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 10 minutes)

Paper reference **1SC0/1BF**

Combined Science
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 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

- 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 ▶

P72554A

N:1/1/

P 7 2 5 5 4 A 0 1 2 0

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 an animal cell.

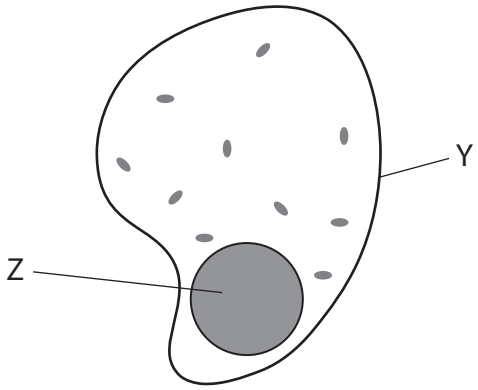

Figure 1

(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	to carry the microscope
stage	to make the cells look brighter
	to look through to see the cells
	to place a slide on
	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)

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

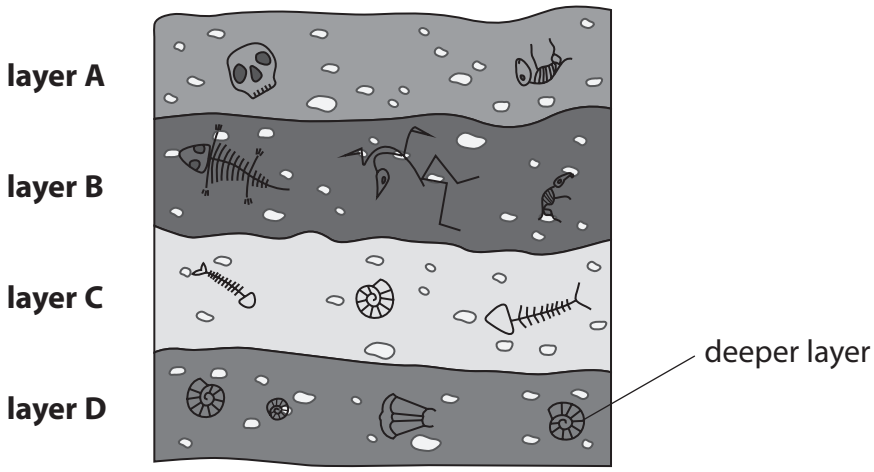


Figure 4

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

(1)

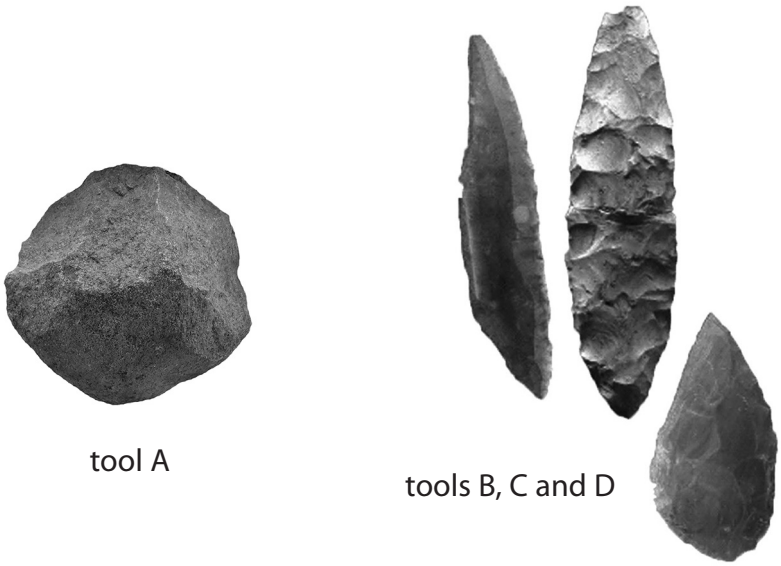
☒ **A** layer A

☒ **B** layer B

☒ **C** layer C

☒ **D** layer D

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



tool A

tools B, C and D

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)

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3 (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 6 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 6

(i) A person has a BMI of 39.0

Explain the risk of this person developing cardiovascular disease.

(2)

.....

.....

.....

.....

.....

(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 7 shows the percentage of people who smoked cigarettes in England from 2011 to 2019.

