

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)

Tuesday 16 May 2023

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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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 an animal cell.

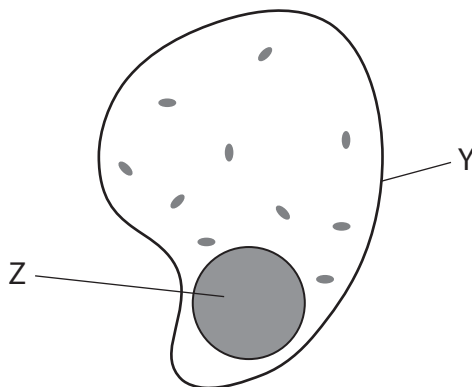


Figure 1

- (i) Which part of the cell is labelled Y?

(1)

- ☐ A cell wall
☐ B cell membrane
☐ C nucleus
☐ D cytoplasm

- (ii) Which structures are found in the part labelled Z?

(1)

- ☐ A chromosomes
☐ B mitochondria
☐ C ribosomes
☐ D vacuoles

- (iii) Name the part of an animal cell where respiration occurs.

(1)



(b) A microscope can be used to observe the structure of a cell.

Figure 2 shows a microscope.



© RouDhi/Shutterstock

Figure 2

(i) Give **one** advantage of using a microscope to look at cells.

(1)



(ii) Draw **one** straight line from each part of the microscope to its function.

(2)

part of the microscope

function

eyepiece •

stage •

• to place a slide on

• to carry the microscope

• to make the cells look brighter

• to look through to see the cells

• to reflect light onto the cells

(c) Figure 3 shows some of the units used when cells and organelles are measured.

micrometre = 10^{-6} m	picometre = 10^{-12} m
nanometre = 10^{-9} m	millimetre = 10^{-3} m

Figure 3

Give the name of the smallest unit shown in Figure 3.

(1)

(Total for Question 1 = 7 marks)

2 (a) Figure 4 shows fossils in different layers of rock.

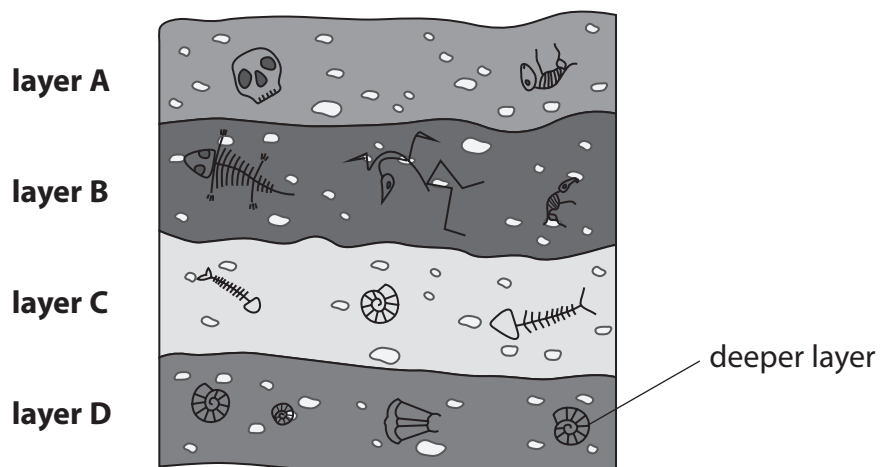


Figure 4

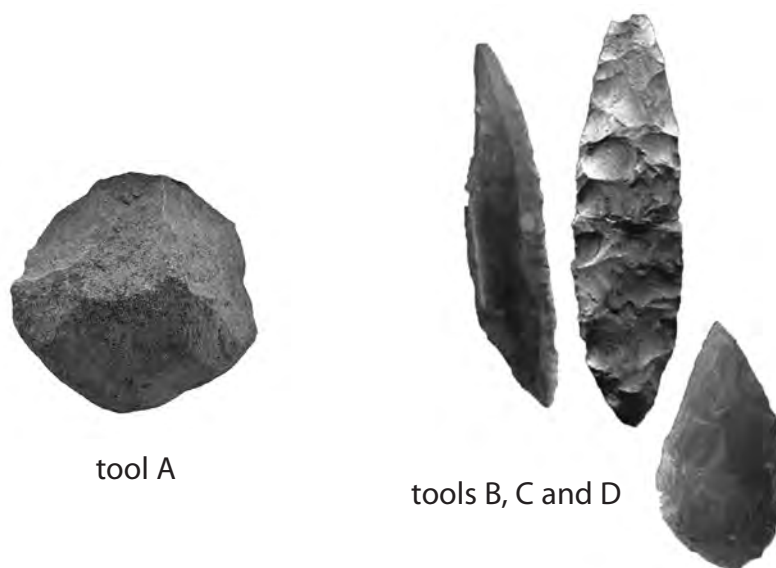
(i) Which layer of rock is likely to contain the most recent fossils?

