Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

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

Friday 10 May 2024

Morning (Time: 1 hour 45 minutes)

Paper reference **1BI0/1F**

Biology

PAPER 1

Foundation Tier

You must have:
Ruler, calculator

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 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

- 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 ▶

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P 7 5 5 0 2 A 0 1 3 2

Pearson

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 bacterial cell.

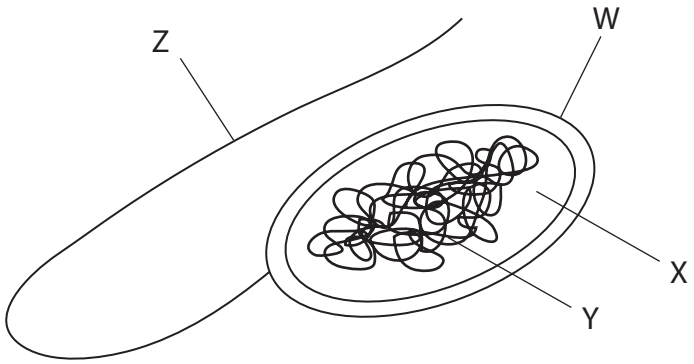

Figure 1

(i) What is structure W?

(1)

☒ **A** cell wall

☒ **B** cytoplasm

☒ **C** chromosomal DNA

☒ **D** plasmid

(ii) Give the name of structure Z.

(1)

.....

(iii) State the function of structure Z.

(1)

.....

.....

(b) The human body has defences to protect against infection by bacteria.

Draw **one** straight line from each body defence to its function.

(2)

body defence	**function**
	moves pathogens away from the lungs
hydrochloric acid	makes antibodies
	destroys pathogens in the stomach
skin	makes antigens
	stops pathogens entering the body

(c) Smoking tobacco is a lifestyle factor that can cause disease.

Name **two** other lifestyle factors that can cause disease.

(2)

1 .....

2 .....

(Total for Question 1 = 7 marks)