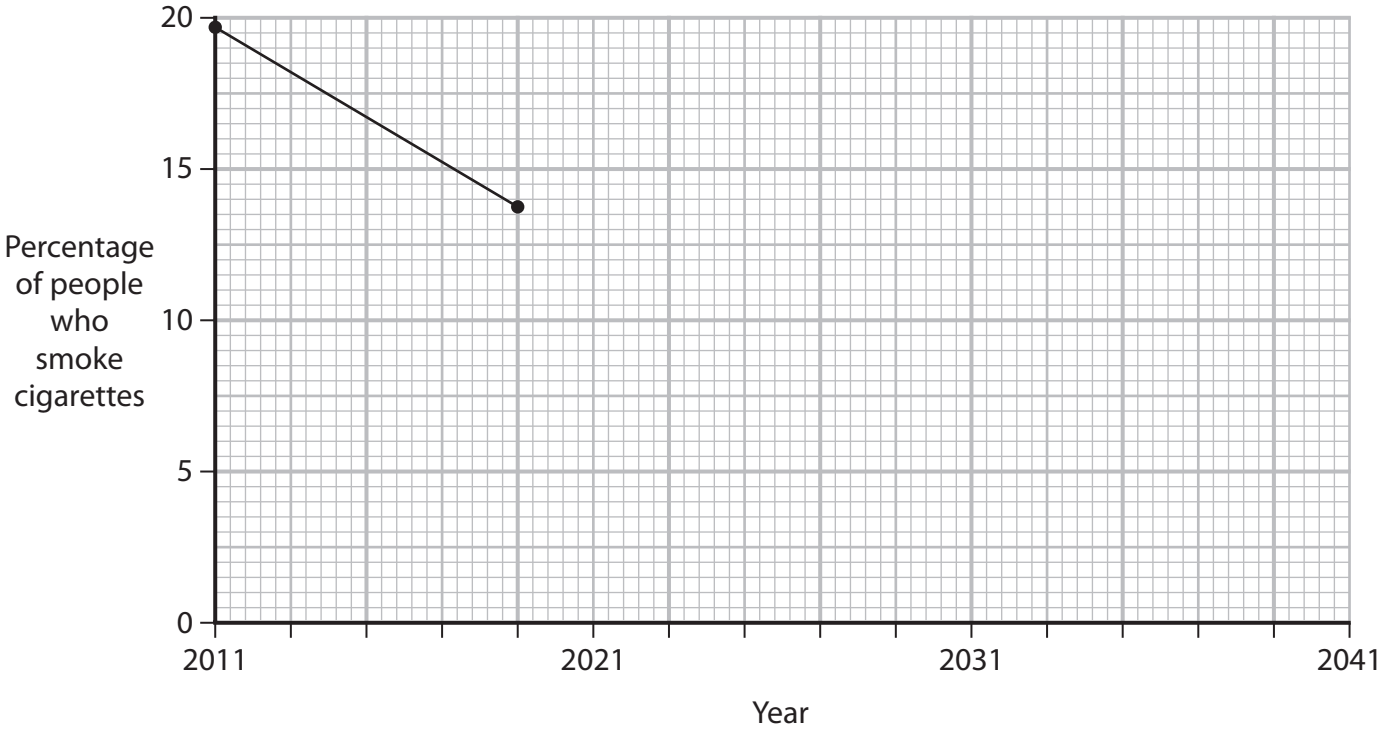

Figure 7

(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 7 to show the likely trend in the percentage of people smoking cigarettes from 2019 to 2041.

(1)

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(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 3 = 10 marks)

4 Figure 8 shows some characteristics of pea plants.

flower colour	seed shape
purple	round
white	wrinkled

Figure 8

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)

.....

.....

.....

.....

(d) The cells in pea plants are diploid.

These cells have 14 chromosomes.

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

(2)

.....

.....

.....

.....

.....

(ii) Describe what happens at fertilisation.

(2)

.....

.....

.....

.....