(1)

- ☐ **A** layer A
- ☐ **B** layer B
- ☐ **C** layer C
- ☐ **D** layer D



Figure 5 shows some stone tools from two different periods of time.



© Yes058 Montree Nanta/Shutterstock

Figure 5

(ii) Explain **one** difference between tool A and tools B, C and D.

(2)

(b) Our human ancestors domesticated animals.

Animals were domesticated to use as working animals and to keep as pets.

(i) Use words from the box to complete the sentences.

(2)

asexual

characteristics

evidence

ideas

inherited

selective

Animals with the most desirable were bred together.

This is called breeding.

(ii) Scientists have analysed the genomes of domestic animals.

Which is the definition of a genome?

(1)

- ☐ **A** all the cells of an organism
- ☐ **B** all the enzymes of an organism
- ☐ **C** all the DNA of an organism
- ☐ **D** all the structures of an organism

(iii) Give **one** advantage of domesticating animals.

(1)

.....

.....

.....

(Total for Question 2 = 7 marks)



- 3 (a) Figure 6 shows the bones in the limbs of a bird and a whale.

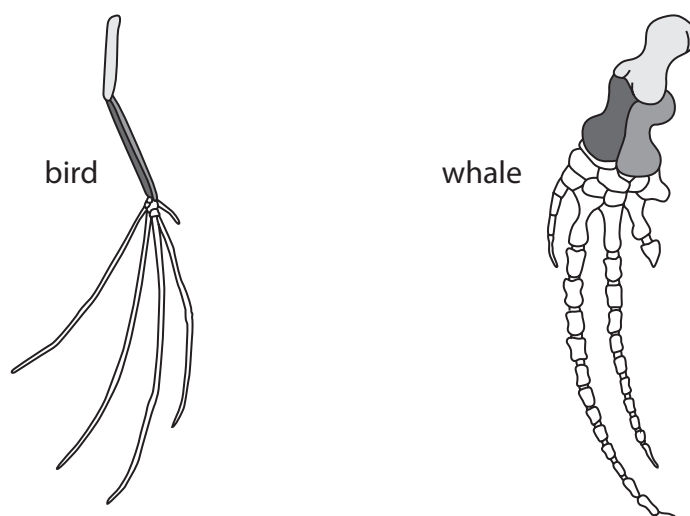


Figure 6

- (i) The bird and the whale have evolved from a common ancestor.

Give **one** way the structure of these limbs provides evidence for this evolution.

(1)

- (ii) Charles Darwin developed the theory of evolution by natural selection.

Which scientist worked with Darwin on the theory of evolution by natural selection?

(1)

- ☐ **A** Alexander Fleming
- ☐ **B** Gregor Mendel
- ☐ **C** Richard Leakey
- ☐ **D** Alfred Russel Wallace



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(b) DNA is found in bones and stem cells.

(i) Suggest **one** reason why DNA is found in bones.

(1)

(ii) Describe how stem cells help animals to grow.

(2)

(iii) Scientists have transplanted stem cells into the retina of the eye.

Name **one** type of light sensitive cell found in the retina.

(1)

(iv) Explain **one** reason for transplanting stem cells into the retina.

(2)

(Total for Question 3 = 8 marks)



4 (a) Which is the reason why obesity is a non-communicable disease?

(1)

- ☐ **A** it is spread from person to person
- ☐ **B** it is caused by a virus
- ☐ **C** it is not spread from person to person
- ☐ **D** it lasts for a short time

(b) Several factors affect the risk of developing cardiovascular disease.