2 Figure 2 shows a method used to extract DNA from strawberries.

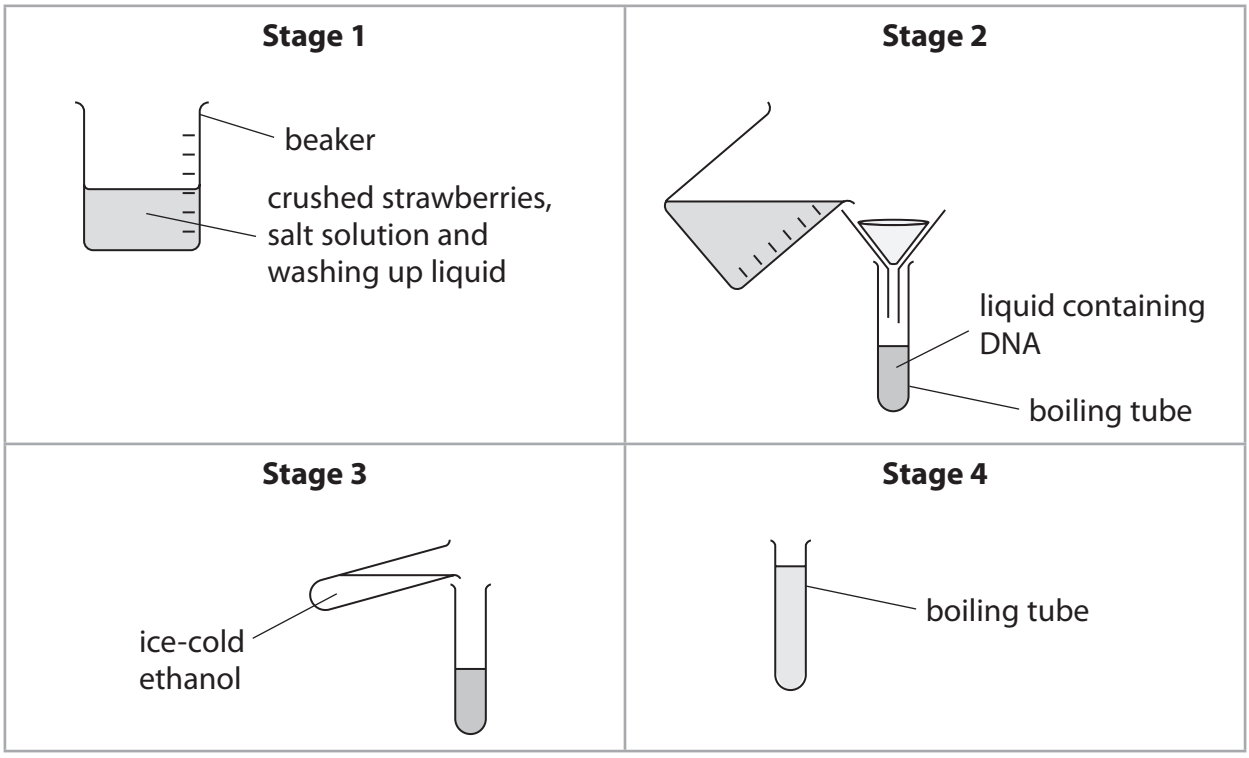

Figure 2

(a) (i) Complete the sentences using words from the box.

(2)

indicator	membranes	salt
substrates	sugar	vacuoles

Crushed strawberries are mixed with washing up liquid and

..... solution.

Washing up liquid helps to release DNA by breaking open cell

..... .

(ii) Describe the method shown in stage 2.

(2)

.....

.....

.....

.....

(iii) What is the colour of the DNA precipitate?

(1)

- ☒ **A** blue
- ☒ **B** orange
- ☒ **C** white
- ☒ **D** red

(b) A scientist used this method to find the mass of DNA in four strawberries.

Figure 3 shows the results.

strawberry	mass of DNA in ng
1	11.8
2	6.5
3	5.9
4	1.4

Figure 3

(i) The range is the difference between the largest value and smallest value in a set of numbers.

Which is the range of these results?

(1)

- ☒ **A** 13.2
- ☒ **B** 10.4
- ☒ **C** 5.9
- ☒ **D** 5.3

(ii) Calculate the mean mass of DNA.

(1)

mean mass of DNA = ... ng

(Total for Question 2 = 7 marks)

3 Figure 4 shows a cross-section of a human eye.

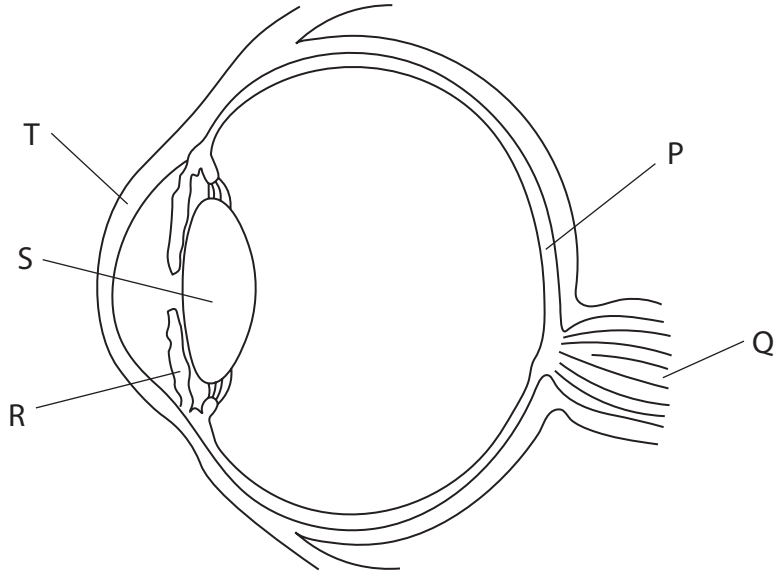

Figure 4

(a) (i) Which structure is the retina?

(1)

- ☒ **A** P
- ☒ **B** Q
- ☒ **C** R
- ☒ **D** S

(ii) Name the structure labelled T.

(1)

.....

(iii) Explain how structure R controls the amount of light entering the eye.

