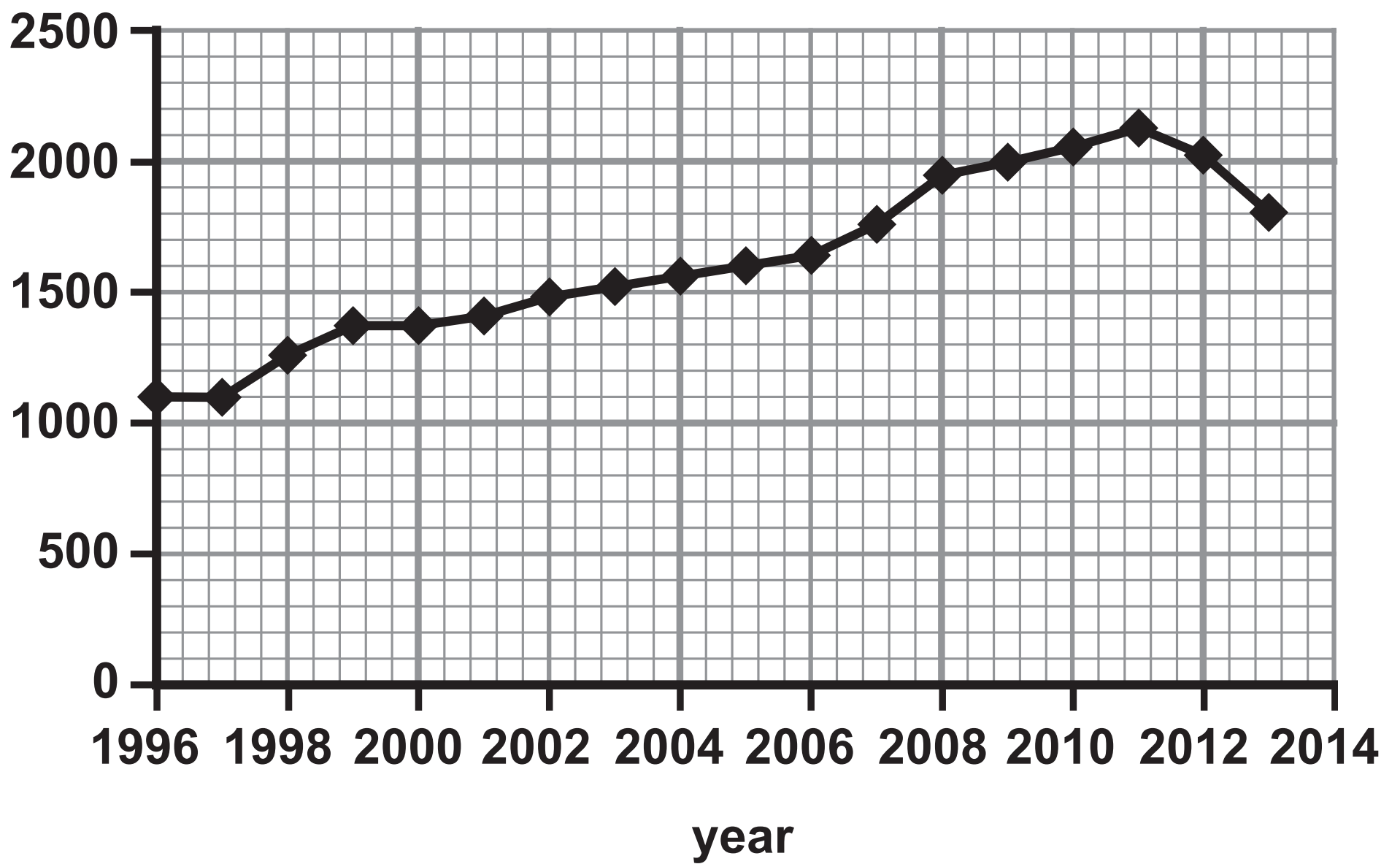


Figure 3

(Question continues on next page)

- (i) Describe the trend in the number of cases of chlamydia between 1996 and 2013. (2 marks)

- (ii) State the number of cases of chlamydia per 100 000 in 2013. (1 mark)

(Question continues on next page)

- (iii) The population of the United Kingdom in 2013 was 64 000 000.

Calculate the number of people with chlamydia in 2013. (2 marks)

(TOTAL FOR QUESTION 3 = 7 MARKS)

(Questions continue on next page)

4 (a) Figure 4 shows the structures in a leaf.