Figure 7 shows different BMI ranges and their weight descriptions.

BMI range	weight description
18.5 to 24.9	healthy weight
25.0 to 29.9	overweight
30.0 to 39.9	obese
40 or more	severely obese

Figure 7

(i) A person has a BMI of 39.0

Explain the risk of this person developing cardiovascular disease.

(2)

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.....

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(ii) Changes in lifestyle can reduce the risk of cardiovascular disease.

State **two** other treatments for cardiovascular disease.

(2)

1

.....

2

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- (c) Figure 8 shows the percentage of people who smoked cigarettes in England from 2011 to 2019.

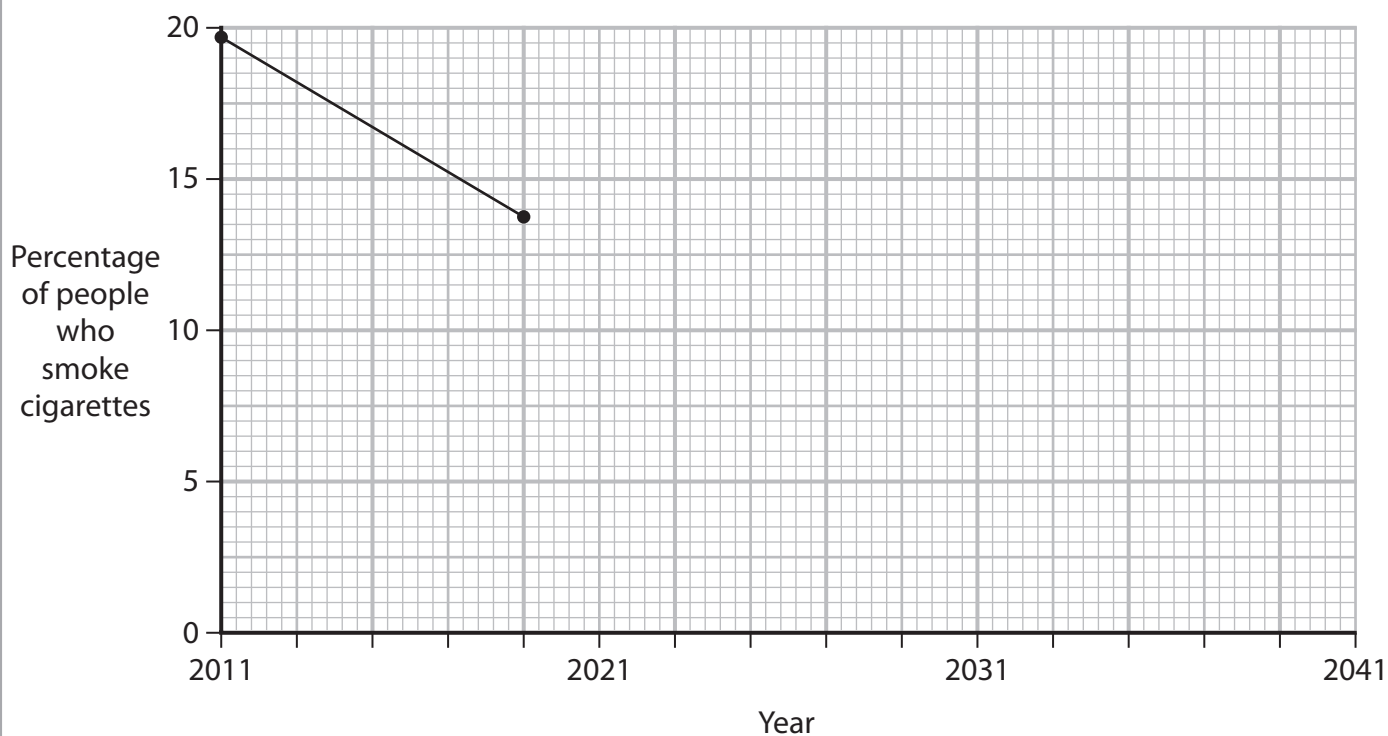


Figure 8

- (i) State the trend shown in the graph from 2011 to 2019.

(1)

- (ii) Give **two** reasons for this change in the number of people smoking cigarettes.