(2)

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.....

.....

(b) Figure 5 shows a diagram of light entering an eye.

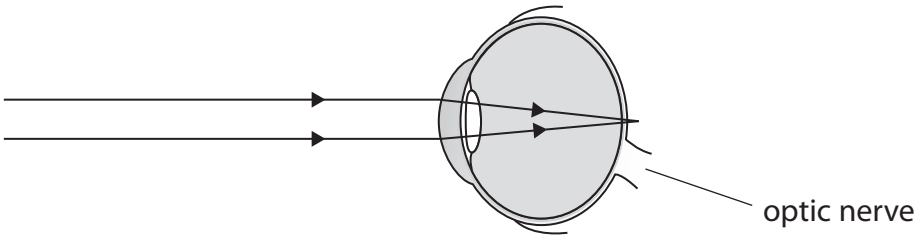

Figure 5

Explain why this person cannot see near objects clearly.

(2)

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.....

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.....

(c) Long-sightedness and short-sightedness are defects of the eye.

(i) Draw, in the box, the shape of the lens needed to correct long-sightedness.

(1)

(ii) Name **one** other defect of the eye.

(1)

.....

.....

(Total for Question 3 = 8 marks)

4 Scientists think that chickens were domesticated from red junglefowl thousands of years ago.

Figure 6 shows some information about these birds.

information	red junglefowl	domesticated chicken
photograph	 (Source: © Jamil Bin Mat Isa/ Shutterstock)	 (Source: © Tsekhmister/ Shutterstock)
mass of adult in kg	0.75 to 1.2	2.5 to 3.0
number of eggs laid per year	10 to 15	250 to 300

Figure 6

(a) Describe how selective breeding has produced chickens that lay large numbers of eggs.

(3)

(b) Chickens have 78 chromosomes in each of their body cells.

These chromosomes are in pairs.

(i) Which term describes a chicken body cell?

(1)

- ☒ **A** dominant
- ☒ **B** haploid
- ☒ **C** recessive
- ☒ **D** diploid

(ii) State the number of chromosomes found in the gametes produced by chickens.

(1)

.....

(c) Complete the table to compare the production of body cells and gametes.

One box has been completed for you.

(3)

type of cell produced	type of cell division	number of daughter cells produced
body cell	mitosis	
gamete		

(d) Some animal cells are stem cells.

Describe the function of stem cells.

(2)

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(Total for Question 4 = 10 marks)

5 The calorimeter shown in Figure 7 can be used to investigate the energy content of food.

Heat energy is released when a small sample of food is burnt, causing the water temperature to increase.