(Total for Question 4 = 12 marks)

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5 (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

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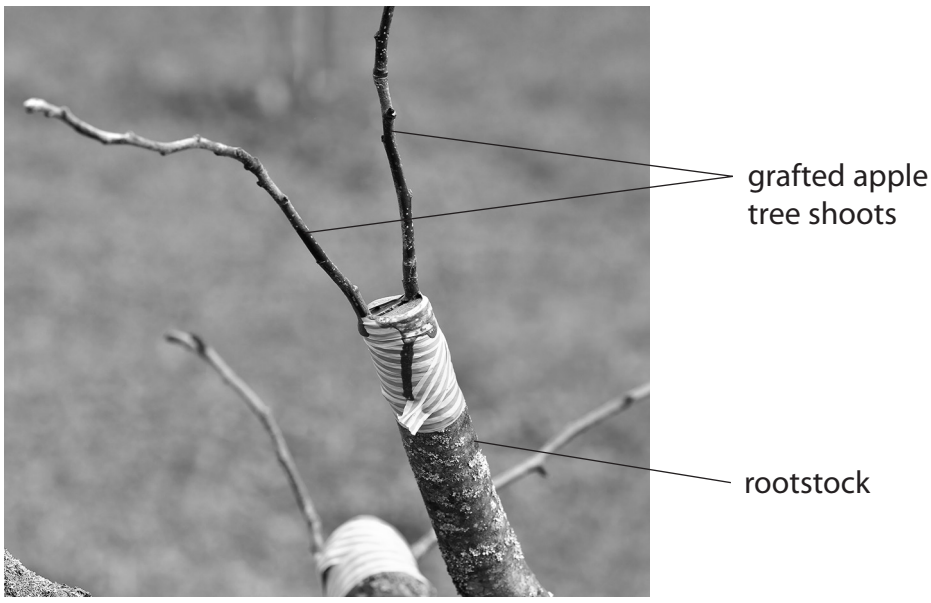
(b) Name the type of reproduction that produces genetically identical organisms.

(1)

.....

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

Figure 9 shows apple tree shoots grafted on to a rootstock.



(Source: © ATTILA Barsan/Shutterstock)

Figure 9

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)

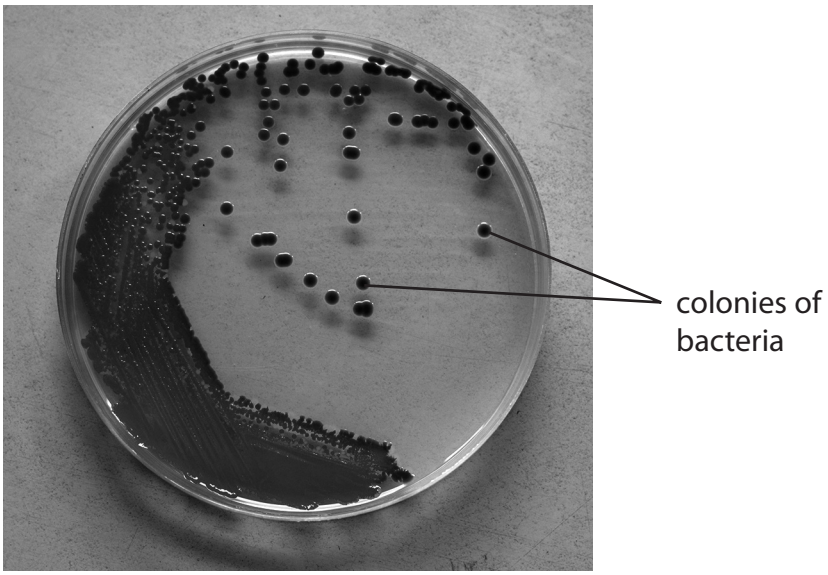
(e) The optimum pH of an enzyme is pH 6.

Explain why this enzyme would not work at pH 10.

(2)

(Total for Question 5 = 11 marks)

6 Figure 10 shows colonies of bacteria growing on an agar plate.



(Source: © Chatchouliya/Shutterstock)

Figure 10

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.

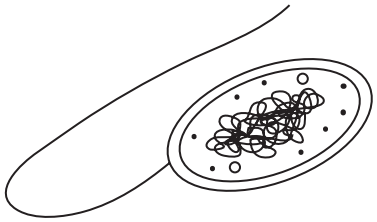
The bacterium in the drawing is 80 mm long.

Calculate the magnification of this drawing.

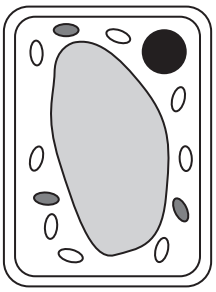
(2)

magnification = ...