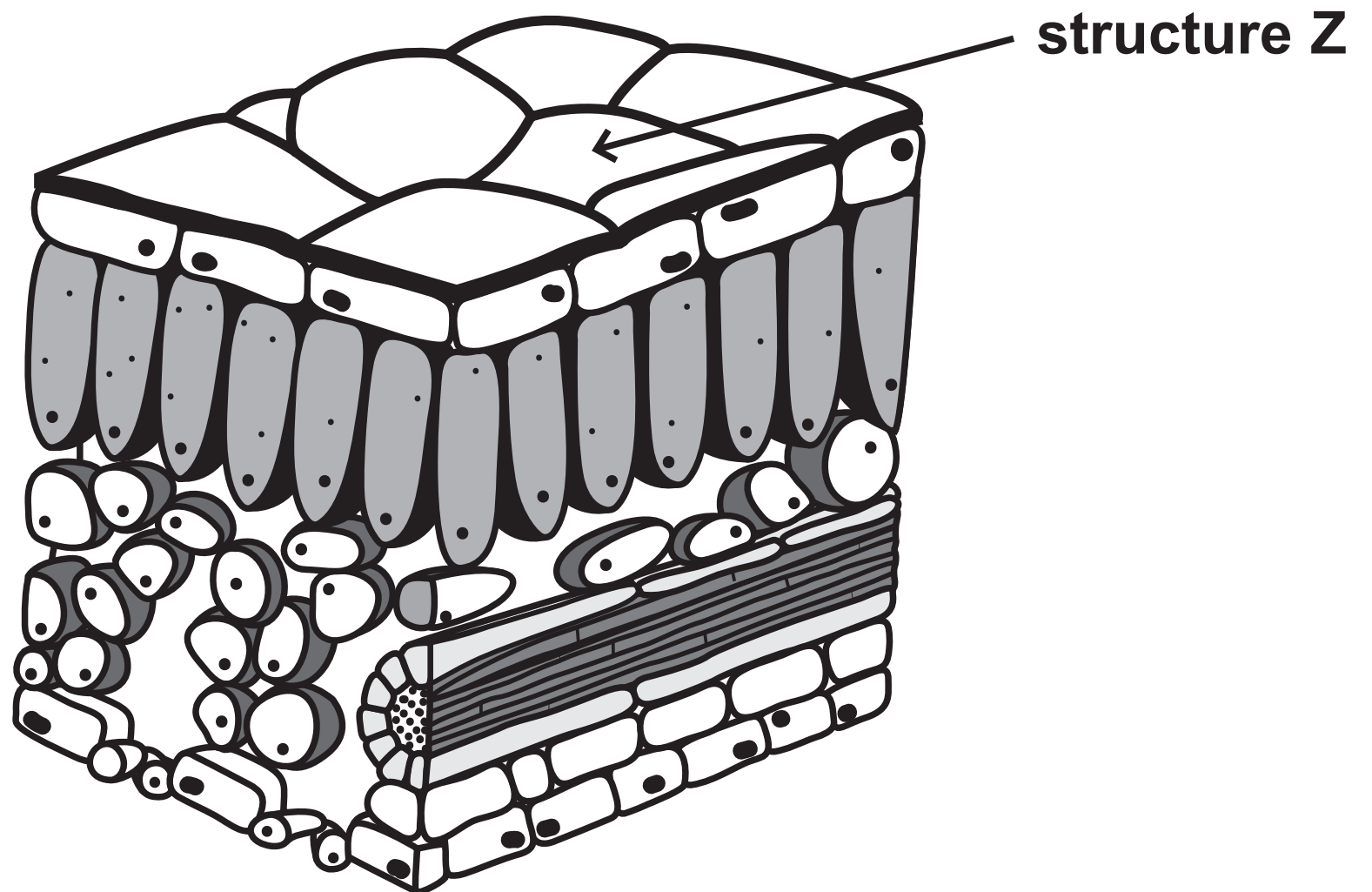


Figure 4

Explain how structure Z is involved in defence against pathogens. (2 marks)

(b) Chemicals can be extracted from plants.

Some of these chemicals can kill bacteria.

A scientist spread some bacteria on a nutrient agar plate as shown in Figure 5.

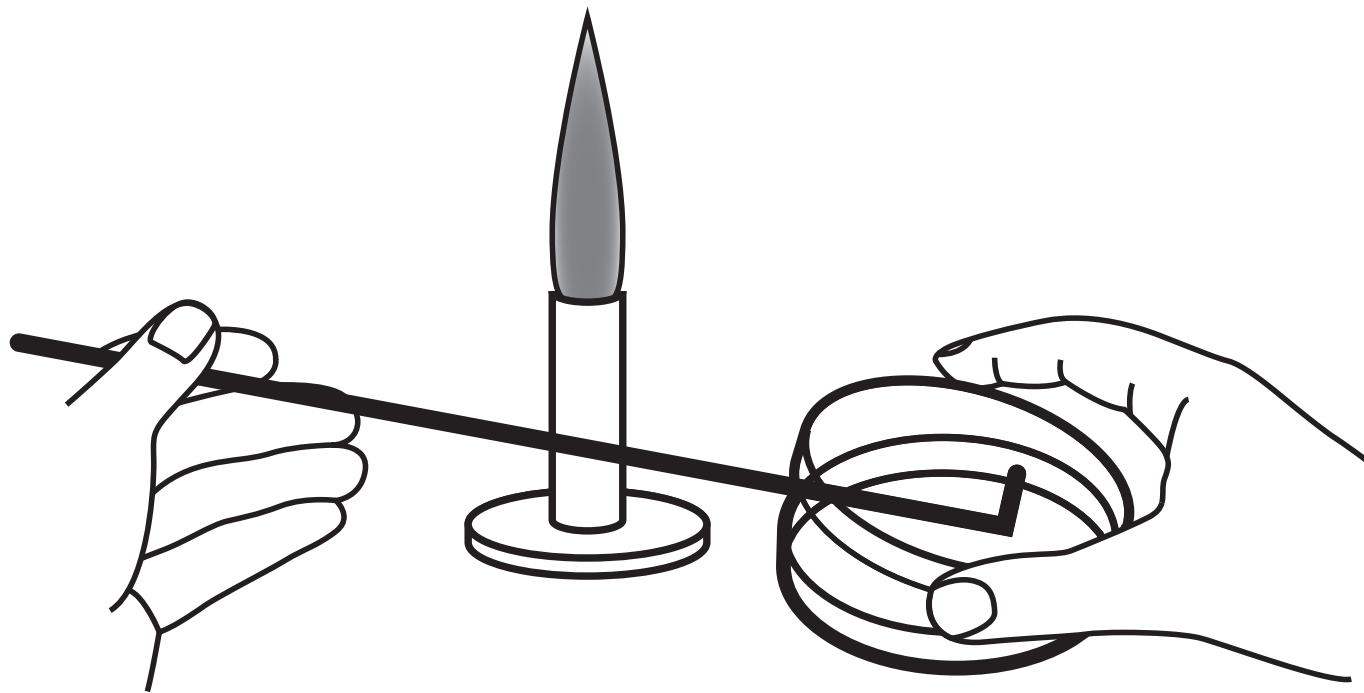


Figure 5

(i) What is being shown in Figure 5? (1 mark)

- ☐ **A aseptic technique**
- ☐ **B cloning**
- ☐ **C genetic engineering**
- ☐ **D selective breeding**

(Question continues on next page)

(Turn over)

(ii) Explain why the scientist worked near to a Bunsen burner. (2 marks)

(Question continues on next page)

(c) A scientist spread bacteria onto the surface of two agar plates.

A filter paper disc was placed in the centre of each plate.

Each filter paper disc had been soaked in a different chemical extracted from plants.

The results are shown in Figure 6.