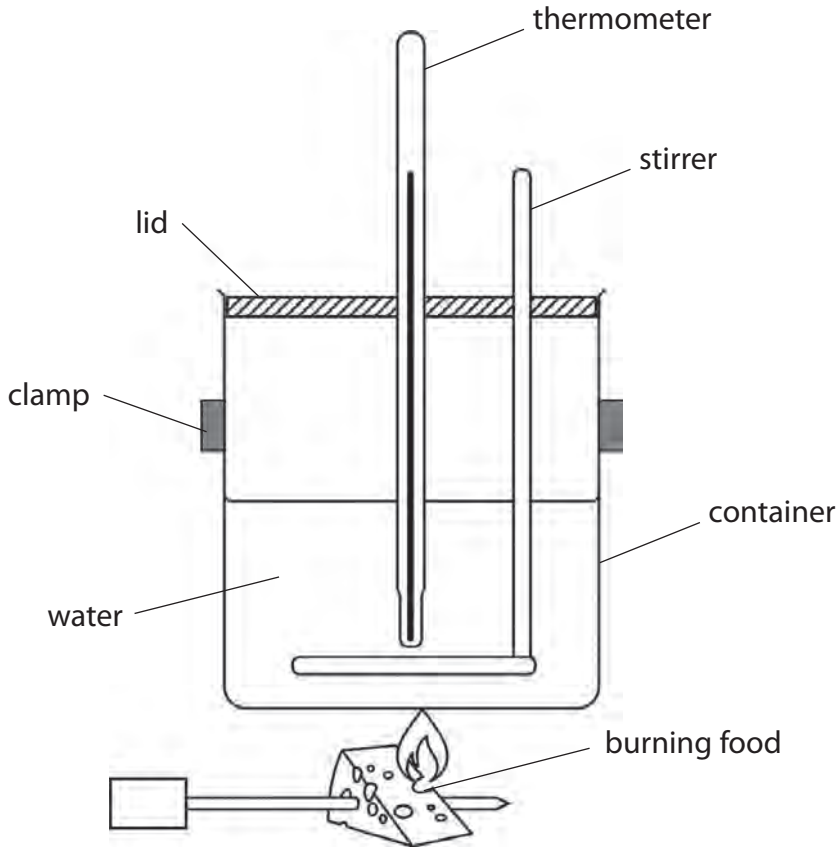

Figure 7

(a) (i) Give **one** function of the lid.

(1)

.....

.....

(ii) Describe how the increase in the temperature of the water could be measured.

(2)

.....

.....

.....

.....

.....

(b) A student used this calorimeter to investigate the energy content of a food.

The results are shown in Figure 8.

temperature change in °C	mass of water in g
30	50

Figure 8

(i) Calculate the energy content of the food.

Use the equation

energy in joules (J) = mass of water × 4.2 × temperature change

(2)

energy content = ... J

(ii) The student repeated the investigation using a different food.

The results are shown in Figure 9.

temperature change in °C	mass of water in g	energy content in J
64	25	6 720

Figure 9

State **two** ways the student could improve the investigation so that the energy content of the two different foods can be compared.

(2)

1 .....

.....

2 .....

.....

(c) Figure 10 shows some facts about two foods.

food	carbohydrate in g	fat in g	energy in kJ
100 g of apple	14.0	0.2	220
100 g of avocado	9.0	15.0	669

Figure 10

Explain the difference in the energy values of these two foods.

(2)

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(Total for Question 5 = 9 marks)

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6 (a) The common cold is caused by a virus.

(i) Give **one** reason why antibiotics are not used to treat the common cold.

(1)

.....

.....

(ii) The development of a new antibiotic has many stages.

Which is the last stage in the development of a new antibiotic?

(1)

☒ **A** preclinical testing

☒ **B** discovery

☒ **C** clinical testing

☒ **D** diagnosis

(b) Figure 11 shows the effect of adding an antibiotic to a culture of bacteria.

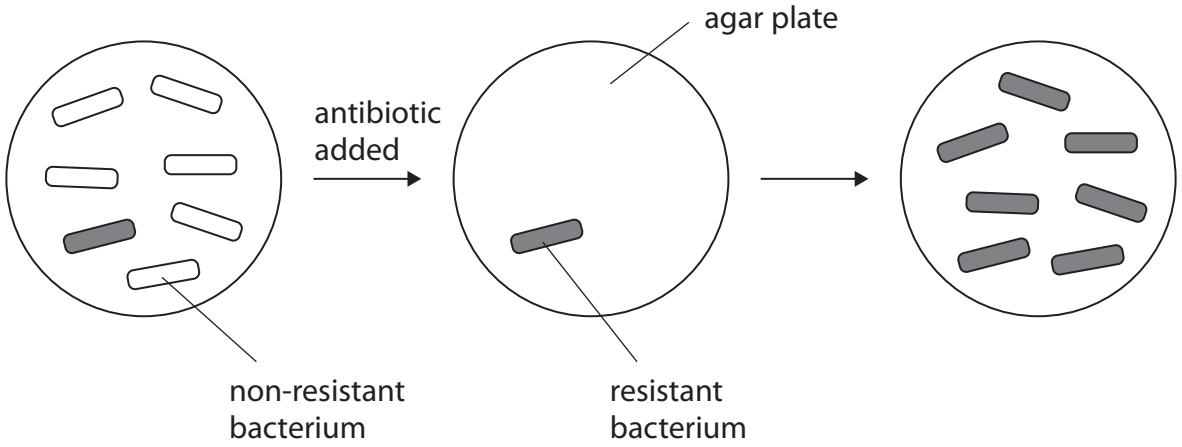

Figure 11

Explain how antibiotic-resistant bacteria have evolved.