(2)

1

2

- (iii) Draw a line on Figure 8 to show the likely trend in the percentage of people smoking cigarettes from 2019 to 2041.

(1)

(iv) Smoking cigarettes can increase the risk of people developing cancer.

Which is the description of cancer?

(1)

- ☐ **A** uncontrolled organ division
- ☐ **B** uncontrolled cell division
- ☐ **C** controlled cell division
- ☐ **D** controlled organ division

(Total for Question 4 = 10 marks)

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5 A student investigated the antibiotic properties of garlic.

Bacteria were spread on an agar plate.

A paper disc soaked in garlic extract and placed on this agar plate.

Figure 9 shows the agar plate after 24 hours.

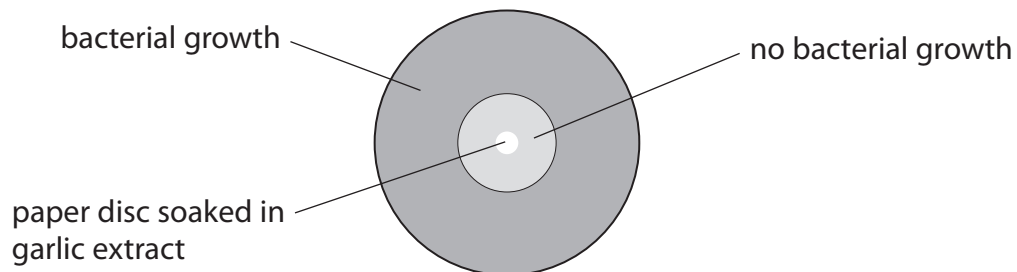


Figure 9

(a) (i) Suggest why there is an area with no bacterial growth.

(1)

- (ii) The student repeated the investigation using three separate agar plates with different concentrations of garlic extract.

Figure 10 shows the results.

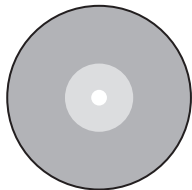
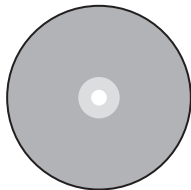
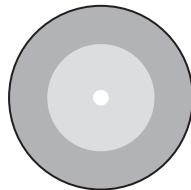
appearance of the agar plates after 24 hours		
A	B	C
		

Figure 10

The concentrations of garlic extract used were 10 mg/cm^3 , 40 mg/cm^3 and 100 mg/cm^3 .

Explain which agar plate, shown in Figure 10, has the paper disc containing the 100 mg/cm^3 garlic extract.

(2)

- (iii) Give **one** way the student could improve their results.

(1)



- (iv) The area with no bacterial growth for agar plate B has a radius of 5 mm.

Calculate the area with no bacterial growth for agar plate B.

The area of a circle is πr^2 .

Use $\pi = 3.14$

(2)

area = mm²

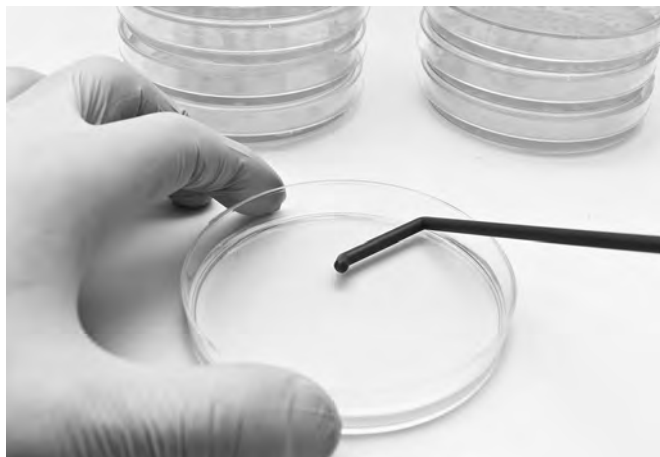
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(b) Figure 11 shows bacteria being spread on an agar plate.



(Source: © Chatchouliya/Shutterstock)

Figure 11

- (i) State the reason for heating the spreader in the flame of a Bunsen burner before use.

(1)

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.....

- (ii) Give **two** other ways of working safely with microorganisms.

(2)

1

.....