*(c) Figure 11 shows a bacterial cell and a plant cell.



bacterial cell



plant cell

Figure 11

Describe the similarities and differences of a bacterial cell and a plant cell.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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Pearson Edexcel

Mark Scheme (Results)

Summer 2023

Pearson Edexcel GCSE
In Combined Science Biology
(1SCO) Paper 1BF

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Summer 2023
Publications Code 1BI0_1BF_2306_MS

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.
Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.
When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

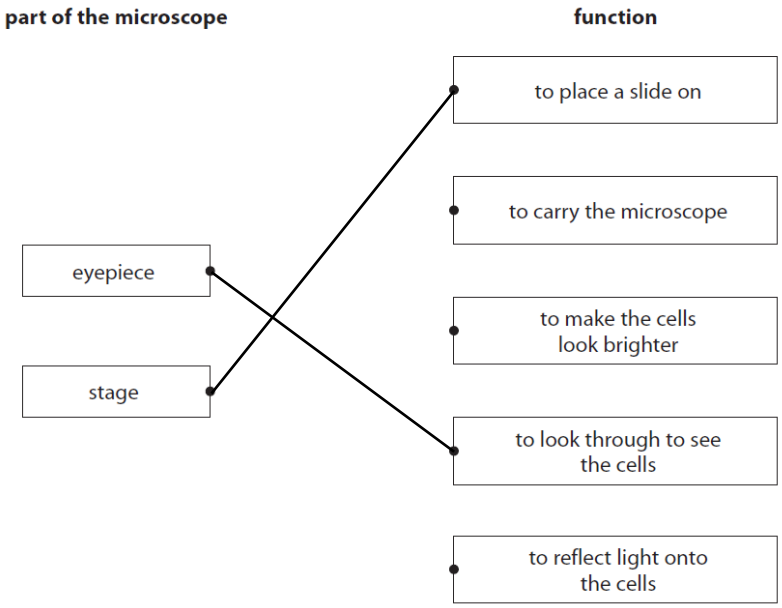
Assessment Objective		**Command Word**	
Strand	**Element**	**Describe**	**Explain**
AO1		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

Question number	Answer	Mark
1(a)(i)	B cell membrane **The only correct answer is B** *A is not correct because Y is not the cell wall* *C is not correct because Y is not the nucleus* *D is not correct because Y is not the cytoplasm*	**(1)** **AO1 1**

Question number	Answer	Mark
1(a)(ii)	A chromosomes **The only correct answer is A** *B is not correct because mitochondria are not found in Z* *C is not correct because ribosomes are not found in Z* *D is not correct because vacuoles are not found in Z*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(a)(iii)	mitochondria	accept cytoplasm	**(1)** **AO1 1**

Question number	Answer	Mark
1(b)(i)	cells appear {larger / magnified} / can be seen in more detail /organelles can be seen	(1) AO1 2

Question Number	Answer	Mark
1(b)(ii)	 do not award mark if more than one line drawn from eyepiece box do not award mark if more than one line drawn from stage box	(2) AO1 2

Question number	Answer	Additional guidance	Mark
1(c)	picometre		**(1)** **AO1 1**

(Total for question 1 = 7 marks)

Question number	Answer	Mark
2(a)(i)	A layer A **The only correct answer is A** *B is not correct because layer B will not contain the most recent fossils* *C is not correct because layer C will not contain the most recent fossils* *D is not correct because layer D will not contain the most recent fossils*	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
2(a)(ii)	An explanation including • tool A is less refined (than B, C and D) (1) • (because) tool A was worked less (1) • (because) it is older / made by earlier humans / less evolved humans (1)	accept reverse arguments	**(2)** **AO3 1ab**

Question number	Answer	Additional guidance	Mark
2(b)(i)	characteristics (1) selective (1)	answers must be in the correct order	**(2)** **AO1 1**

Question Number	Answer	Mark
2(b)(ii)	C all the DNA of an organism **The only correct answer is C** *A is not correct because the genome is not all the cells of an organism* *B is not correct because the genome is not all the enzymes of an organism* *D is not correct because the genome is not all the structures of an organism*	**(1)** **AO1 1**

Question number	Answer	Mark
2(b)(iii)	food security / animals are less dangerous / make jobs easier / companionship / give humans protection	**(1)** **AO1 1**

(Total for question 2 = 7 marks)