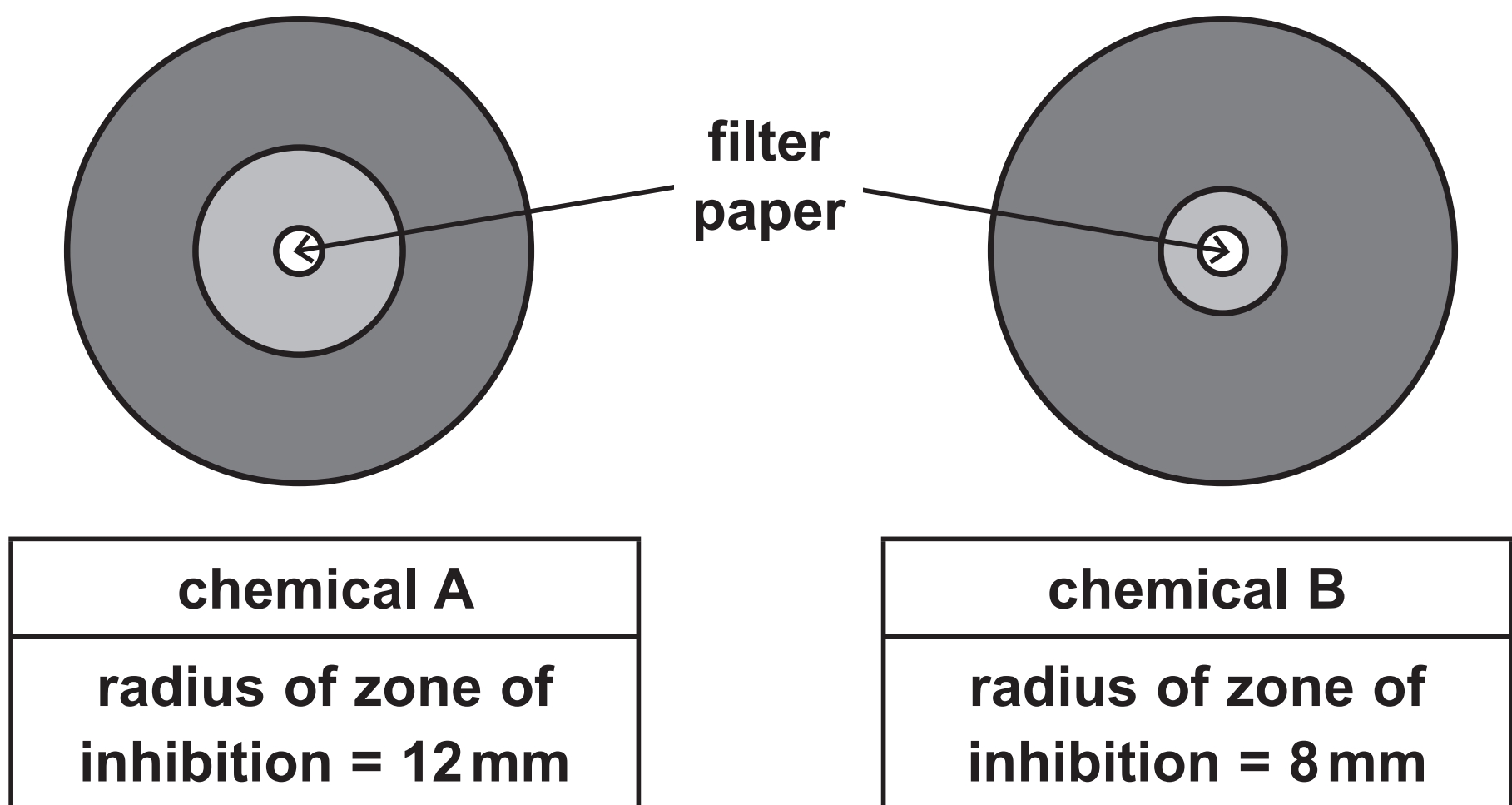


Figure 6

(Question continues on next page)

(Turn over)

- (i) The area of a circle is calculated using πr^2 .

Calculate the area of the zone of inhibition for chemical A. (2 marks)

Use $\pi = 3.14$

_____ mm²

(Question continues on next page)

- (ii) The scientist concluded that chemical A was more effective than chemical B at killing bacteria.

Give TWO variables the scientist needed to control to make this conclusion valid. (2 marks)

1 _____

2 _____

- (d) Some crop plants have been genetically engineered to produce toxic chemicals in their leaves.

Explain ONE advantage of producing these genetically modified crop plants. (2 marks)

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 4 = 11 MARKS)

(Questions continue on next page)

- 5 (a) Figure 7 shows the activity of the enzymes pepsin and trypsin at different pH levels.

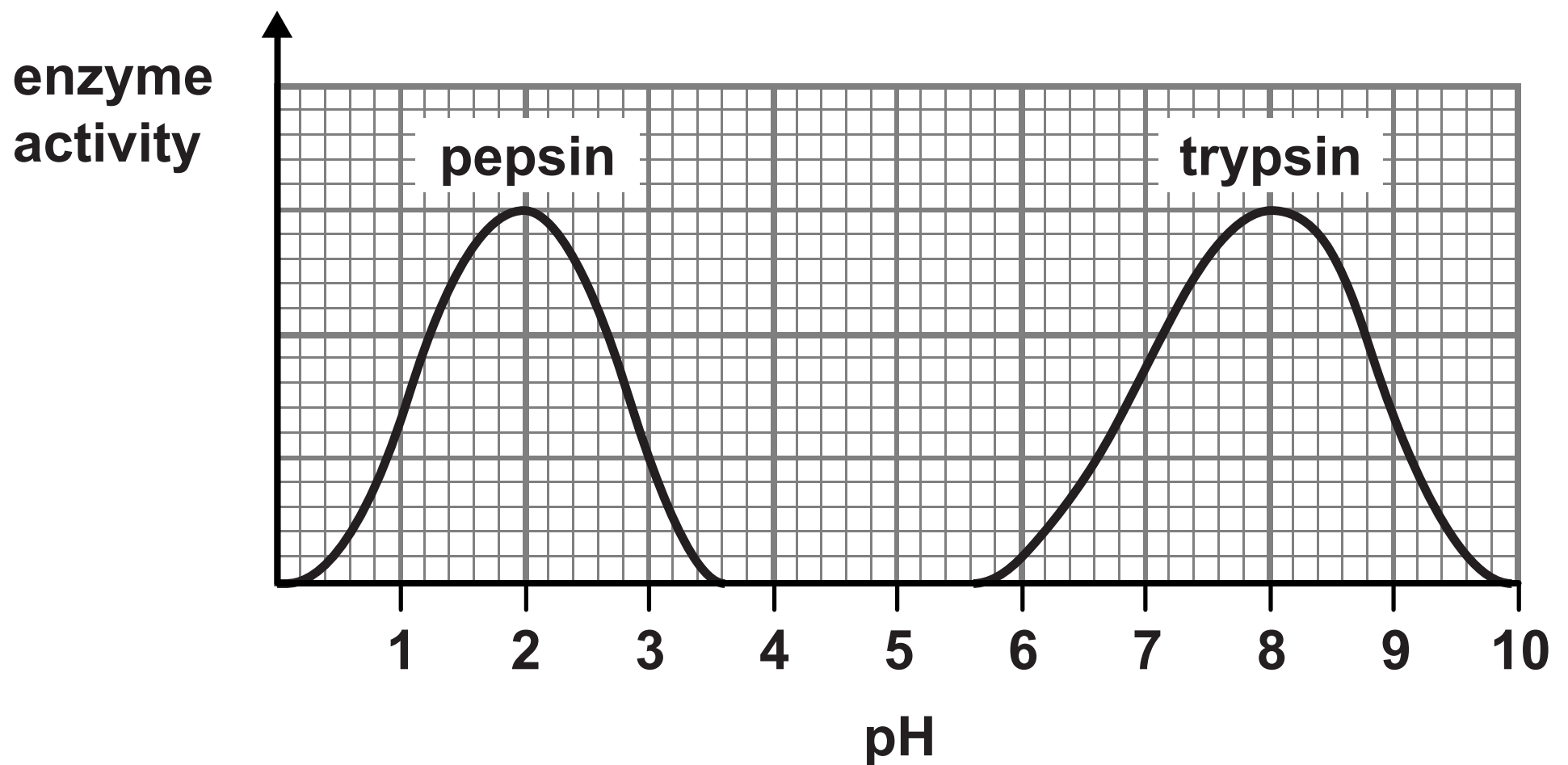


Figure 7

- (i) Describe the trend in the graph for the enzyme **TRYPSIN**.