2

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(Total for Question 5 = 9 marks)

6 Figure 12 shows some characteristics of pea plants.

flower colour	seed shape
purple	round
white	wrinkled

Figure 12

The allele for purple flowers is dominant to the allele for white flowers.

(a) Which term describes the allele for white flowers?

(1)

- ☐ **A** heterozygous
- ☐ **B** homozygous
- ☐ **C** gamete
- ☐ **D** recessive

(b) A scientist crossed a pea plant that produced round seeds (Rr) with a pea plant that produced wrinkled seeds (rr).

(i) Complete the Punnett square.

(2)

		wrinkled seeds	
round seeds	R		
	r		

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

(1)

percentage =%

(c) The scientist crossed **two** purple flowering pea plants.

The offspring were:

- 133 plants with purple flowers
 - 46 plants with white flowers
- (i) Calculate the ratio of offspring with purple flowers to offspring with white flowers.

Give your answer to the nearest whole number.

(2)

ratio : 1

- (ii) Explain why it was possible for this cross to produce some offspring with white flowers.

(2)

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(d) The cells in pea plants are diploid.

These cells have 14 chromosomes.

- (i) Explain why pea plant gametes have only seven chromosomes.

(2)

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(ii) Describe what happens at fertilisation.

(2)

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(Total for Question 6 = 12 marks)

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- 7 The growth of crop plants, such as wheat, can be improved by the use of fertilisers and the control of pests.

Figure 13 shows the mass of grains produced by wheat plants grown in soil without fertiliser and in soil with fertiliser.

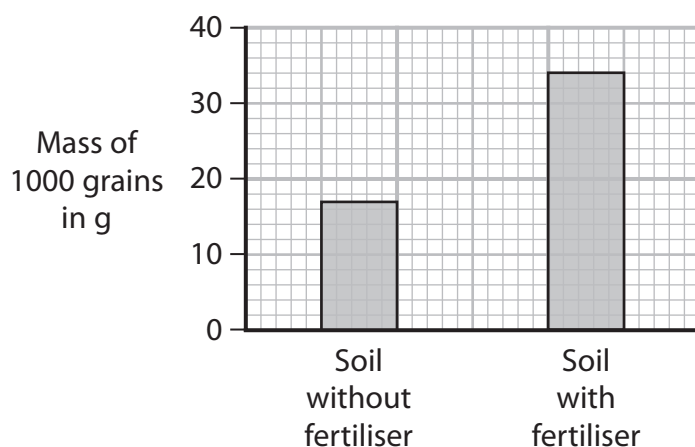


Figure 13

- (a) Give **one** effect on the grains produced, when wheat plants are grown in soil with fertiliser.

(1)

- (b) Explain why farmers measure the mass of 1000 grains rather than the mass of one wheat grain.

(2)

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(c) Biological control can be used to reduce pest damage on crops.

(i) Which is the definition of biological control?

(1)

- ☐ A using antiseptics to control pests
- ☐ B using fertilisers to control pests
- ☐ C using predators to control pests
- ☐ D using pesticides to control pests

(ii) Figure 14 shows a crop being grown under a clear plastic cover and a crop being grown in a garden.

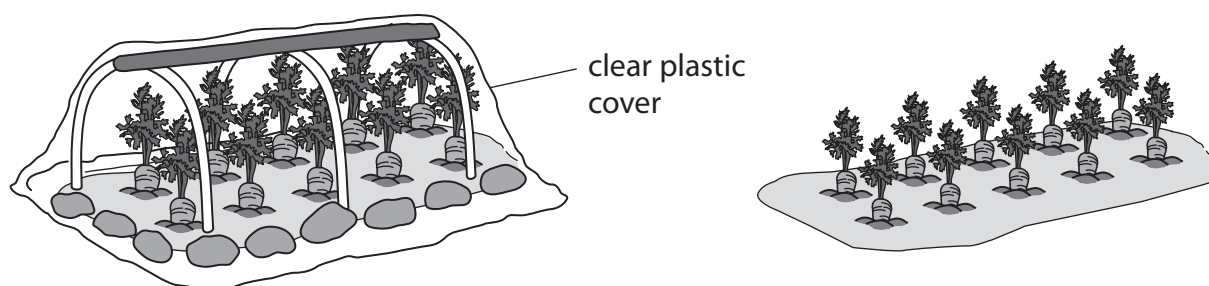


Figure 14

Explain why biological control would be more successful when a crop is grown under a clear plastic cover.

(2)

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.....

8 (a) Apple trees show genetic variation.

(i) State **one** possible cause of genetic variation in apple trees.

(1)

(ii) The colour of an apple is an observable characteristic.

Which is the term for an observable characteristic?

(1)

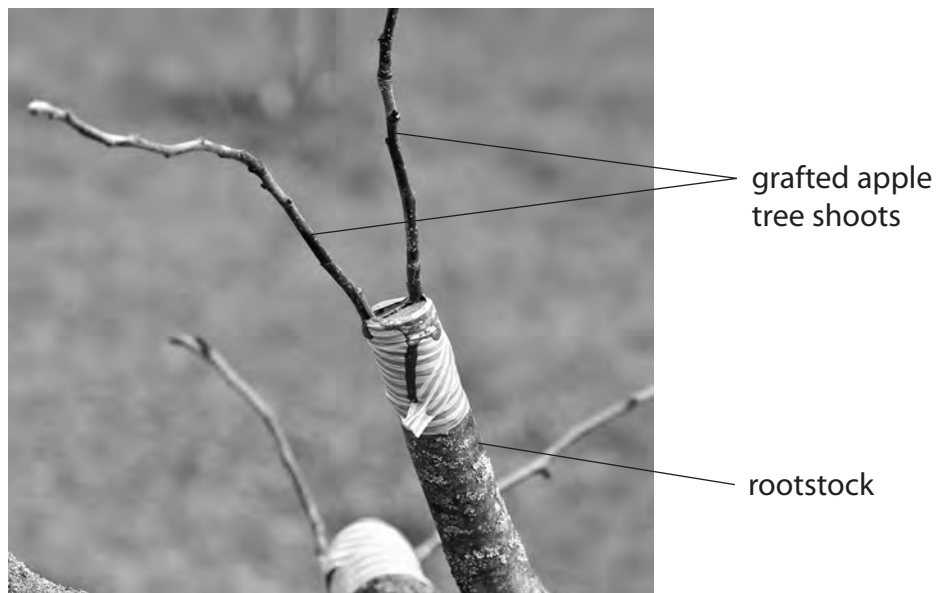
- ☐ A gene
- ☐ B genotype
- ☐ C heterozygous
- ☐ D phenotype

(b) Name the type of reproduction that produces genetically identical organisms.

(1)

(c) Grafting is a technique used to grow some varieties of apple tree.

Figure 16 shows apple tree shoots grafted on to a rootstock.



(Source: © ATTILA Barsan/Shutterstock)

Figure 16

Grafting can be used to produce apple trees that are genetically identical.

Give **one** advantage and **one** disadvantage of growing genetically identical apple trees.

(2)

advantage

disadvantage

(d) As apples ripen, enzymes convert starch into sugars.

Devise a method to find the optimum pH of an enzyme that breaks down starch.

You may use standard laboratory equipment and the solutions listed in the box.

starch solution	enzyme solution	iodine solution
a range of pH solutions		

(4)

(e) The optimum pH of an enzyme is pH 6.

Explain why this enzyme would not work at pH 10.

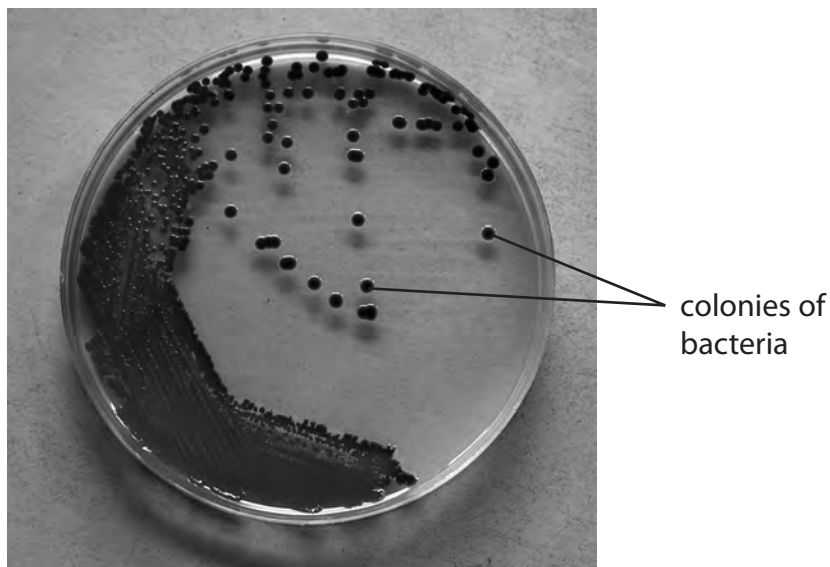
(2)

(Total for Question 8 = 11 marks)



P 7 2 6 2 6 A 0 2 5 3 2

- 9 Figure 17 shows colonies of bacteria growing on an agar plate.



(Source: © Chatchouliya/Shutterstock)

Figure 17

Each colony starts as one bacterium.

Every time bacteria reproduce, the number of bacteria in each colony doubles.

- (a) Calculate the number of bacteria in a colony after five hours, if each bacterium reproduces every 30 minutes.

(2)

..... bacteria

- (b) Some bacteria are pathogens.

- (i) State the meaning of the term pathogen.

(1)

.....

.....



(ii) Explain why antibiotics can be used to treat bacterial infections.

(2)

(iii) A rod-shaped bacterium is 0.005 mm long.

A student draws the rod-shaped bacterium.

The bacterium in the drawing is 80 mm long.

Calculate the magnification of this drawing.

(2)

magnification =

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A diagram of a cell, possibly a bacterium or a simple eukaryote. It features a long, thin, curved flagellum extending from the left side of the cell body. The cell body is oval-shaped and contains a large, irregularly shaped nucleus with a dense, tangled internal structure. Several small, dark dots are scattered throughout the cytoplasm, representing organelles or ribosomes.

A diagram of a cell containing a large central vacuole (light blue) and a prominent, dark blue nucleus. The cell is bounded by a purple line representing the cell membrane.

(6)

(Total for Question 9 = 13 marks)

10 Figure 19 shows a chart used by opticians to test a person's vision.

The person's vision is judged by the lowest row of letters they can read.

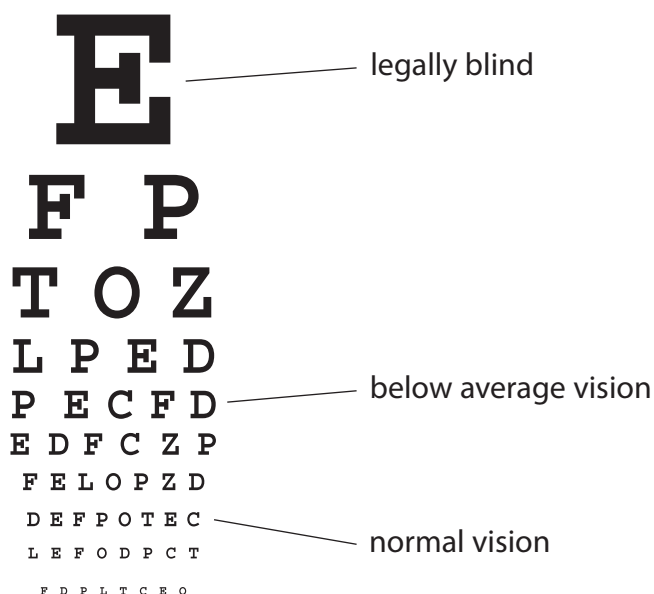


Figure 19

(a) (i) An optician tested the eyesight of 240 people.

35% of these people could read the normal vision row without wearing glasses.

The rest of the people need glasses to correct their vision.

Calculate the number of people who need glasses to correct their vision.

(3)

..... people

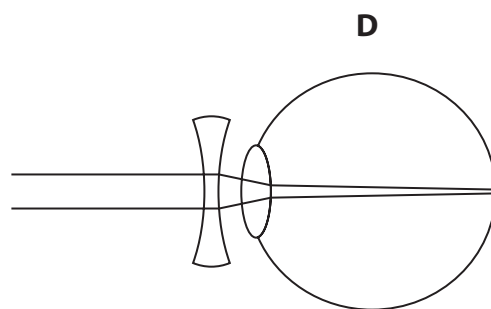
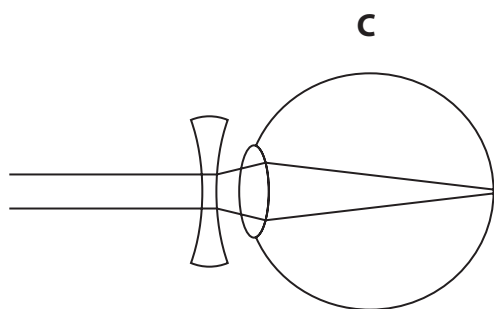
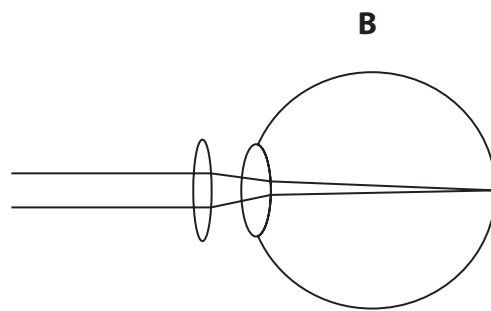
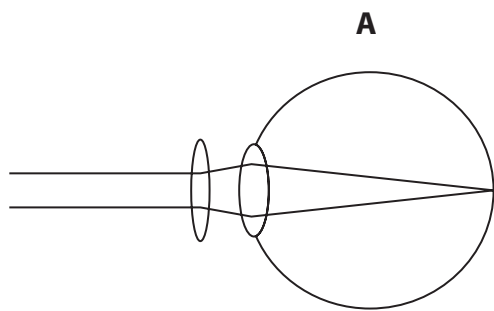
(ii) An optician can use the chart to diagnose short-sightedness.

Give **one** reason why people are short-sighted.

(1)

(iii) Which diagram shows how short-sightedness can be corrected?

(1)



- ☐ **A**
- ☐ **B**
- ☐ **C**
- ☐ **D**

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- (b) Cataracts can affect a person's vision.

Figure 20 shows what a person with normal vision and a person with cataracts can see for the top letter on the optician's chart.



person with normal vision



person with cataracts

Figure 20

- (i) Describe why a person with cataracts would see the image shown in Figure 20.

(2)

- (ii) State the treatment for cataracts.

(1)

(c) Figure 21 shows the structure of the brain.

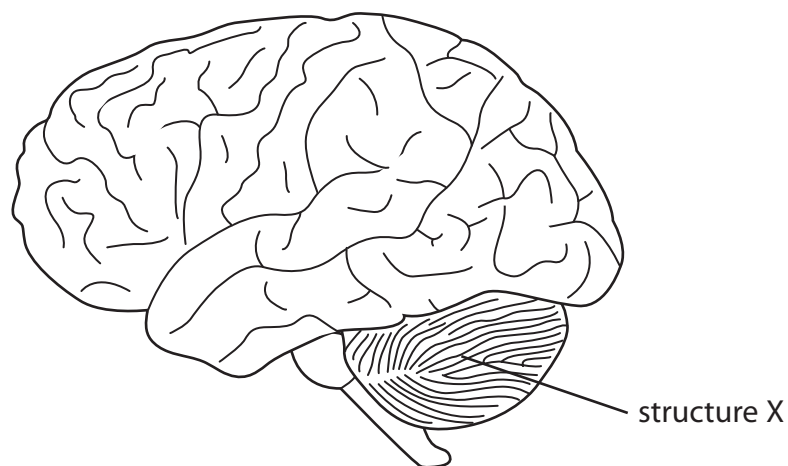


Figure 21

(i) Which region of the brain is labelled structure X?

(1)

- ☐ **A** cerebellum
- ☐ **B** cerebral hemisphere
- ☐ **C** medulla oblongata
- ☐ **D** spinal cord

(ii) When a person reacts to a stimulus, messages from the brain are sent to their muscles.

Describe how messages are sent from the brain to muscles.

(2)

.....

.....

.....

.....

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