Question Number	Answer	Mark
3(a)	C it is not spread from person to person **The only correct answer is C** ***A*** *is not correct because obesity is not spread from person to person* ***B*** *is not correct because obesity is not caused by a virus* ***D*** *is not correct because obesity does not last for a short time*	**(1)** **AO1 1**

Question Number	Answer	Mark
3(b)(i)	An explanation linking • the risk is high (1) • because the person is obese (1)	**(2)** **AO3 1ab**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	Any two from: • medication (1) • heart transplant (1) • stents (1) • bypass surgery (1)	accept named medicines	**(2)** **AO1 1**

Question Number	Answer	Mark
3(c)(i)	(the percentage of people who smoked cigarettes from 2011 to 2019) has decreased	**(1)** **AO3 2a**

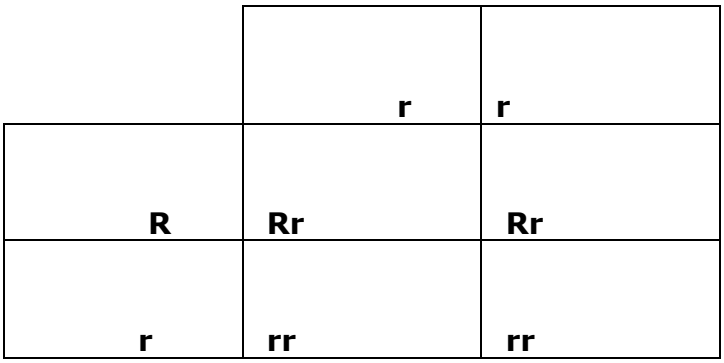
Question Number	Answer	Mark
3(c)(ii)	Two from • more smokers die than non-smokers (and fewer people taking up smoking) (1) • people are more aware of the dangers of smoking / have followed health advice (1) • (there are) alternatives to smoking cigarettes / {nicotine gum / nicotine patches / vapes} available (1) • smoking cigarettes is expensive / unaffordable (1)	**(2)** **AO3 2a**

Question Number	Answer	Mark
3(c)(iii)	a line showing a continued downward trend to 2041	**(1)** **AO3 2a**

Question Number	Answer	Mark
3(c)(iv)	B uncontrolled cell division **The only correct answer is B** ***A*** *is not correct because cancer is not uncontrolled organ division* ***C*** *is not correct because cancer is not controlled cell division* ***D*** *is not correct because cancer is not controlled organ division*	**(1)** **AO1 1**

(Total for question 3 = 10 marks)

Question Number	Answer	Mark
4(a)	D recessive **The only correct answer is D** ***A*** *is not correct because the term that describes the allele for white flowers is not heterozygous* ***B*** *is not correct because the term that describes the allele for white flowers is not homozygous* ***C*** *is not correct because the term that describes the allele for white flowers is not gamete*	**(1)** **AO1 1**

Question Number	**Answer**	**Mark**
4(b)(i)	 • gametes (r r) (1) • genotypes of offspring (1)	**(2)** **AO2 2ab**

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	50 (%)	ecf from Punnett square	**(1)** **AO3 2a**

Question Number	Answer	Additional guidance	Mark
4(c)(i)	(133 ÷ 46) = 2.89 / 2.9 (1) Rounded to the whole number 3 (:1)	award full marks for correct answer without working	**(2)** **AO3 2a**

Question Number	Answer	Mark
4(c)(ii)	An explanation linking • both parents are heterozygous / Pp / each parent has an allele for white flowers (1) • (so) some offspring have {two recessive alleles / pp} / are homozygous recessive (1)	**(2)** **AO2 2**

Question Number	Answer	Additional guidance	Mark
4(d)(i)	An answer including two from • gametes are produced by meiosis (1) • (meiosis) {halves the number of chromosomes / produces haploid gametes} / gametes have one of each pair of chromosomes (1)	accept when gametes fuse diploid cells / cells with 14 chromosomes are produced (1)	**(2)** **AO1 1**

Question Number	Answer	Mark
4(d)(ii)	Any two from: • (male and female) gametes fuse (1) • (forming a) zygote (1) • (forming a) diploid cell (1)	**(2)** **AO1 1**

(Total for question 4 = 12 marks

Question number	Answer	Additional guidance	Mark
5(a)(i)	mutation / sexual reproduction / different combinations of alleles can occur	accept genetic modification	**(1)** **AO2 1**