Use information from Figure 11 in your answer.

(4)

(c) One source of evidence for human evolution is from stone tools.

Give **one** other source of evidence for human evolution.

(1)

.....

.....

(d) Figure 12 shows two stone tools.

(Source: © John Kepchar/Shutterstock)

tool A
approximately
4 000 years old

(Source: © Eduardo Estellez/ Shutterstock)

tool B
approximately
100 000 years old

Figure 12

(i) Explain how these tools provide evidence for human evolution.

(3)

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(ii) Describe **two** methods that scientists use to date stone tools.

(2)

1 .....

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2 .....

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(Total for Question 6 = 12 marks)

7 Tissue culture can be used to grow cells.

(a) (i) State **one** difference between normal body cells and cancer cells.

(1)

.....

.....

.....

(ii) Cancer cells can be grown in tissue culture.

Give **one** disadvantage of testing drugs on these cancer cells.

(1)

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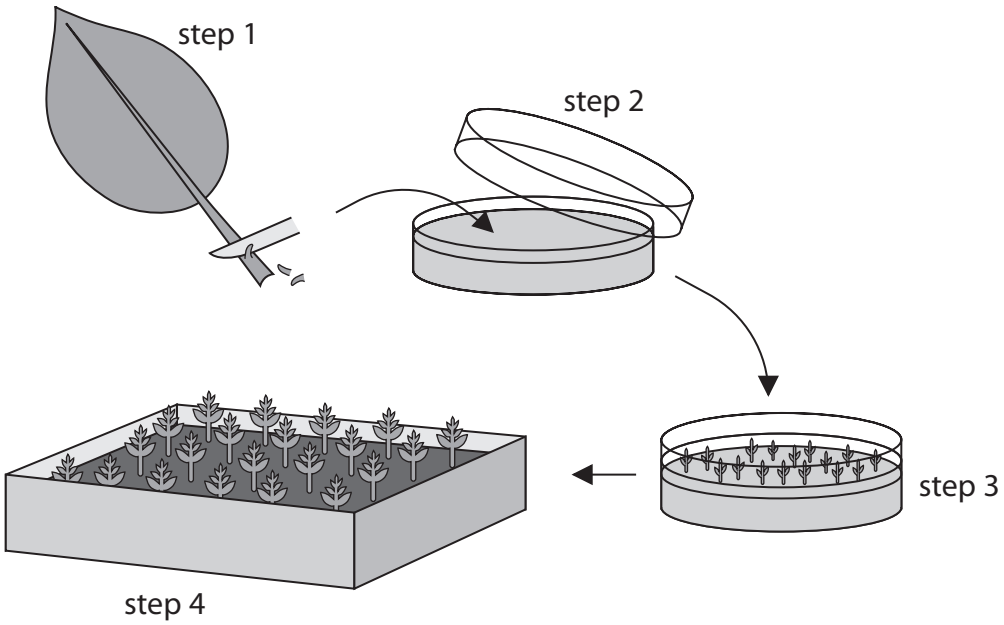
(b) Tissue culture can be used to conserve rare plants.

Figure 13 shows some of the stages involved.



Step 1: Cells are taken from a rare plant.

Step 2: The cells are placed on sterile growth medium.

Step 3: The cells develop into small plantlets with roots and stems.

Step 4: The plantlets are grown in compost.

Figure 13

(i) State **one** way the growth medium can be sterilised.

(1)

.....

.....

(ii) Explain **one** reason why the growth medium must be sterilised.

(2)

.....

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.....

(iii) Suggest **one** advantage of using tissue culture to conserve rare plants.

(1)

.....