Use data from the graph to support your answer. (4 marks)

(Continue your answer on next page)

(Turn over)

(Question continues on next page)

- (ii) State the optimum pH for the enzyme PEPSIN.
(1 mark)

- (iii) Pepsin only works effectively in the stomach.

Describe the conditions in the stomach that
allow pepsin to work effectively. (2 marks)

(Question continues on next page)

- (b) At high pH values the active site of the enzyme pepsin changes shape.

When the active site of the enzyme changes shape, the enzyme is (1 mark)

- ☐ A specific
- ☐ B denatured
- ☐ C digested
- ☐ D dead

- (c) State what is produced when proteins are digested. (1 mark)

(TOTAL FOR QUESTION 5 = 9 MARKS)

(Questions continue on next page)

(Turn over)

- 6 (a) A karyogram is a picture of the chromosomes found in the nucleus of a single cell.

Figure 8 shows a human karyogram.

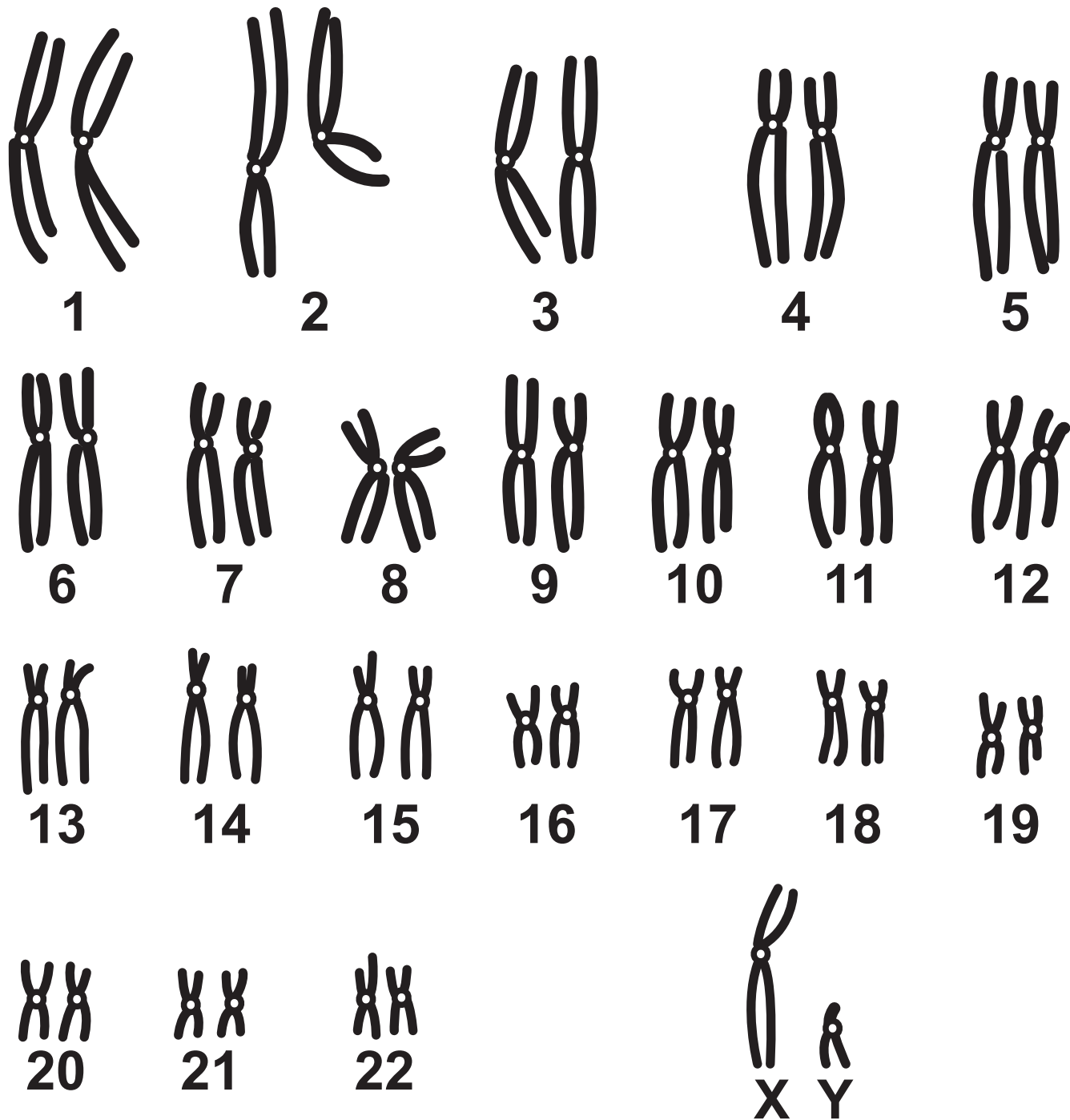


Figure 8

(Question continues on next page)

- (i) State TWO reasons why this karyogram cannot be from a gamete (sex cell). (2 marks)

1 _____

2 _____

- (ii) State the gender shown by this karyogram.
(1 mark)

(Question continues on next page)

- (iii) Complete the Punnett square to show how gender is inherited. (2 marks)

		male gametes	
female gametes			

- (iv) State the probability that a child will be male. (1 mark)

(Question continues on next page)

(b) Figure 9 shows two sperm cells.

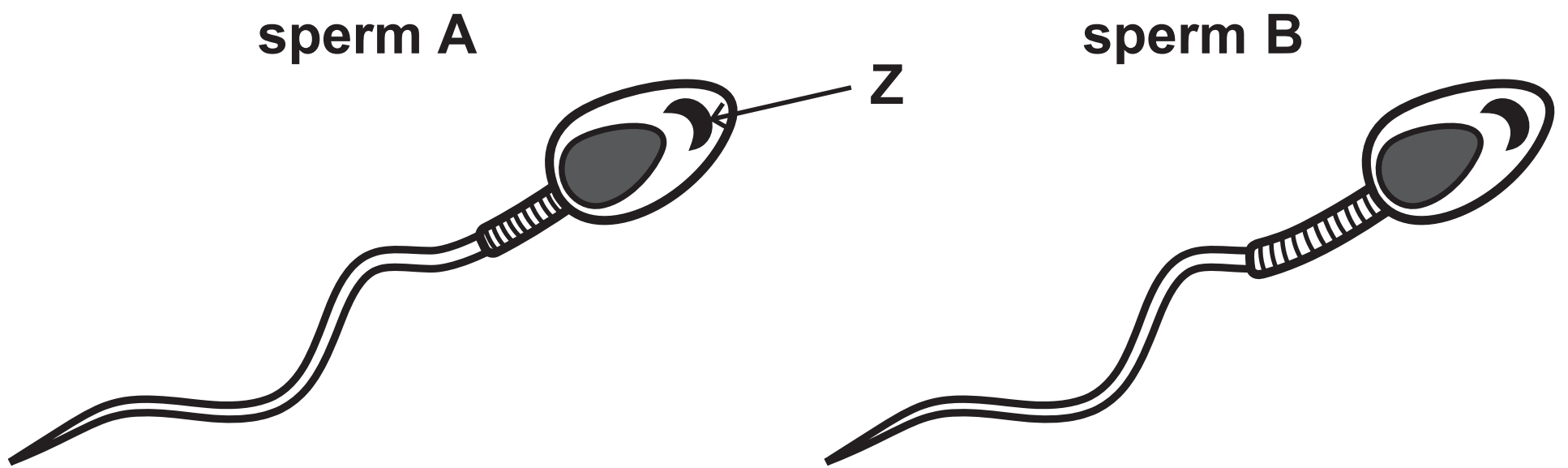


Figure 9

(i) Name structure Z. (1 mark)

(ii) Sperm B has a larger middle section than sperm A.

Explain why sperm B will be more likely to fertilise an egg than sperm A if they were both released at the same time. (3 marks)

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 6 = 10 MARKS)

(Questions continue on next page)

7 Starch is a nutrient in food.

Starch is a source of energy.

(a) Name the enzyme that breaks down starch. (1 mark)

(b) Enzymes from different parts of the digestive system were used to investigate the breakdown of starch.

Figure 10 shows the apparatus used in this investigation.

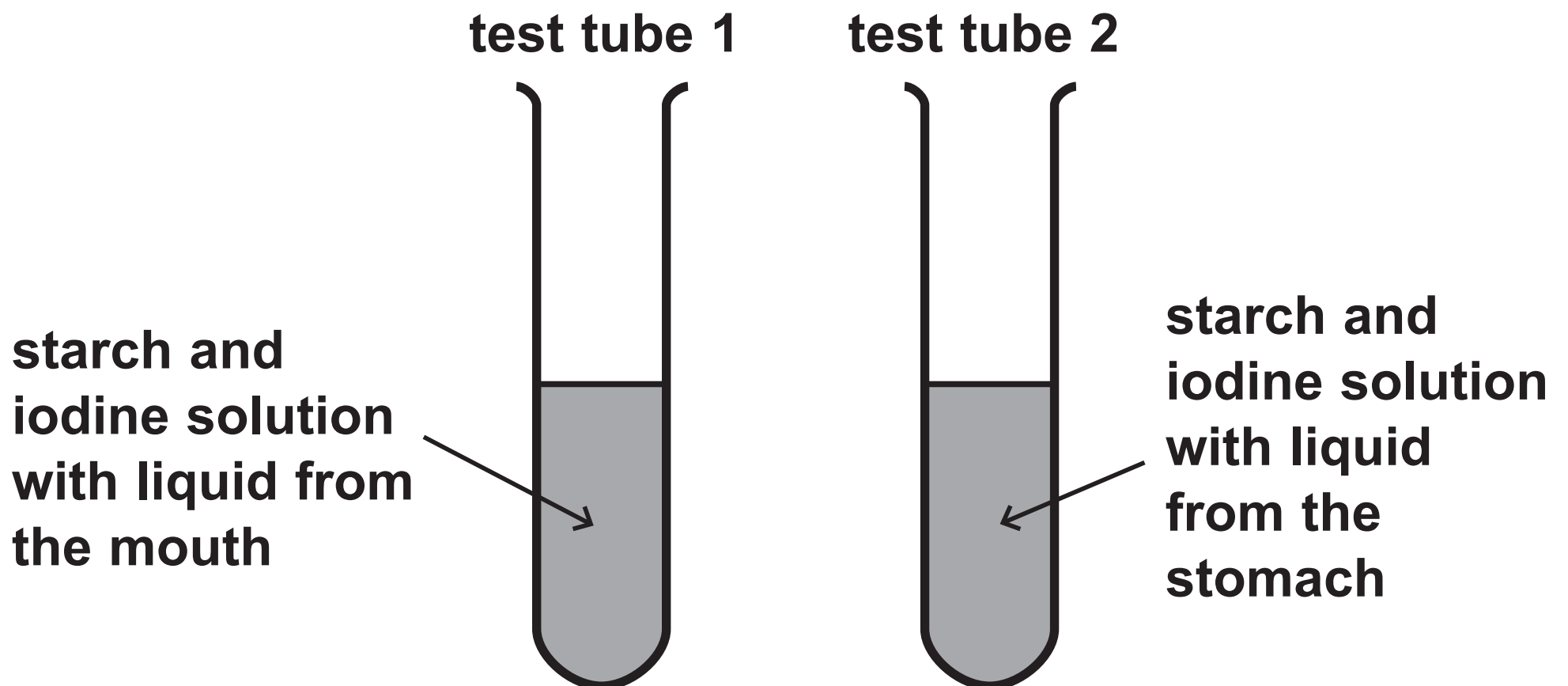


Figure 10

(Question continues on next page)

(Turn over)

The colour of the contents of each test tube was recorded every two minutes for a total of ten minutes.

The results are shown in Figure 11.

colour of the contents of each test tube		
time in minutes	test tube 1 starch and iodine solution with liquid from the mouth	test tube 2 starch and iodine solution with liquid from the stomach
0	blue-black	blue-black
2	blue-black	blue-black
4	brown	blue-black
6	orange	blue-black
8	orange	blue-black
10	orange	blue-black

Figure 11

- (i) Give ONE reason why the contents of both test tubes were blue-black at the beginning of the investigation. (1 mark)

(ii) Explain the results of this investigation after ten minutes. (3 marks)

(Question continues on next page)

- *(c) The diagram shows equipment that can be used to measure the energy content of different foods.**

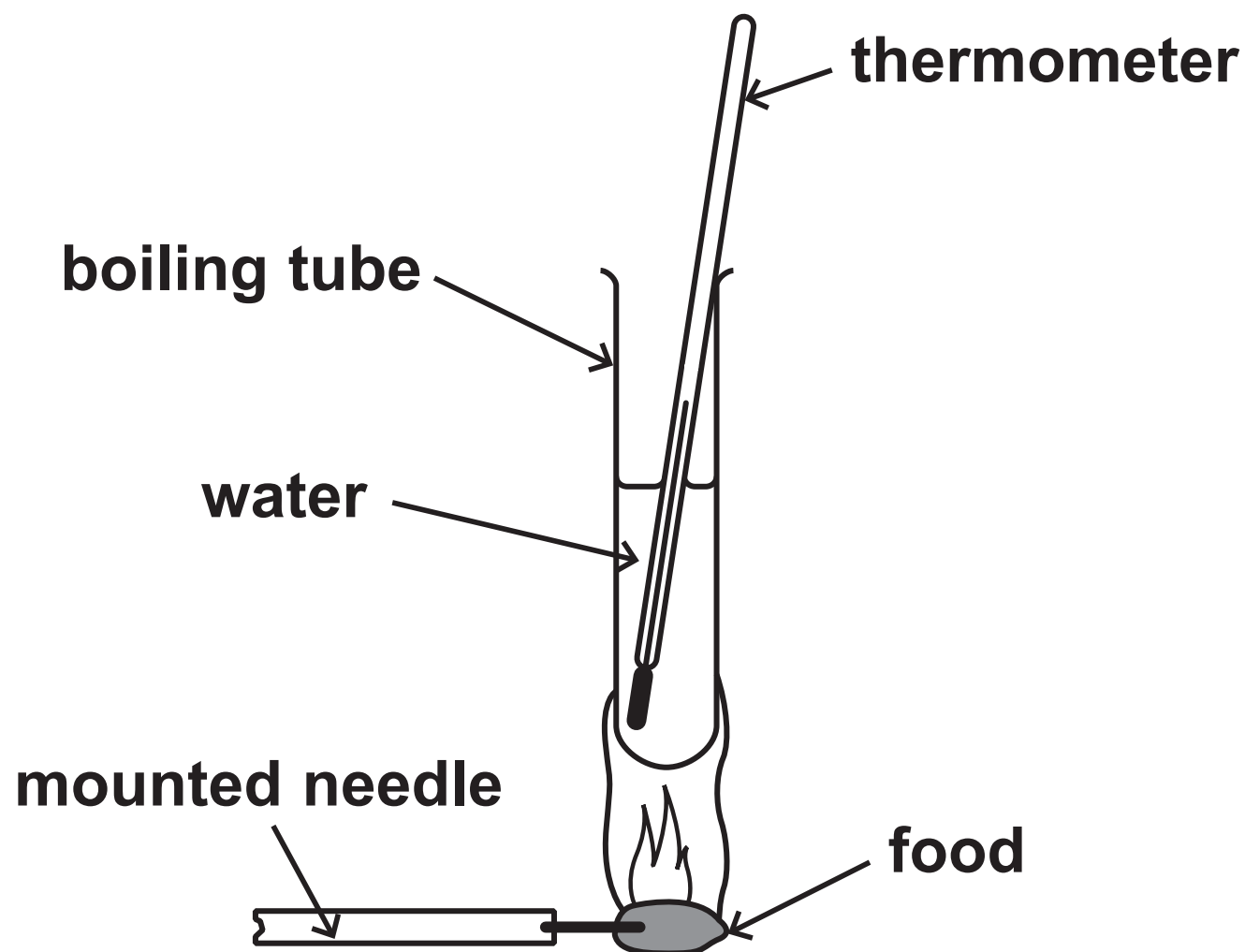


Figure 12

Devise a method to compare the energy content of two foods using this equipment.

**Include details of how to control the variables.
(6 marks)**

(Continue your answer on next page)

(Turn over)

[illegible]

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 7 = 11 MARKS)

(Questions continue on next page)

8 (a) James Watson and Francis Crick built a model that showed that DNA has a double helix structure.

**(i) Which statement about DNA is correct?
(1 mark)**

- ☐ **A each pair of bases is joined by hydrogen bonds**
- ☐ **B phosphate groups are joined by hydrogen bonds**
- ☐ **C nucleotides consist of a sugar and a phosphate group only**
- ☐ **D bases are joined to phosphate molecules**

(Question continues on next page)

- (ii) Figure 13 shows the percentage of each base in human DNA.

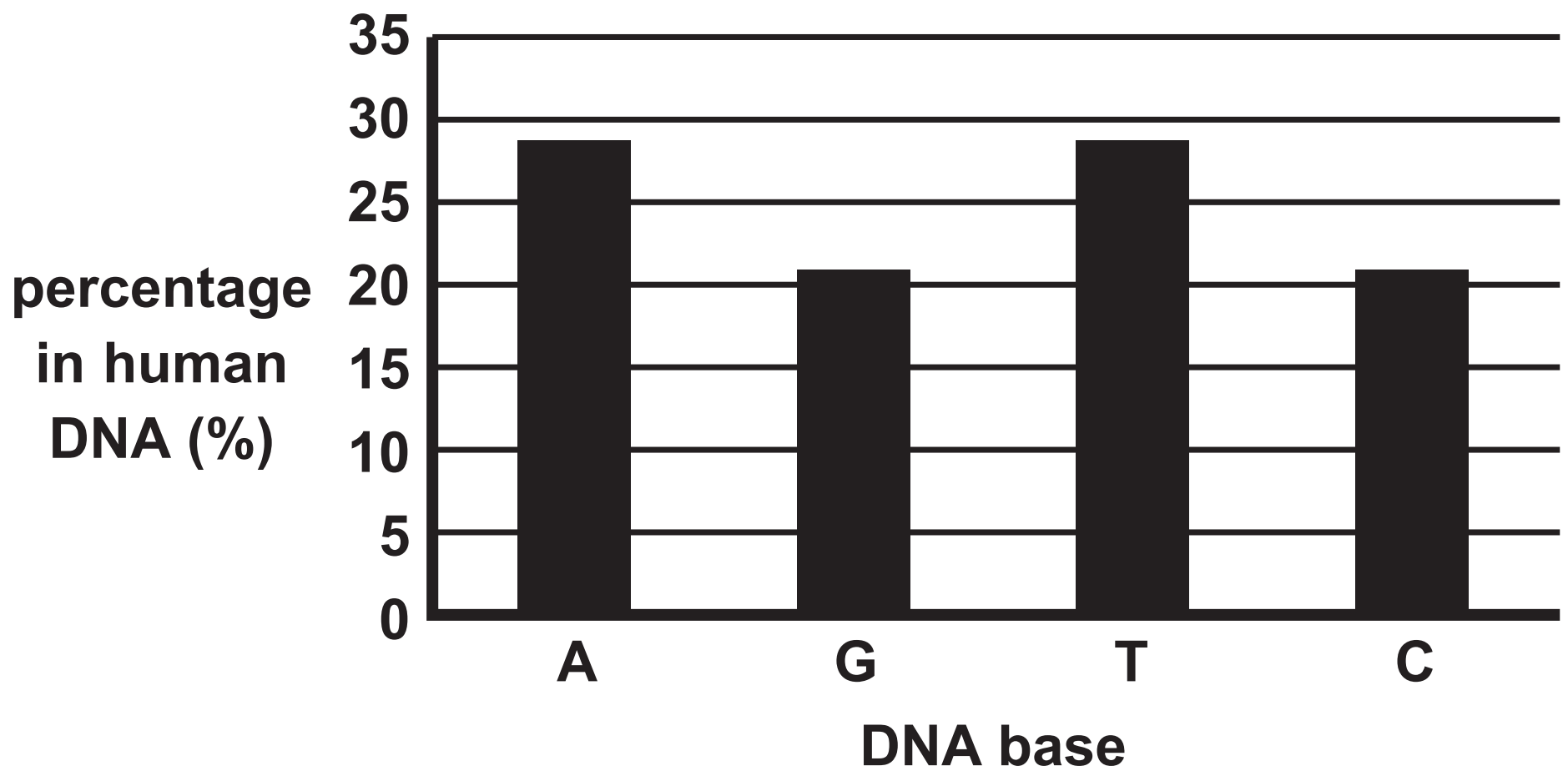


Figure 13

Describe how this data provides evidence for base pairing in DNA. (2 marks)

(Continue your answer on next page)

(Turn over)

-
-
-
- (b) 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)

- (c) A student used the method shown in Figure 14 to compare the mass of DNA extracted from strawberry fruit cells and from kiwi fruit cells.

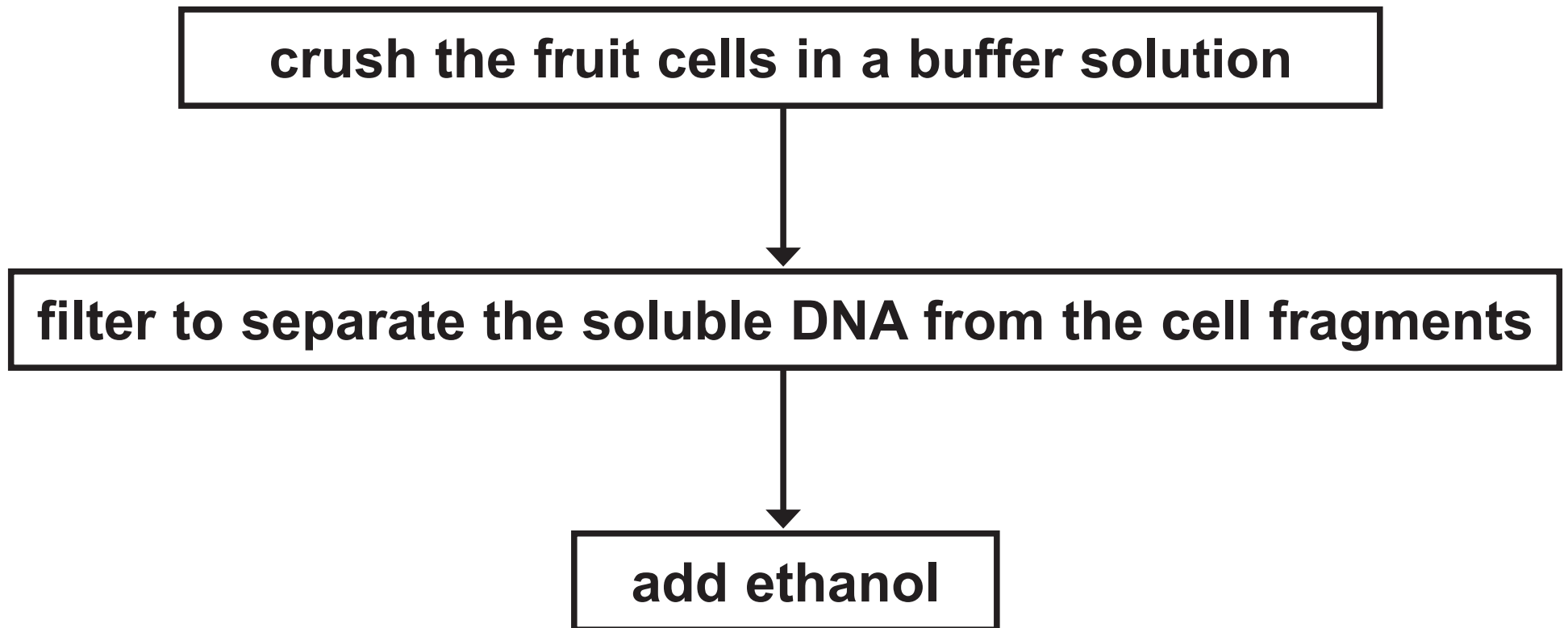


Figure 14

- (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)

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

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

[illegible]

(TOTAL FOR QUESTION 8 = 12 MARKS)

(Questions continue on next page)

(Turn over)

- 9 (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)

(Continue your answer on next page)

(Turn over)

(Question continues on next page)

***(c) Figure 15 shows three stone tools found in different layers of rock.**

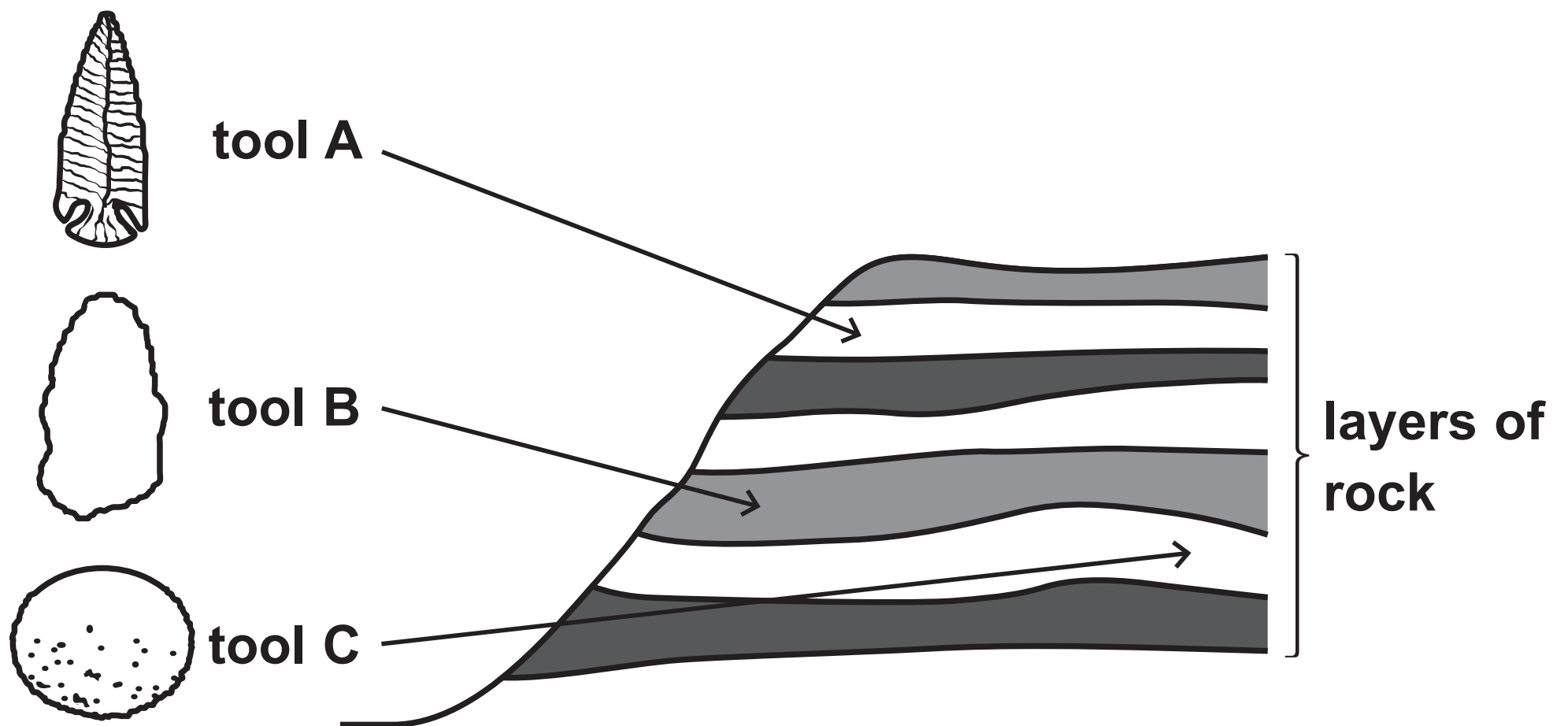


Figure 15

Explain how information from Figure 15 provides evidence for human evolution. (6 marks)

(Continue your answer on next page)

(Turn over)

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(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 9 = 13 MARKS)

(Questions continue on next page)

- 10 (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 16 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 16

(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 16. (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 17 shows light rays entering the eye of a person with normal vision.

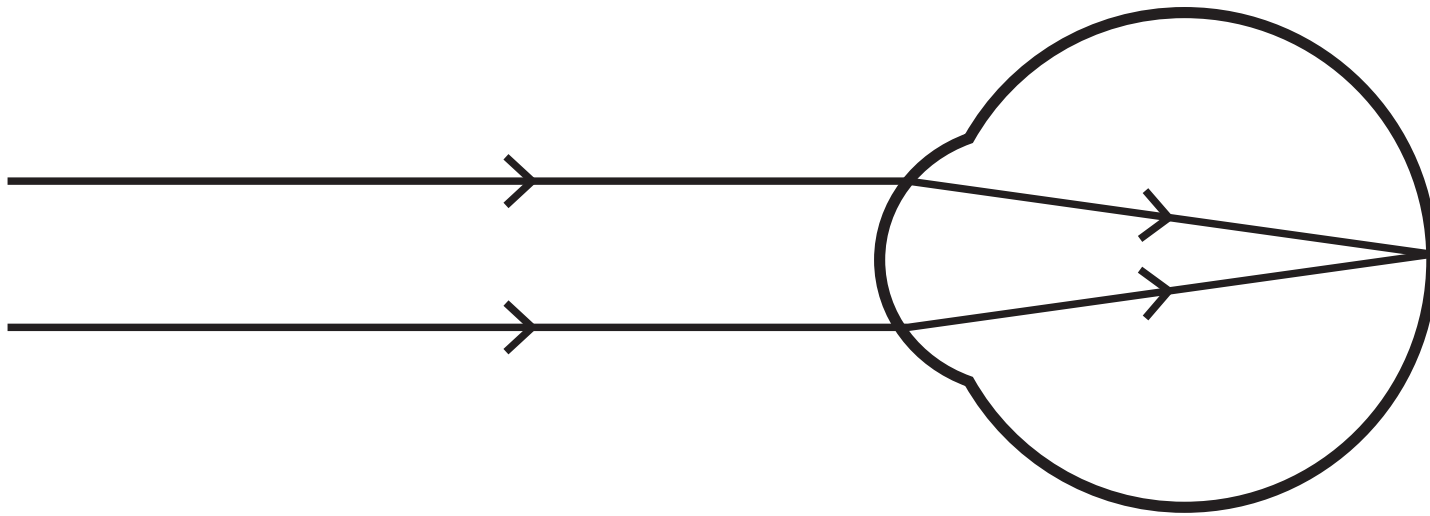


Figure 17

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

- (ii) Figure 18 shows light rays entering the eye of a person with an eye defect and two lenses that can be used to correct eye defects.

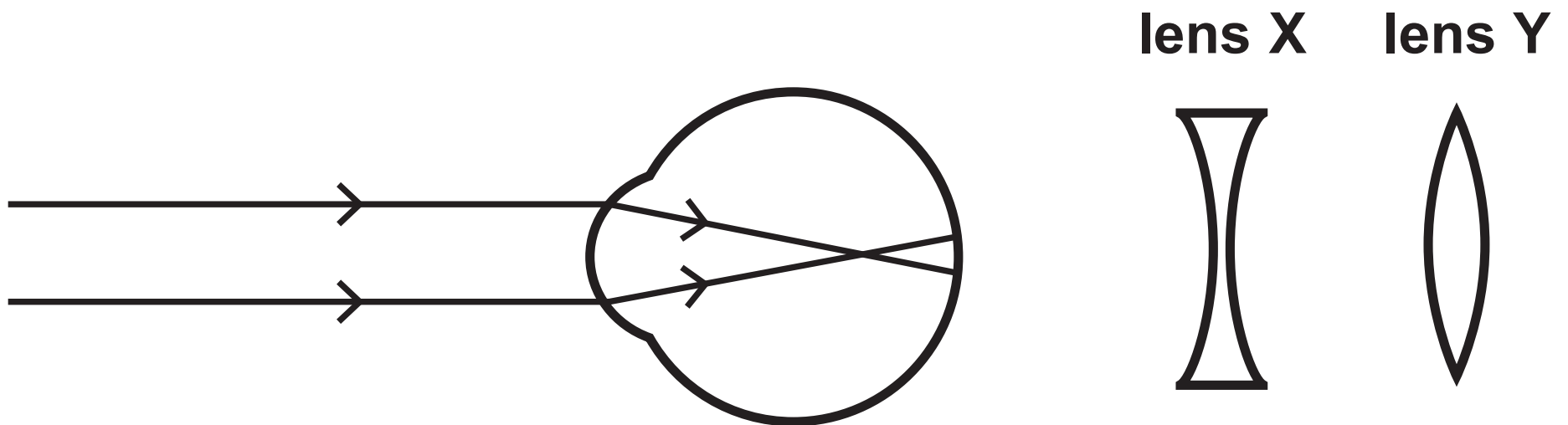


Figure 18

Explain which lens would correct the eye defect shown in Figure 18. (2 marks)

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 10 = 11 MARKS)

TOTAL FOR PAPER = 100 MARKS
END