Question number	Answer	Mark
5(a)(ii)	D phenotype **The only correct answer is D** ***A*** *is not correct because gene is not the correct term for an observable characteristic* ***B*** *is not correct because genotype is not the correct term for an observable characteristic* ***C*** *is not correct because heterozygous is not the correct term for an observable characteristic*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
5(b)	asexual (reproduction)	ignore mitosis reject meiosis accept cloning / binary fission	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
5(c)	One from advantages: • (fruit) will have desired qualities (1) • can be produced faster (1) **AND** One from disadvantages: • susceptible to a disease (1) • can't survive an environmental change (1) • reduced gene pool (1)	ignore genetically identical / no variation for advantages and disadvantages accept examples of characteristics e.g. all tasty / same taste ignore higher yield accept inherited/genetic diseases accept can't survive a selection pressure	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
5(d)	A method including four from: • mix starch, enzyme and pH (solution) (1) • use iodine (to test for starch) (1) • (with iodine solution) blue-black means starch is present / {orange / brown} means no starch present (1) • control of one variable e.g. concentration, volume, temperature (1) • **repeat** using different pH solutions (1)	all three solutions are required accept add iodine to a spotting tile ignore blue ignore amount unless a measurement is given	**(4)** **AO3 3a**

Question Number	Answer	Additional guidance	Mark
5(e)	An explanation linking two from: • enzyme denatures (1) • which changes the shape of the **active site** (1) • so {the enzyme cannot bind to its substrate / active site no longer complementary / no **enzyme-substrate** complexes form} (1)	accept enzyme changes shape accept substrate {no longer fits /is no longer complementary} accept starch for substrate	**(2)** **AO2 1**

(Total for question 5 = 11 marks)

Question number	Answer	Additional guidance	Mark
6(a)	Calculation 300 ÷ 30 / 2^{10} / indication that there are 10 divisions (1) Evaluation 1024	award full marks for the correct answer with no working accept 512 for one mark	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
6(b)(i)	(pathogens are organisms) that **cause** disease	ignore examples of pathogens unless linked to causing disease accept **cause** disease / illness / infections	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
6(b)(ii)	An explanation including two from: • they inhibit processes (in bacteria) (1) • so **bacteria** {are destroyed / are killed / growth stops / reproduction stops} (1) • but antibiotics {do not affect/damage} the host cell (1)	accept named processes e.g. disrupt cell walls accept slows down for stopped	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
6(b)(iii)	substitution 80 ÷ 0.005 (1) 16 000	award full marks for the correct answer with no working	**(2)** **AO2 1**

Question number	Indicative content	Mark
***6(c)**	**<u>similarities</u>** • cell membrane • cell wall • ribosomes • cytoplasm • both have DNA **<u>differences</u>** • chromosomal DNA (bacteria) • plasmid DNA (bacteria) • flagella (bacteria) • smaller size (bacteria) • prokaryotic (bacteria) • nucleus containing DNA (plants) • chloroplasts (plants) • mitochondria (plants) • vacuole (plants) • eukaryotic (plants)	**(6)** **AO1 1**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • Presents a description with some structure and coherence.
Level 2	3-4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. • Presents a description that has a structure which is mostly clear, coherent and logical.
Level 3	5-6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents a description that has a well-developed structure which is clear, coherent and logical.

Level	Mark	Additional Guidance	General additional guidance The level is determined by the number points of indicative content and the inclusion of similarities and differences in the response.
	0	No rewardable material	
Level 1	1–2	Makes simple statements identifying either similarities **or** differences between bacterial cells and plant cells.	Possible candidate responses • Bacterial cells and plant cells have a cell wall. • Bacterial cells and plant cells have a cell wall for structural support.
Level 2	3–4	Makes simple statements to describe a similarity **and** a difference between bacterial cells and plant cells including some detail.	Possible candidate responses • Both cells have a cell membrane and a cell wall. Bacteria have flagella, but plant cells do not. • Both cells have a cell membrane and a cell wall for structural support. Bacteria have flagella, but plant cells do not.
Level 3	5–6	Gives an accurate, detailed description of similarities **and** differences between bacterial cells and plant cells.	Possible candidate responses • Both cells have a cell membrane and a cell wall. Bacteria have flagella and plasmids but plant cells do not. • Both cells have a cell membrane and a cell wall for structural support. Bacteria have flagella for movement, and a plasmid, but plant cells do not.

(Total for question 6 = 13 marks)