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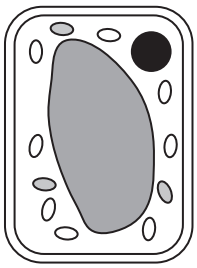
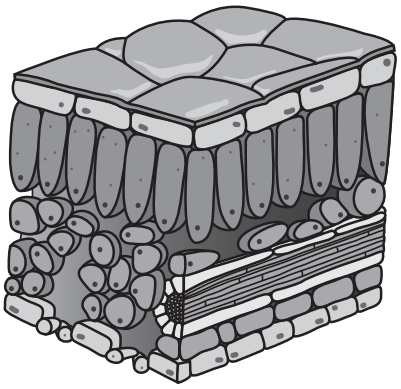
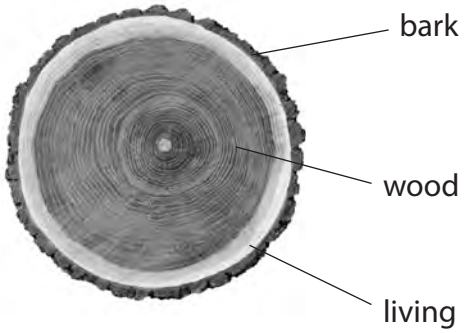
*(c) Figure 14 shows some plant structures that protect plants from attack by pests and pathogens.

<table>
<tr>
<td>plant cell
  </td>
<td>section through a plant leaf
  </td>
</tr>
<tr>
<td>plant stem
 
(Source: © Redmond135/Shutterstock)</td>
<td>section through a woody stem
 

(Source: © captureandcompose/Shutterstock)</td>
</tr>
</table>

Figure 14

Describe how physical barriers protect plants from attack by pests and pathogens.

Use information from Figure 14 in your answer.

(6)

(Total for Question 7 = 12 marks)

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8 A student investigated the effect of temperature on the rate of reaction of the enzyme pepsin.

Figure 15 shows the data collected.

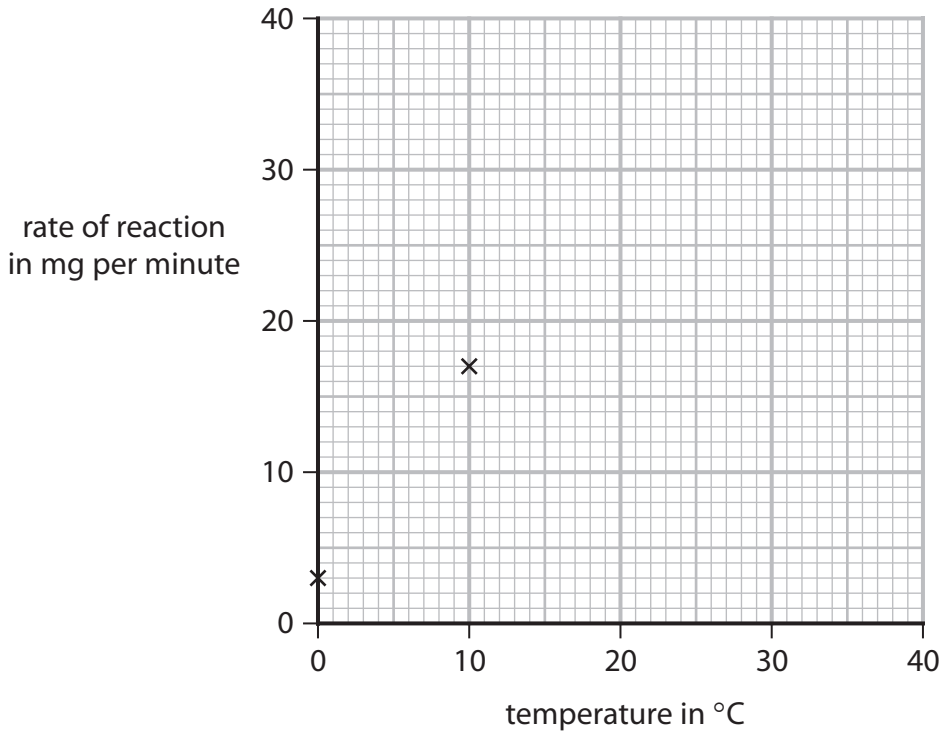
temperature in °C	rate of reaction in mg per minute
0	3.0
10	17.0
20	26.0
30	32.0
40	34.0

Figure 15

(a) Complete the graph by plotting the results shown in Figure 15 and drawing a line of best fit.

The first two points have been plotted for you.

(2)



(b) Pepsin and trypsin are enzymes that break down proteins.

Figure 16 shows the results of an investigation into the activity of pepsin and trypsin at different pH levels.

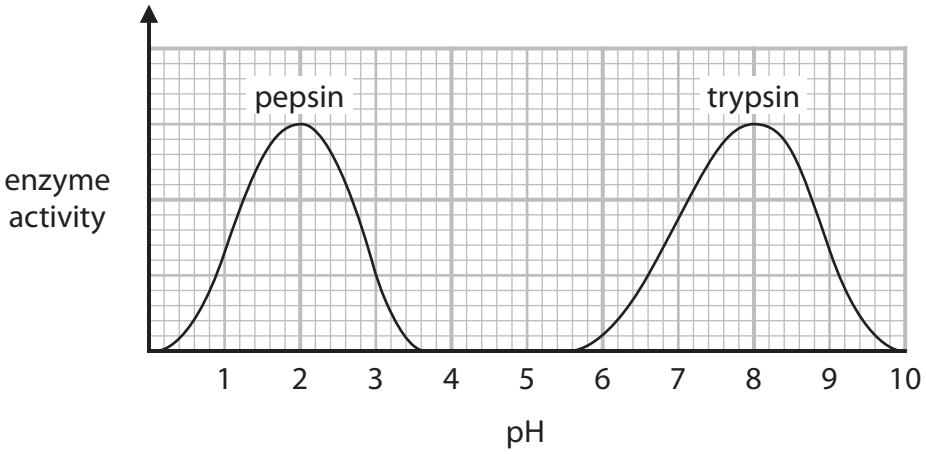


Figure 16

(i) Which molecules are produced when a protein is broken down?

(1)

- ☒ **A** sugars
- ☒ **B** amino acids
- ☒ **C** fatty acids
- ☒ **D** starches

(ii) Describe the trend in the graph for the enzyme pepsin.

Use data from the graph to support your answer.

(3)

(iii) State the optimum pH for the enzyme trypsin.

(1)

.....

(iv) Explain why there is no trypsin activity at pH 5.

(3)

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.....

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.....

(v) Temperature is a variable that should be controlled in this investigation.

Give **one** way the temperature could be controlled.

(1)

.....

.....

(Total for Question 8 = 11 marks)

9 (a) Malaria is a disease that causes damage to the blood and liver.

(i) Which type of pathogen causes malaria?

(1)

- ☒ **A** a bacterium
- ☒ **B** a fungus
- ☒ **C** a protist
- ☒ **D** a virus

(ii) State how the pathogen that causes malaria is spread.

(1)

.....

.....

(b) Measles is a disease caused by a virus.

Figure 17 shows the number of measles cases reported in England and Wales from 1985 to 2015.

year	number of measles cases reported
1985	97 408
1995	7 447
2005	2 089
2015	1 193

Figure 17

Explain **one** conclusion that can be made about the change in the number of measles cases reported from 1985 to 2015.

(2)

.....

.....

.....

.....

.....

(c) Describe **two** ways the immune system will respond to an infection by a pathogen.

(2)

1 .....

.....

2 .....

.....

(d) (i) Beriberi is a disease caused by a lack of vitamin B1 in the diet.

Give **one** reason why beriberi is classed as a non-communicable disease.

(1)

.....

.....

*(ii) Beriberi can affect reflexes.

Figure 18 shows a reflex arc.

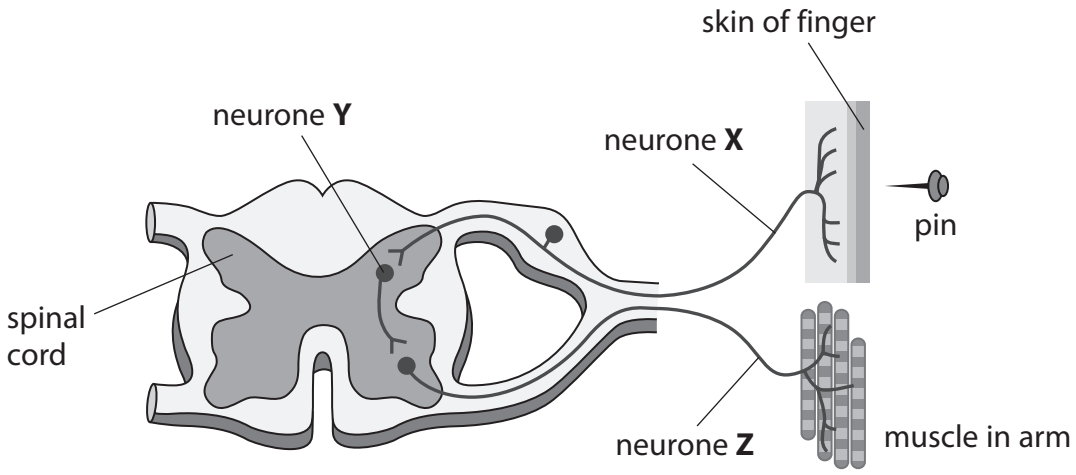

Figure 18

When the skin is pricked by a pin, electrical impulses travel through a reflex arc.

Describe the path taken by electrical impulses from the skin to the muscles in the arm.

Include the names of neurones X, Y and Z in your answer.

(6)

(Total for Question 9 = 13 marks)

10 (a) Mendel crossed pea plants that always produced purple flowers with pea plants that always produced white flowers.

The flowers of the offspring were all purple, as shown in Figure 19.

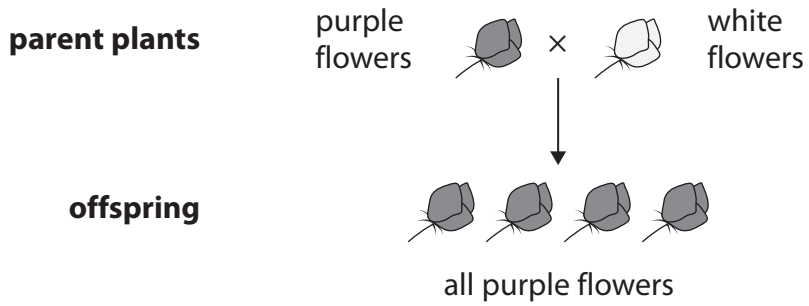

Figure 19

(i) Which conclusion can be made about the characteristic for purple flowers?

(1)

☒ **A** the characteristic is recessive

☒ **B** the characteristic is dominant

☒ **C** the characteristic is a mutation

☒ **D** the characteristic is environmental

(ii) Mendel used two of the offspring with purple flowers in another cross.

The pea plants he obtained from this cross produced purple flowers or white flowers in a ratio of 3 : 1.

Calculate the expected number of pea plants with purple flowers, in a sample of 160 pea plants.

(2)

Number of pea plants with purple flowers = ...

(iii) A pea plant producing purple flowers had the genotype Aa.

This pea plant was crossed with a pea plant producing white flowers.

Complete the Punnett square to show the possible genotypes of the offspring.

Show the percentage of pea plants that produce white flowers in your answer.

(3)

		white flowers	
purple flowers	**A**		
	a		

Percentage of pea plants that produce white flowers = ... %

(b) Asexual reproduction can be used to produce flowering plants.

Give **two** advantages of using asexual reproduction to produce flowering plants.

(2)

1 .....

.....

2 .....

.....

(c) Flower colour is controlled by genes.

(i) Which is a definition of a gene?

(1)

☒ **A** a section of a DNA molecule that codes for a protein

☒ **B** a section of a chromosome that codes for DNA

☒ **C** the entire DNA of an organism

☒ **D** a section of a chromosome that coils into a double helix

(ii) The two strands of a DNA molecule are linked by complementary bases.

Describe how the complementary bases are linked in a DNA molecule.

(2)

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.....

.....

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS