AQA GCSE Biology | 8461

SPECIFICATION POINT 4.7.3.3

Land use

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**59**
Available paper years	**2007–2025**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.7.3.3 Land use

Answer 01 · Mark scheme June 2007 | BLY1B | Original Q2 | Legacy

Two	**A**	biodiversity	**2**
	B	carbon dioxide	**1**
	C	energy	**4**
	D	methane	**3**

Answer 02 · Mark scheme June 2007 | BLY1B | Original Q4 | Legacy

Four	**A**	burning fuels that release sulfur dioxide	**3**
	B	digging a new quarry	**4**
	C	sewage disposal	**2**
	D	using pesticides on crops	**1**

Answer 03 · Mark scheme June 2008 | BLY1BP | Original Q6 | Legacy

Six	**A**	nucleus transferred from skin cell of Dog Y	**2**
	B	electric shock applied	**3**
	C	ball of cells inserted into womb of female	**4**
	D	nucleus removed from egg cell	**1**

	A	**B**	**C**	**D**

Answer 04 · Mark scheme November 2008 | BLY1AP | Original Q7 | Legacy

Seven	**3**	**2**	**4**	**2**

4.7.3.3 Land use

Answer 05 · Mark scheme

June 2009 | BLY1F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)(i)	(more) habitats / (greater) variety of habitats / range of food	allow (more) places / trees for homes **or** different places to live allow no pesticides /herbicides / chemicals sprayed allow more food allow safer / can hide allow effects of machinery	1
2(a)(ii)	any **two** from: • building /houses / factories / etc • roads • quarrying • waste dumps / landfill • grazing	ignore timber / uses of wood	2
2(b)(i)	fertilisers		1
2(b)(ii)	pesticides		1
2(b)(iii)	pesticide / herbicide / chemicals / sprays	allow river (through farmland) polluted allow correct effect of fertilisers on river organisms	1

Question 2 continues on the next page…

BLY1F

Question 2 Continued

question	answers	extra information	mark
2(c)	any **two** from • pollution / named pollutant / combustion / cars • dumping waste / litter • raw materials used up **or** reference to quarries / mines • chopping down trees • building / houses / etc • global warming	allow 'not recycling'	2
Total			**8**

4.7.3.3 Land use

Answer 05 · Mark scheme

June 2009 | BLY1F | Original Q2 | Legacy

BLY1F

Answer 06 · Mark scheme

November 2009 | BLY1BP | Original Q2 | Legacy

Two	**A**	Carbon dioxide taken in by plants	**3**
	B	Methane released by cow	**1**
	C	Oil used in the factory	**4**
	D	Sulfur dioxide released by the chimney	**2**

4.7.3.3 Land use

Answer 07 · Mark scheme

January 2010 | BLY3F | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)	more reliable **or** in case one does not work / is anomalous	do **not** accept accurate ignore fair test	1
3(b)	any **three** from: **Flask A**: • bacteria could not get in • due to U-tube / bent tube / trapped in bend **Flask B**: • bacteria could get in • due to straight tube / not trapped	allow microorganisms	3
Total			**4**

4.7.3.3 Land use

Answer 07 · Mark scheme

January 2010 | BLY3F | Original Q3 | Legacy

BLY3F

Answer 08 · Mark scheme

March 2010 | BLY1BP | Original Q2 | Legacy

Two	**A**	biodiversity	**2**
	B	pollution	**4**
	C	global warming	**3**
	D	deforestation	**1**

Answer 09 · Mark scheme

June 2010 | BLY1BP | Original Q9 | Legacy

No matching mark scheme was available in the supplied archive for this question.

4.7.3.3 Land use

Answer 10 · Mark scheme

June 2010 | BLY3F | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)(i)	to kill (micro)organisms / bacteria / microbes **or** to sterilise	allow get rid of organisms etc allow kill germs	1
8(a)(ii)	(micro)organisms / they could not enter (the broth / flask) **or** (micro)organisms / they get trapped / stuck (in the bend)	apply list principle to air	1
8(b)	(more) reliable **or** to check if anomalous / consistent (same every time)	do **not** allow precise / accurate / valid / fair	1
8(c)	any **two** from: • microorganisms now enter (the broth / flask) • microorganisms from air / bend / neck / x • nutrients / energy source for microorganisms (in broth)	ignore oxygen / air	2
8(d)	biogenesis		1
Total			**6**

4.7.3.3 Land use

Answer 11 · Mark scheme November 2010 | BLY1AP | Original Q8 | Legacy

Eight	**3**	**2**	**4**	**1**

Answer 12 · Mark scheme January 2011 | BLY1F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)	methane		1
6(b)	fertiliser		1
6(c)	fuel		1
6(d)	the greenhouse effect		1
Total			**4**

Answer 12 · Mark scheme January 2011 | BLY1F | Original Q6 | Legacy

BLY1F

4.7.3.3 Land use

Answer 13 · Mark scheme

January 2011 | BLY2F | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)(i)	colour of light / bulb / lamp	allow wavelength for colour allow bulb alone do **not** accept light / colour unqualified	1
7(a)(ii)	any **one** from eg • temperature • light intensity **or** distance between lamp and plant / tube • carbon dioxide • other light in room • mass / size / amount / age / type of pondweed • volume / amount of water	 allow heat allow amount / brightness of light ignore light unqualified allow symbols allow use a dark room allow same piece of pondweed ignore pondweed unqualified ignore reference to time	1
7(a)(iii)	improved reliability **or** can spot anomalies / changes	allow for reliability **or** less likely to lose count allow reference to calculating a mean / average ignore reference to accuracy / precision / fair	1
7(b)(i)	green		1

Question 7 continues on the next page

BLY2F

Question 7 continued

question	answers	extra information	mark
7(b)(ii)	any **two** from: • least / less bubbles / gas / oxygen / mean • least / less photosynthesis • least / less glucose / sugar / carbohydrate / food made	ignore references to colour reference to least / less needed only once, in context, for **2** marks only penalise no once, ie no bubbles = **0** mark no bubbles so no photosynthesis = **1** mark allow most / more green light reflected (by chloroplasts)	2
Total			**6**

4.7.3.3 Land use

Answer 13 · Mark scheme

January 2011 | BLY2F | Original Q7 | Legacy

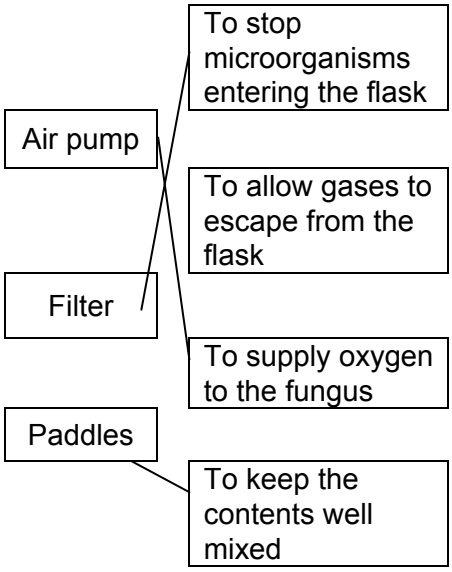
BLY2F

4.7.3.3 Land use

Answer 14 · Mark scheme

January 2011 | BLY3F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)		all three correct = **3** marks two correct = **2** marks one correct = **1** mark extra line from a statement cancels the mark	3
6(b)(i)	increased growth **or** increased (dry) mass correct use of numbers eg by 18 (grams) / by 46 times		1 1
6(b)(ii)	glucose supplies energy / materials (for growth) **or** glucose can be used in respiration	ignore glucose provides food	1
6(c)	magnesium		1
6(d)	mycoprotein		1
Total			**8**

4.7.3.3 Land use

Answer 14 · Mark scheme

January 2011 | BLY3F | Original Q6 | Legacy

BLY3F

Answer 15 · Mark scheme

March 2011 | BLY1BP | Original Q8 | Legacy

Eight	**2**	**2**	**3**	**2**

Answer 16 · Mark scheme

June 2011 | BLY1BP | Original Q2 | Legacy

Two	**A**	burning fuels that release carbon dioxide	3
	B	building new houses	4
	C	spraying crops with pesticides	2
	D	using weedkillers on crops	1

4.7.3.3 Land use

Answer 17 · Mark scheme

June 2011 | BLY2F | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)	any **one** from: • (same) volume / amount / 1 cm^3 lipase • (same) volume / amount / 5 cm^3 lipid • mixed after 3 minutes / same time before mixing	ignore reference to recording results every 5 minutes **or** concentrations of lipid / lipase allow amount of solution allow keep same volumes in the test tubes do **not** accept temperature	1
8(b)	so that the lipase and the lipid reached the right temperature		1
8(c)	any **two** from • decrease in time **or** faster (breakdown) • then increase in time **or** then slower (breakdown) • fastest / least time / optimum at 35°C	ignore explanations	2
8(d)	any **two** from: • test more regularly eg test every minute • test at smaller temperature intervals • test between 50 (°C) and 95 (°C) • repeat at same temperatures **or** repeat the investigation **or** compare results with others	ignore 'test at more temperatures' unqualified any interval < 5min any value <15°C allow test more temperatures in the range any value in range, eg test at 70 allow do **it** again	2

Question 8 continues on the next page

4.7.3.3 Land use

Answer 17 · Mark scheme

June 2011 | BLY2F | Original Q8 | Legacy

Question 8 continued

question	answers	extra information	mark
8(e)(i)	(lipase / it) denatured / destroyed / changed shape	allow damaged / deformed do **not** accept killed ignore broken (down)	1
8(e)(ii)	fatty acids and glycerol		1
Total			**8**

4.7.3.3 Land use

Answer 17 · Mark scheme June 2011 | BLY2F | Original Q8 | Legacy

BLY2F

Answer 18 · Mark scheme November 2011 | BLY1BP | Original Q2 | Legacy

Two	**A**	deforestation	**3**
	B	recycling waste	**2**
	C	less cattle farming	**4**
	D	treating sewage	**1**

4.7.3.3 Land use

Answer 19 · Mark scheme

January 2013 | BL2FP | Original Q7 | Legacy

Question 7

question	Answers	extra information	mark
7(a)	any **one** from: • add a water bath • heat screen • use LED • low energy bulb / described	ignore 'check temperature'	1
7(b)(i)	rate / number of bubbles decreases **or** less oxygen / gas released	accept converse with reference to increasing light **or** shorter distance ignore reference to rate of photosynthesis	1
7(b)(ii)	temperature / CO_2 (concentration)	accept 'it was too cool' **or** not enough CO_2 accept number of chloroplasts / amount of chlorophyll allow heat allow CO2 do **not** allow CO^2	1

Question 7 continues on the next page . . .

BL2FP

Question 7 continued . . .

<table>
<tr><th>question</th><th colspan="4">Answers</th><th>extra information</th><th>mark</th></tr>
<tr><td rowspan="4">7(c)</td><td colspan="4">Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a ‘best-fit’ approach to the marking.</td><td></td><td>6</td></tr>
<tr><td>0 marks</td><td colspan="2">Level 1 (1-2 marks)</td><td>Level 2 (3-4 marks)</td><td>Level 3 (5-6 marks)</td><td></td></tr>
<tr><td>No relevant content.</td><td colspan="2">There is a brief description of at least 1 tissue or at least 1 function of an indicated part of the leaf.
The account lacks clarity or detail.</td><td>There is a clear description which includes at least 1 named tissue and at least 1 correct function described for an indicated part of the leaf.</td><td>There is a detailed description of most of the structures and their functions.</td><td></td></tr>
<tr><td colspan="5">examples of responses:
• epidermis
• cover the plant
• mesophyll / palisade
• photosynthesises
• phloem
• xylem
• transport.
The following points are all acceptable but beyond the scope of the specification:
• (waxy) cuticle – reduce water loss
• epidermis – no chloroplasts so allows light to penetrate
• stomata / guard cells – allow CO_2 in (and O_2 out) or controls water loss
• palisade (mesophyll) – <u>many</u> chloroplasts to trap light
– near top of leaf for receiving more light
• spongy (mesophyll) – air spaces for rapid movement of gases</td><td></td></tr>
<tr><td>Total</td><td colspan="3"></td><td></td><td>9</td></tr>
</table>

4.7.3.3 Land use

Answer 19 · Mark scheme

January 2013 | BL2FP | Original Q7 | Legacy

BL2FP

4.7.3.3 Land use

Answer 20 · Mark scheme

Question 6

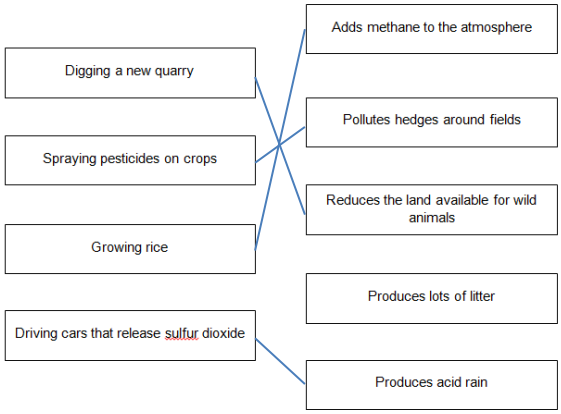
question	answers	extra information	mark
6(a)	LHS – glucose RHS – water	 allow H_2O / H20	1 1
6(b)	so the earthworms' body temperature would change to 20 °C		1
6(c)(i)	56 or 55 or 54	if incorrect answer given accept 60 - 5 for **1** mark or 60 – 6 for **1** mark or 60 – 4 for **1** mark	2
6(c)(ii)	one-tenth of answer to (c)(i) eg 5.5		1
6(c)(iii)	(at 10 °C / lower temperature): lower rate of respiration worms less active / worms release less energy / worms use less energy	 allow chemical reactions slower or enzymes less active ignore breathing do not allow anaerobic 	 1 1
6(d)(i)	anomalous result / not in line with other data / does not fit the pattern		1
6(d)(ii)	more representative / more reliable / can check 'repeatability' / see if get similar values / identify anomalies	ignore valid / more fair ignore reproducible ignore 'to remove' anomalies do not accept more accurate or more precise	1
Total			**10**

4.7.3.3 Land use

Answer 21 · Mark scheme

June 2013 | BL3FP | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)		**1** mark for each correct line extra line from box in left hand column cancels mark	4
1(b)	any **two** from: • climate change • more extreme weather / changes to weather (patterns) / described • rise in sea level • melting of ice caps • reduced biodiversity • changes to migration patterns • changes in distribution of species	ignore 'Earth warmer' accept faster plant growth / tropical species can be grown in UK accept tropical diseases / example spread to temperate regions	2
Total			**6**

4.7.3.3 Land use

Answer 22 · Mark scheme June 2014 | BL2FP | Original Q9 | Legacy

9(a)	anaerobic respiration	allow phonetic spelling	1	AO1 2.6.2a, b,d
9(b)(i)	4.4	4.2, 4.3, 4.5 or 4.6 with figures in tolerance (6.7 to 6.9 and 2.3 to 2.5) and correct working gains 2 marks 4.2, 4.3, 4.5 or 4.6 with no working shown or correct working with one reading out of tolerance gains 1 mark correct readings from graph in the ranges of 6.7 to 6.9 **and** 2.3 to 2.5 but no answer / wrong answer gains 1 mark	2	AO2 2.6.2a, b,d
9(b)(ii)	more energy is needed / used / released (at 14 km per hour) not enough oxygen (can be taken in / can be supplied to muscles) so more anaerobic respiration (to supply the extra energy) **or** more glucose changed to lactic acid	do **not** allow energy production ignore work allow reference to oxygen debt do **not** allow less / no oxygen allow not enough aerobic respiration	1 1 1	AO1 / AO2 2.6.2a, b,d
Total			**6**	

4.7.3.3 Land use

Answer 23 · Mark scheme

7			6	AO1 3.3.1

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	There is at least one reason for deforestation **or** an attempt at a description of at least one way deforestation is affecting the atmosphere.	There is at least one reason for deforestation **and** a description of the way deforestation is affecting one gas in the atmosphere **or** the process that causes an effect.	There are reasons for deforestation **and** a clear description of the way deforestation is affecting one gas in the atmosphere **and** the process that causes this.

examples of the points made in the response	extra information
Reasons for deforestation • timber for construction / furniture / boat building / paper production • growing plants for biofuels for motor fuel / aviation / lawnmowers • use of wood as a fuel • land for building or agriculture to provide food, such as rice fields and cattle ranching	

Effects of deforestation
• increase in carbon dioxide in atmosphere
  ○ due to burning
  ○ due to activities of microbes
  ○ less carbon dioxide taken in / locked up (by trees)
  ○ less photosynthesis
• increase in methane in atmosphere
  ○ due to rice production / cattle
	ignore references to oxygen
	
	accept explanations of the effect of water (vapour)

4.7.3.3 Land use

Answer 24 · Mark scheme

June 2015 | BL2FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	glycerol		1	AO1 2.5.2f
7(a)(ii)	pancreas / small intestine	accept duodenum / ileum ignore intestine unqualified	1	AO1 2.5.2f
7(b)	any **two** from: • type of milk • volume / amount of milk • vol. bile equals vol. water • volume of lipase • concentration of lipase • temperature	ignore time interval ignore solution unqualified do **not** allow pH ignore starting pH ignore volume / amount of bile / water ignore concentration of bile accept amount of lipase if neither volume nor concentration given	2	AO3 2.5.2f,h
7(c)(i)	fatty acid (production)		1	AO2 2.5.2f,h
7(c)(ii)	faster reaction / digestion (with bile) **or** pH decreases faster (with bile) **or** takes less time (with bile) **or** steeper fall / line (with bile)	allow use of data ignore easier	1	AO3 2.5.2f,h

4.7.3.3 Land use

Answer 24 · Mark scheme

June 2015 | BL2FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(c)(iii)	all fat / milk digested **or** same amount of fatty acids present **or** (lower pH) denatures the enzyme / lipase	allow all reactants used up ignore reference to neutralisation allow enzyme won't work at low pH do **not** allow enzyme killed	1	AO2 2.5.2f,h
Total			**7**	

4.7.3.3 Land use

Answer 24 · Mark scheme

June 2015 | BL2FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref

4.7.3.3 Land use

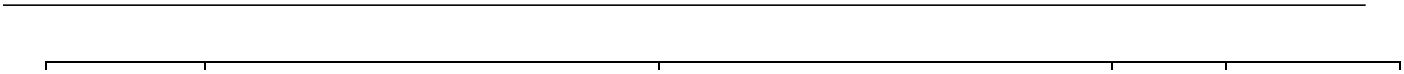
Answer 25 · Mark scheme June 2015 | BL3FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)	any **one** from: • increased pollution • dumping waste	allow described consequence eg vermin accept (increased) landfill accept (increased) fly tipping	1	AO1 341a
2(b)(i)	(mass of SO_2) decreases and then levels off / plateaus		1 1	AO2 341b
2(b)(ii)	2008	clear evidence of calculating 700 (000) = 1 mark	2	AO2 341
2(b)(iii)	any **one** from: • acid rain • erosion of statues / buildings • destruction of habitats • reduction in biodiversity • damage to lichen • breathing problems	ignore reference to ozone layer allow damage to plants	1	AO1 341b
2(c)	Carbon dioxide being absorbed in oceans and lakes Photosynthesis by trees		1 1	AO1 343b,342a
Total			**8**	

4.7.3.3 Land use

Answer 25 · Mark scheme

June 2015 | BL3FP | Original Q2 | Legacy



4.7.3.3 Land use

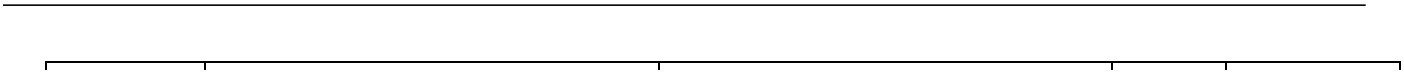
Answer 26 · Mark scheme June 2015 | BL3FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	methane / CH_4	allow CH_4 do **not** allow CH^4 **or** ch4 or CH4	1	AO1 343c
4(b)	any **two** from: • didn't carry out repeats • only tested four types of manure • don't know the mass of manure was the same each time • inaccuracies in measuring (diameter of) balloon • bottles might have been different sizes • temperature of the room may have been different		2	AO3 343c
4(c)	The potato contains a lot of carbohydrate		1	AO1 343c
Total			**4**	

4.7.3.3 Land use

Answer 26 · Mark scheme

June 2015 | BL3FP | Original Q4 | Legacy



4.7.3.3 Land use

Answer 27 · Mark scheme

June 2015 | BL3FP | Original Q9 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)	any **two** from: • (volume of) peat compost has been steady and then declined **or** volume of peat compost has declined since 2005 • (volume of) peat-free compost has increased (since 1999) • (volume of) peat is higher than peat-free until 2005, then peat-free compost is higher (than peat) • total volume of peat and peat-free compost has increased	allow 2007 instead of 2005 allow 2007	2	AO2 342d
9(b)	increases carbon dioxide (in the atmosphere)	ignore methane	1	AO1 342
9(c)	any **one** from: • reduces biodiversity • destruction of habitats • disruption of food chains		1	AO1 342b
Total			**4**	

4.7.3.3 Land use

Answer 28 · Mark scheme June 2016 | BL1FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	receptor cells		1	AO1 1.2.1b
2(a)(ii)	eye(s)	accept retina	1	AO1 1.2.1b
2(b)(i)	any **one** from: • gender / sex • quality of eyesight • eg of factor that might affect reaction times	 eg wearing glasses eg alcohol consumption / distractions / tiredness / health / time of day / amount of practice (at this test) do not allow time / age	1	AO3 1.2.1
2(b)(ii)	182	allow 182.0	1	AO2 1.2.1
2(b)(iii)	Any anomalies can be identified.		1	AO3 1.2.1
2(b)(iv)	reaction time (too) long **or** reactions (too) slow (so) more likely to have / cause an accident	allow reaction time (too) slow allow examples of data quoted **or** derived from Table1, eg (mean) reaction time for 90 year olds is 162 ms longer than for 75 year olds	1 1	AO3 1.2.1
Total			**7**	

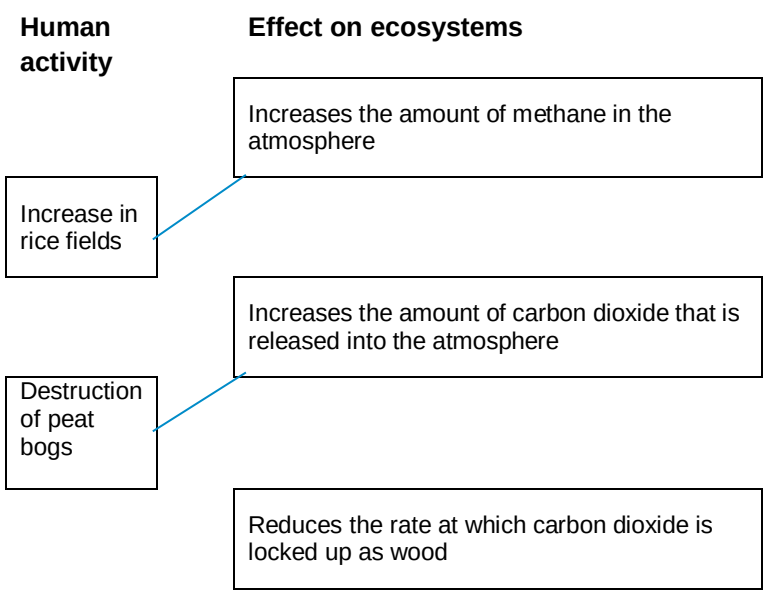
4.7.3.3 Land use

Answer 28 · Mark scheme

June 2016 | BL1FP | Original Q2 | Legacy

4.7.3.3 Land use

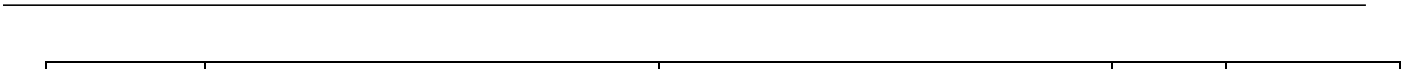
Answer 29 · Mark scheme June 2016 | BL3FP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)	 extra lines from left cancels mark		2	AO1 3.4.2c/d
6(b)(i)	any **two** from: • (to provide land) for farming / agriculture • (to provide land) for quarrying • (to provide land) for building • to provide wood for building materials • to provide fuel • to provide paper		2	AO1 3.4.2c
6(b)(ii)	any **two** from: • changes in earth's climate, ie droughts, flooding, hurricanes • rise in sea levels • reduce biodiversity • change in migration patterns • may change distribution of species	ignore acid rain **and** the ozone layer **and** forest fires ignore temperature rise allow ice caps melt	2	AO1 3.4.2a
Total			**6**	

4.7.3.3 Land use

Answer 29 · Mark scheme

June 2016 | BL3FP | Original Q6 | Legacy



4.7.3.3 Land use

Answer 30 · Mark scheme

June 2017 | BL2FP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	sugar(s) / glucose	allow maltose do not allow if extra incorrect answers	1	AO1 2.5.2d Prac
8(b)(i)	any **two** from: • volume of pH solution • volume of amylase / enzyme solution • volume of starch / suspension / substrate • time left (before mixing)	allow amount for volume if neither mark given allow 1 mark for volume(s) of solution(s) ignore time between samples ignore ref. to (room) temperature ignore ref. to concentration	2	AO2 2.5.2b Prac
8(b)(ii)	4 minutes: (dark) blue **and** 6 minutes: (light) brown	allow black ignore purple do **not** allow light blue allow yellow / orange	1	AO3 2.5.2b Prac
8(b)(iii)	any **two** from: • take each reading more than once • use colour standards for deciding end-point • test more pH values between 6 and 8 **or** test at smaller pH intervals • test at shorter intervals • same temperature (in a water bath)	ignore take more readings allow compare with another group allow use a colorimeter ignore wider range of pH unqualified allow example – e.g. every half min	2	AO3 2.5.2b Prac

4.7.3.3 Land use

Answer 30 · Mark scheme

June 2017 | BL2FP | Original Q8 | Legacy

8(b)(iv)	no reaction **or** stays (dark) blue **or** takes >9 minutes enzyme denatured	allow takes longer allow description of denaturing, i.e. shape change allow description of trend on graph	1 1	AO2/3 2.5.2a/b
Total			**8**	

4.7.3.3 Land use

Answer 31 · Mark scheme

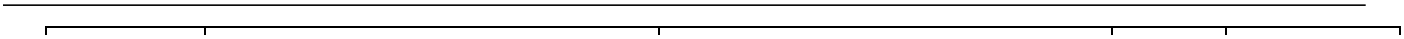
June 2017 | BL3FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	8.0		1	AO2 3.4.2
1(a)(ii)	To provide land to grow crops. To provide space for building.		1 1	AO1 3.4.1c 3.4.2a/c
1(b)	Carbon dioxide Methane		1 1	AO1 3.4.3a
Total			**5**	

4.7.3.3 Land use

Answer 31 · Mark scheme

June 2017 | BL3FP | Original Q1 | Legacy



4.7.3.3 Land use

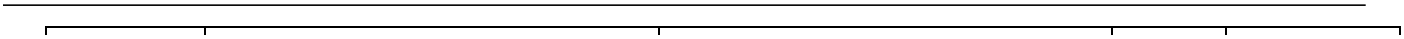
Answer 32 · Mark scheme June 2017 | BL3FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	methane / CH_4	additional answers negate mark	1	AO1 3.4.3c
4(b)	any **two** from: • (same) mass of material • (same) volume of water • (left for the same amount of) time • (kept at the same) temperature	 allow (same) amount of material allow (same) amount of water	2	AO2 3.4.3c
4(c)(i)	8.2 in manure, test 3 circled	allow if clearly indicated, eg arrow pointing at 8.2	1	AO3 3.4.3c
4(c)(ii)	14.3		1	AO2 3.4.3c
4(c)(iii)	manure and beans produces the most biogas	allow ecf from 4(c)(ii)	1 1	AO2/3 3.4.3c
4(d)	Advantage any **one** from: • constant supply • produces own gas • saves money • uses up manure • is a renewable energy source Disadvantage any **one** from: • fire risk • smell • risk of explosion		1 1	AO3 3.4.3c
Total			**9**	

4.7.3.3 Land use

Answer 32 · Mark scheme

June 2017 | BL3FP | Original Q4 | Legacy



4.7.3.3 Land use

Answer 33 · Mark scheme

June 2018 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	toxins / poisons (secreted by / from / in bacteria)		1	AO1 4.3.1.3
07.2	any **two** from: • wash hands after using toilet / being sick **or** wash hands before preparing / handling food **or** do not prepare food (whilst infected) • isolate yourself • disinfect clothes / surfaces • do not share utensils / cutlery / towels	ignore 'wash hands' unqualified ignore reference to coughing / sneezing allow examples of how isolation could be achieved	2	AO2 4.3.1.1
07.3	antibiotics	allow named examples of antibiotics	1	AO1 4.3.1.8
07.4	immune system is damaged / weakened **or** immune system doesn't function properly white blood cells cannot kill bacteria / *Salmonella* (as effectively)	allow immunocompromised allow lack of / no white blood cells allow no / fewer antibodies so bacteria not killed **or** less phagocytosis so bacteria not killed **or** no / fewer antitoxins to counter toxins	1 1	AO2 4.3.1.2

4.7.3.3 Land use

Answer 33 · Mark scheme

June 2018 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	any **one** from: • (give chickens) antibiotics • don't sell infected chickens / eggs • keep infected chickens isolated / indoors • slaughter the infected chickens	allow (give chickens) monoclonal antibodies allow don't sell the chickens / eggs ignore don't sell chickens / eggs allow keep the chickens indoors ignore keep chickens indoors ignore vaccination / chlorination / disinfection	1	AO1 4.3.1.3
07.6	(cleaning liquid) B **and** greater reduction in number of bacteria (after cleaning) in both locations	ignore few bacteria in both locations allow neither / both **and** idea of experimental error	1	AO3 4.1.1.6 4.3.1
07.7	radius (of area with no bacteria growing)	allow diameter (of the area with no bacteria growing) ignore πr^2 unqualified allow idea of placing agar plate onto graph paper and counting the squares not covered with bacteria	1	AO2 4.1.1.6

4.7.3.3 Land use

Answer 33 · Mark scheme

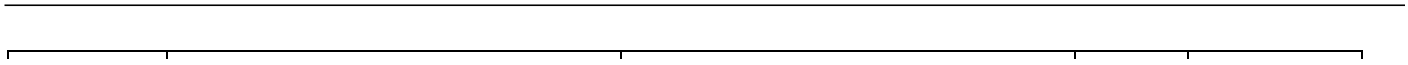
June 2018 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.8	repeat **and** look to see if results are similar	ignore repeat unqualified allow repeat **and** look to see if results are different allow repeat and see if there are anomalies ignore repeat and identify anomalies ignore repeat and compare unqualified	1	AO3 4.1.1.6
07.9	any **one** from: • toxicity / side / health effects • effect on other types of bacteria / pathogens • interaction with other cleaners • ease of use • dilution factor of each cleaner (vs. cost) • time cleaner is effective for	 ignore harmful / dangerous allow reference to allergies allow not tested on other types of bacteria ignore germs ignore concentration unqualified ignore how long the cleaner lasts for allow reference to odour of cleaning liquid ignore reference to cost unqualified ignore environmental effects / flammability	1	AO3 4.1.1.6
Total			**11**	

4.7.3.3 Land use

Answer 33 · Mark scheme

June 2018 | 8461/1F | Original Q7



4.7.3.3 Land use

Answer 34 · Mark scheme June 2018 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	description of a method to achieve random placement	examples could include random number generator or random coordinates allow throw over the shoulder **or** with eyes shut ignore throw unqualified	1	AO1 4.7.2.1
06.2	any **one** from: • random (location) • avoid bias • obtain valid / representative results	allow by chance allow more accurate / precise mean ignore fair test / accurate / precise unqualified	1	AO1 4.7.2.1
06.3	as a control / comparison **or** B varies from A in only one factor (to) show results (in A) are due to weed killer	allow see the difference do **not** accept a control variable allow to see the effect of the weed killer allow so the results are valid	1 1	AO2 4.7.2.1 AO3 4.7.2.1
06.4	11	allow eleven	1	AO2 4.7.2.1
06.5	$\frac{10 - 2}{10} \times 100$ 80	an answer of 80 scores **2** marks	1 1	AO2 4.7.2.1

4.7.3.3 Land use

Answer 34 · Mark scheme

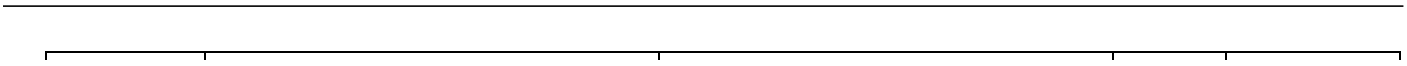
June 2018 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	use more quadrats	allow use larger quadrats allow repeat	1	AO3 4.7.2.1
	original may not be representative **or** reference to weeds being distributed unevenly	allow mean is more reliable / accurate / precise ignore more valid	1	
	or leave for more than two weeks (1) original may not be representative (1)	allow mean is more reliable / accurate / precise allow weed killer may take longer than two weeks to work (fully) ignore more valid		
Total			**9**	

4.7.3.3 Land use

Answer 34 · Mark scheme

June 2018 | 8461/2F | Original Q6



4.7.3.3 Land use

Answer 35 · Mark scheme

June 2019 | 8461/1F | Original Q5

05.1	gonorrhoea		1	4.3.1.3 AO1
05.2	the bacteria are resistant to the antibiotics		1	4.3.1.3 AO2
05.3	abstain from sex(ual intercourse) **or** wash hands after touching penis / urinating / using the toilet	allow abstinence ignore wash hands unqualified	1	4.3.1.1 4.3.1.3 AO2
05.4	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.		4–6	4.1.1.6 AO3 x3 AO2 x3
	Level 1: Relevant features are identified and differences noted.		1–3	
	No relevant content		0	
	Indicative Content: **qualitative statements** • **3** works best on **A** • **1** works best on **B** • **2** works best on **C** • **1** is least effective on **A** • **3** is least effective on **B** • **3** is least effective **or** has no effect on **C** **quantitative statements** • **1** kills more of **B** and **C** compared to **A** • **2** kills more of **C** than **A** / **B** • **3** kills more of **A** than **B** and **C** • **2** kills the same amount of **A** and **B** • **2** and **3** killed similar amounts of **B** • **C** are resistant to **3** • only **2** worked well on all of the bacteria • for **A**, **3** works best, **2** is next and **1** is least effective • for **B**, **1** works best, **2** is next and **3** is least effective • for **C**, **2** works best, **1** is next and **3** is least effective for **level 2** reference to qualitative and quantitative statements is required			

Answer 35 · Mark scheme

June 2019 | 8461/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	sample **E**		1	4.1.1.6 AO2
05.6	$\frac{15 + 12 + 13 + 16}{4}$ **or** $\frac{56}{4}$ 14	an answer of 14 scores **2** marks	1 1	4.1.1.6 AO2
05.7	(area = 0.1 × 0.1 =) 0.01 (volume = 0.01 × 0.01 =) 0.0001 (number = $\frac{14}{0.0001}$ =) 140 000	an answer of 140 000 scores **3** marks an incorrect answer for one step does not prevent allocation of marks for subsequent steps allow 1×10^{-2} allow 1×10^{-4} allow ecf from question **05.6** allow 1.4×10^{5} do **not** accept 14×10^{4}	1 1 1	4.1.1.6 AO2
05.8	Q		1	4.1.1.6 AO2
05.9	(bacteria) could make humans ill **or** (bacteria) could kill humans **or** (bacteria) could release toxins	allow reverse argument allow (bacteria) cause infection / disease allow (bacteria) cause appropriately named disease ignore harmful	1	4.3.1.1 AO2
Total			**17**	

4.7.3.3 Land use

Answer 35 · Mark scheme

June 2019 | 8461/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.7.3.3 Land use

Answer 36 · Mark scheme

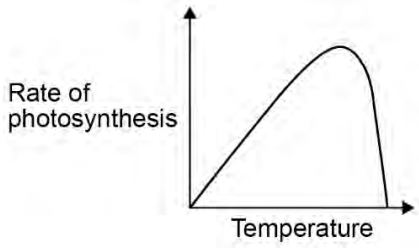
June 2019 | 8461/1F | Original Q9

09.1	LHS: carbon dioxide **and** water RHS: glucose	words take precedence over symbols allow correct symbols (ignore balancing) in any order do **not** accept starch ignore carbohydrates / sugar	1 1	4.4.1.1 AO1
09.2	power output of bulb		1	4.4.1.2 AO2
09.3	any **two** from: • repeat **and** calculate a mean **or** repeat **and** to eliminate anomalies • control the (water) temperature • control the concentration of carbon dioxide • control the distance of the bulb from the pondweed • control the mass / length / species / age of the pondweed • give pondweed time to equilibrate	ignore do a control experiment unqualified allow a method of controlling (water) temperature allow a method of controlling carbon dioxide concentration allow use the same piece of pondweed allow do experiment with the bulb off / in the dark	2	4.4.1.2 AO3
09.4	3.3 (cm^3/hour)		1	4.4.1.2 AO2

4.7.3.3 Land use

Answer 36 · Mark scheme

June 2019 | 8461/1F | Original Q9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	correct scale **and** axis labelled	max **3** marks for bar chart	1	4.4.1.2 AO2
	all points plotted correctly	allow points plotted to within ± ½ small square allow 3 or 4 correct plots for **1** mark allow correct plot from incorrect value calculated in question **09.4**	2	
	correct curved line of best fit	ignore line extended beyond 60 / 250 (W) ignore line joined point to point with straight lines	1	
09.6	correct answer from their line drawn on **Figure 15**	allow ± ½ small square tolerance allow 1.8 / 1.9 if no line of best fit or incorrect graph is drawn	1	4.4.1.2 AO2
09.7			1	4.4.1.2 AO2
Total			**12**	

4.7.3.3 Land use

Answer 37 · Mark scheme

June 2019 | 8461/2F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	Raphus		1	AO2 4.6.4
05.2	any **two** from: • humans hunted / killed / ate the dodo **or** dodo easy to catch • humans ate / collected eggs • humans ate the dodo's food • animals brought by humans ate dodo / eggs • diseases introduced by humans **or** by imported animals • humans destroyed dodo's habitat / nests	allow examples – eg cats / dogs / pigs / rats allow deforestation	2	AO2 4.6.3.6
05.3	any **one** from: • growing crops / biofuels • grazing animals • building houses • quarrying / mining • dumping waste	allow farming / agriculture allow other correct examples – eg building roads	1	AO1 4.7.3.3 4.7.3.4
05.4	there is less photosynthesis the trees are burned		1 1	AO2 4.4.1.1 4.4.1.2 4.7.3.4 4.7.3.5
05.5	increase		1	AO1 4.7.3.5
05.6	9 × 30 270	an answer of 270 scores **2** marks	1 1	AO2 4.7.3.4 4.7.3.6

4.7.3.3 Land use

Answer 37 · Mark scheme

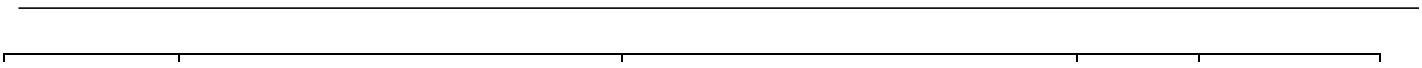
June 2019 | 8461/2F | Original Q5

Question	Answers	Mark	AO / Spec. Ref.
05.7	**Level 2:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	3–4	AO3
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content • displaced animals can move to adjacent areas • where suitable habitat is found **or** where the trees have not been cut down • seeds return to deforested area • from other (forested) areas • plants / trees begin to grow back • so provide food / shelter / nest sites / suitable habitat for animals • animals return to re-growing area • from other (forested) areas • sufficient time for regeneration • old growth area is a source of recolonising organisms		4.7.3.1 4.7.3.4 4.7.3.6
Total			**13**

4.7.3.3 Land use

Answer 37 · Mark scheme

June 2019 | 8461/2F | Original Q5



4.7.3.3 Land use

Answer 38 · Mark scheme

June 2019 | 8461/2F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	primary consumer		1	AO2 4.7.2.1 4.7.4.1
07.2	correct shape: 4 tiers with largest at bottom and smallest at top correctly labelled: dragonfly / nymph + hydra + daphnia + algae	 in this order **or** allow: 3rd-order **or** tertiary consumer **or** apex / top predator **or** (trophic level) 4 2nd-order **or** secondary consumer **or** (trophic level) 3 1st-order **or** primary consumer **or** herbivore **or** (trophic level) 2 producer **or** (trophic level) 1 allow for **2** marks inverted pyramid if correctly labelled	1 1	AO2 4.7.4.2
07.3	any **one** from: (Daphnia biomass smaller because) • non-digestible parts (of algae) or lost in faeces • not all absorbed • lost in urine / urea • used in respiration **or** lost as carbon dioxide / CO_2 • algae not all eaten **or** eaten by other organisms • some algae decompose	 ignore waste allow excretion allow (to supply energy) for movement / warmth allow used to supply energy	1	AO1 4.7.4.3
07.4	 14 14 000	an answer of 14 000 scores **2** marks allow evidence of an incorrectly calculated mean × 1000 allow 1.4×10^4	 1 1	AO2 4.7.2.1

4.7.3.3 Land use

Answer 38 · Mark scheme

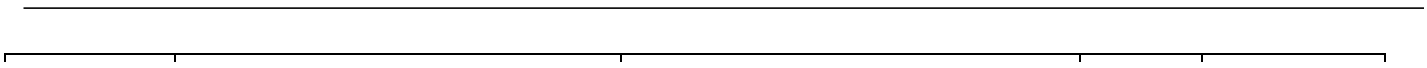
June 2019 | 8461/2F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5		an answer of 2.625×10^4 **or** 2.63×10^4 **or** 2.6×10^4 scores **4** marks an answer of 26250 scores **3** marks allow ecf from Question **07.4**		AO2 4.7.2.1
	(volume of pond =) 1.875 **or** $2.5 \times 1.5 \times 0.5$	an incorrect answer for one step does **not** prevent allocation of marks for subsequent steps	1	
	$14\,000 \times 1.875$	allow ecf from Question **07.4**	1	
	26250		1	
	2.625×10^4	allow 2.63×10^4 **or** 2.6×10^4	1	
07.6	increased (growth / reproduction of) algae (more algae so) more food for Daphnia	allow fertiliser toxic to Hydra (1) (so) fewer Daphnia eaten (1)	1 1	AO2 4.7.2.1 4.7.3.2 4.7.4.1
07.7	(Hydra have) less food because (graph shows) fewer Daphnia (with more fertiliser)	allow other valid suggestions, eg fertiliser toxic to Hydra (1) **or** fertiliser causes growth of algae (on surface) which block light and so die and decay **or** eutrophication (1) (decay / eutrophication) uses up oxygen (so lack of oxygen for Hydra) (1)	1 1	AO3 4.7.2.1 4.7.3.2
Total			**14**	

4.7.3.3 Land use

Answer 38 · Mark scheme

June 2019 | 8461/2F | Original Q7



Answer 39 · Mark scheme

November 2020 | 8461/1F | Original Q7

The full source mark scheme begins on page 114. Follow original question 7 in that document.

4.7.3.3 Land use

Answer 40 · Mark scheme

November 2020 | 8461/2F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	any **two** from: • double • helix • long / thin	allow two strands allow twisted / spiral / coiled	2	AO1 4.6.1.4
07.2	bases		1	AO1 4.6.1.5
07.3	protein		1	AO1 4.6.1.4 4.6.1.5
07.4	nucleotide		1	AO1 4.6.1.5
07.5 **mark with 07.6**	0.34 × 6 000 2040 (million nm)		1 1	AO2 4.6.1.4 4.6.1.5
07.6 **mark with 07.5**	answer from question **07.5** correctly converted	if no answer to question **07.5**, allow 2.04 (m)	1	AO2 4.6.1.4 4.6.1.5
07.7	any **one** of: • to determine if the cancer is genetic (or caused by lifestyle factors) • to inform / help treatment • to allow embryo screening to ensure allele is not passed on • to inform relatives if they have inherited (affected) gene / allele • to detect cancer early **or** before symptoms show • to understand cause of the cancer		1	AO3 4.6.1.7 4.2.2.7
Total			**9**	

4.7.3.3 Land use

Answer 40 · Mark scheme

November 2020 | 8461/2F | Original Q7

4.7.3.3 Land use

Answer 41 · Mark scheme

November 2020 | 8461/2F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	bacteria fungi	allow singular allow mould ignore microbes / germs / decomposers do **not** accept viruses	1 1	AO1 4.7.2.2 4.7.2.3
08.2	fatty acid(s)		1	AO2 4.7.2.3 4.2.2.1 RPA10
08.3	any **one** from: • universal indicator (paper / solution) • pH meter	allow UI (paper / solution) ignore pH paper unqualified allow pH probe ignore datalogger unqualified ignore Cresol red ignore phenolphthalein / litmus	1	AO1 4.7.2.3 RPA10
08.4	any **two** from: • volume of milk • exposure to air / oxygen • sterilise test tubes • treatment of milk before investigation • freshness / age of milk (at start) • time of day pH was measured	allow amount of milk allow bungs on test tubes allow example such as pasteurised or not allow starting pH of milk	2	AO1 4.7.2.3 RPA10
08.5	almond (milk)		1	AO3 4.7.2.3 RPA10

4.7.3.3 Land use

Answer 41 · Mark scheme

November 2020 | 8461/2F | Original Q8

08.6	as temperature increases up to 15 °C the time taken (to reach pH 5) decreases above 15 °C the time taken (to reach pH 5) stays the same	allow converse if no other mark awarded allow **1** mark for as temperature increases the time taken (to reach 5 °C) decreases and then stays the same	1 1	AO2 4.7.2.3 RPA10
08.7	any **one** from: • bacteria / microbes / microorganisms / fungi dividing faster (when warmer) • reactions (in the bacteria) are happening faster (to decay milk) • (because there is) more (kinetic) energy • enzyme activity is higher (at 10 °C than at 5 °C)	allow converse if clearly describing 5 °C allow number of bacteria / microbes / microorganisms / fungi increasing (when warmer) allow more bacteria microbes / microorganisms / fungi allow particles move faster allow more collisions between particles allow enzymes work faster ignore enzymes work better	1	AO2 4.7.2.3 4.1.1.6 RPA10
08.8	any **two** from: • different concentration / type of fat / lipid • different concentration / type of proteins / carbohydrate / sugar • different (amount / type of) bacteria present • may have been pasteurised by a different process • different starting pH	allow different amounts of fat / lipid allow different amounts of proteins / carbohydrate / sugar allow may have been treated in different ways (before the investigation) ignore different oxygen concentration	2	AO3 4.7.2.3 RPA10

4.7.3.3 Land use

Answer 41 · Mark scheme

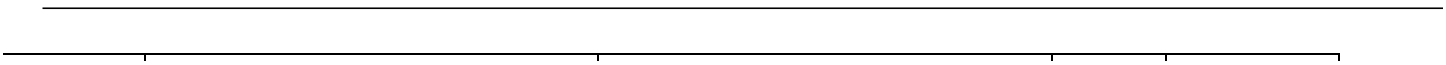
November 2020 | 8461/2F | Original Q8

08.9	determine the types of bacteria present in the milk		1	AO3 4.7.2.3 RPA10
Total			**13**	

4.7.3.3 Land use

Answer 41 · Mark scheme

November 2020 | 8461/2F | Original Q8



4.7.3.3 Land use

Answer 42 · Mark scheme

November 2020 | 8461/2F | Original Q9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	$\frac{6.0}{1.6}$ 3.75	allow a range of 5.9 to 6.1 for 6.0 do **not** accept if a unit is given if no other marks awarded, allow a correct answer using a value of 5.8 or 6.2 for **1** mark	1 1	AO2 4.7.3.2
09.2	$\frac{2.5 - 1.6}{50}$ 0.018 (billion per year)	allow $\frac{0.9}{50}$	1 1	AO2 4.7.3.2
09.3 view with Figure 12	suitable extrapolation line on Figure **2** reading taken at 2050 from student's line	allow straight extrapolation allow a tolerance of ± ½ small square allow **1** mark for 10 billion if no extrapolation drawn	1 1	AO2 4.7.3.2
09.4	fewer fish caught **or** limit the number of fish caught (remaining fish) can reproduce	allow a method of doing this, eg increase mesh size **or** do not catch young fish allow more fish (survive to) reproduce	1 1	AO1 4.7.5.1 4.7.5.3

4.7.3.3 Land use

Answer 42 · Mark scheme

November 2020 | 8461/2F | Original Q9

Question	Answers	Mark	AO / Spec. Ref.
09.5	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	4-6	AO1 4.7.3.1 4.7.3.2 4.7.3.3 4.7.3.4 4.7.3.6 4.7.3.5 4.7.5.1 4.7.5.2
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–3	
	No relevant content	0	
	Indicative content **human land use** • increasing population requires more food • crops / livestock for food • farming crops for biofuels • peat use as compost • peat use as fuel • increased use of pesticide / insecticide / herbicide / fertilisers • use of free-range / organic methods increases land use (for same yield) **link to biodiversity** • deforestation • monocultures • loss of hedgerows to make fields larger • loss of habitat • consequence of loss of habitat eg (change in) migration • fertiliser run off polluting water • use of pesticide / insecticide / herbicide reduces insects / plants which damages food chains • more soil erosion **link to atmospheric pollution** • more carbon dioxide (from farm animals / machinery) • more methane (from cows) • climate change **or** global warming • example of impact on biodiversity • acid rain • desertification Answers referring to only land use or only biodiversity are level 1		

4.7.3.3 Land use

Answer 42 · Mark scheme

November 2020 | 8461/2F | Original Q9

09.6	golden rice has improved nutritional value		1	AO1 4.7.5.4
09.7	any **one** from: • gene may contaminate / enter other breeds / species • reduction / extinction of population of wild / traditional rice • reduction / extinction of population of flowers / insects • high cost of seeds • may have too much vitamin A (in diet)	ignore references to religious beliefs allow decrease in biodiversity allow decrease in gene pool allow may harm (human) health allow may cause side effects (on humans) ignore may harm humans unqualified	1	AO3 4.6.2.4
Total			**16**	

4.7.3.3 Land use

Answer 43 · Mark scheme November 2021 | 8461/1F | Original Q4

04.1	$C_6H_{12}O_6$		1	AO1 4.4.1.1 4.4.2.1
04.2	carbohydrase		1	AO1 4.2.2.1
04.3	beaker	allow water bath	1	AO1 4.2.2.1 RPA5
04.4	so that both solutions could reach 10 °C		1	AO2 4.2.2.1 RPA5
04.5	10 / ten (minutes)		1	AO3 4.2.2.1 RPA5
04.6	test the mixture with iodine solution every 30 seconds		1	AO3 4.2.2.1 RPA5
04.7	35 °C		1	AO3 4.2.2.1 RPA5
04.8	enzyme / amylase is denatured **or** enzyme / amylase stops working (so) starch is not broken down **or** starch is still present	allow active site / enzyme has changed shape do **not** accept enzyme / amylase has died	1 1	AO2 4.2.2.1 RPA5
Total			**9**	

4.7.3.3 Land use

Answer 43 · Mark scheme

November 2021 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.7.3.3 Land use

Answer 44 · Mark scheme

November 2021 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	place the quadrat using random coordinates		1	AO1 4.7.2.1 RPA9
06.2	$\frac{40 + 52 + 88 + 80 + 40}{5}$ **or** $\frac{300}{5}$ 60		1 1	AO2 4.7.2.1 RPA9
06.3	the area of buttercup plants in quadrat 5 is much larger		1	AO3 4.7.2.1 RPA9
06.4	any **two** from: • place (many) more quadrats • divide quadrats into more / smaller squares • estimate actual percentage cover in quadrat (instead of counting squares) • only count squares with at least 50% cover	 allow repeat allow combine results with results of other students allow use a point quadrat ignore place quadrats randomly	2	AO3 4.7.2.1 8.2.9

4.7.3.3 Land use

Answer 44 · Mark scheme

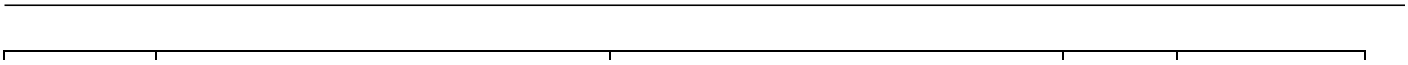
November 2021 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	any **three** from: • light • water • minerals / ions / salts • pH • temperature • herbivores • trampling / cultivation • pathogens / disease • use of weedkiller	 allow rain / moisture allow named example such as nitrate / phosphate allow fertiliser allow named example allow wind allow oxygen / air in the soil ignore carbon dioxide ignore weather	3	AO1 4.7.1.1 4.7.1.2 4.7.1.3
Total			**9**	

4.7.3.3 Land use

Answer 44 · Mark scheme

November 2021 | 8461/2F | Original Q6



4.7.3.3 Land use

Answer 45 · Mark scheme

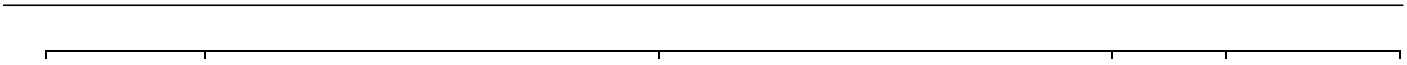
November 2021 | 8461/2F | Original Q9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	(put beaker in a) water bath	allow (put beaker in an) incubator	1	AO1 4.7.2.3 RPA10
09.2	volume of the milk **or** type of milk	allow amount of milk allow named type of milk, eg cows' or semi-skimmed	1	AO1 4.7.2.3 RPA10
09.3	correct scale and axis labelled all points plotted correctly suitable curved line of best fit	scale must be at least 1 cm for 1 day allow a tolerance of ± ½ small square allow 4 or 5 correct plots for **1** mark ignore line joined point to point with straight lines	1 2 1	AO2 4.7.2.3 RPA10
09.4	similar shaped line drawn to left of 20 °C line on **Figure 4** same start pH	 allow a tolerance of ± ½ small square allow from student's line of best fit or student's plot for 0 days	1 1	AO2 4.7.2.3 RPA10
Total			**8**	

4.7.3.3 Land use

Answer 45 · Mark scheme

November 2021 | 8461/2F | Original Q9

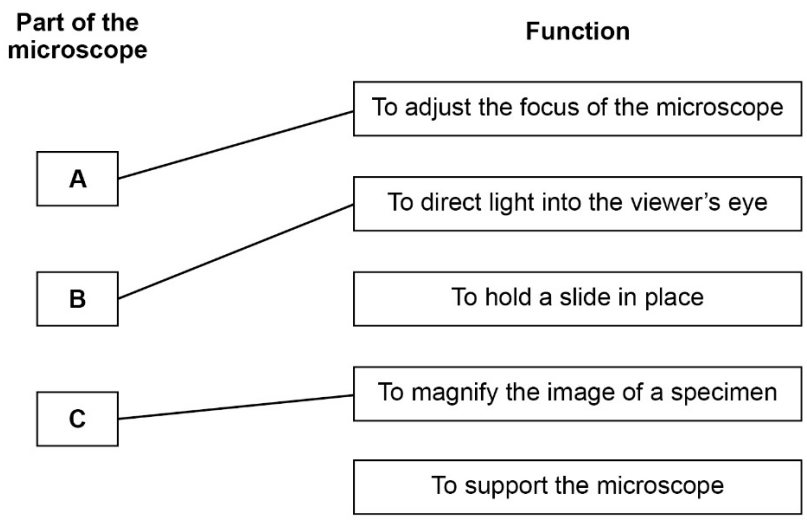


4.7.3.3 Land use

Answer 46 · Mark scheme

June 2022 | 8461/1F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	 do **not** accept more than one line from a box on the left		1 1 1	AO2 4.1.1.2 RPA1

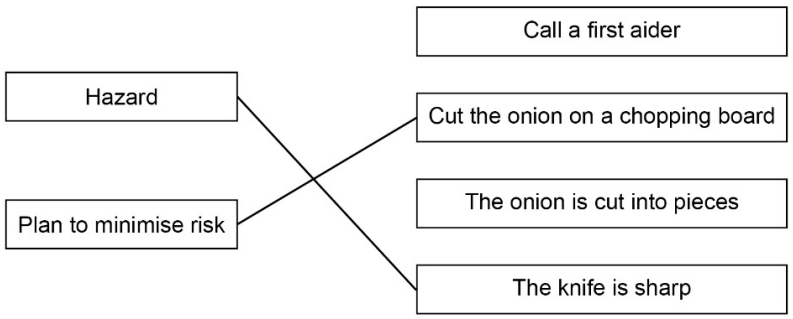
Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	to stain the cells		1	AO2 4.1.1.2 RPA1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	to allow light to pass through the cells		1	AO2 4.1.1.2 RPA1

4.7.3.3 Land use

Answer 46 · Mark scheme

June 2022 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	 do **not** accept more than one line from a box on the left		1 1	AO3 4.1.1.2 RPA1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	*student's measurement* 49 (mm)	allow in range 48 – 50 (mm)	1	AO2 4.1.1.5 RPA1
	conversion of student's measurement 49 000 (µm)	allow correct conversion using student's measurement	1	
	substitution $\frac{49\,000}{400}$	allow a correct substitution using incorrectly measured / converted length	1	
	122.5 (µm)	allow a correct answer from student's division using a magnification of ×400	1	

4.7.3.3 Land use

Answer 46 · Mark scheme

June 2022 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	the cells would look larger the cells would show more internal structures		1 1	AO1 4.1.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	complete the cell walls include the magnification		1 1	AO3 4.1.1.5 RPA1

Total Question 4		15

4.7.3.3 Land use

Answer 47 · Mark scheme

June 2022 | 8461/1F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1		must be in this order		AO1 4.1.1.1 4.1.1.2
	nucleus	allow chromosomes allow plasmid	1	
	(site of aerobic) respiration	allow makes ATP **or** releases energy do **not** accept produces / makes / creates energy do **not** accept anaerobic respiration	1	
	(cell) membrane		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	photosynthesis	allow produce glucose / sugar allow to absorb (sun) light ignore contains chlorophyll	1	AO1 4.1.1.2 4.4.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	root (hair)	allow xylem / phloem / epidermis / meristem	1	AO1 4.1.1.3 4.2.3.1 4.2.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	concentration of salt solution		1	AO1 4.1.3.2 RPA3

4.7.3.3 Land use

Answer 47 · Mark scheme

June 2022 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	to make sure **only** the potato mass was measured **or** if water / solution / liquid was left on (the potato), the mass would be higher / affected	allow (to) remove **excess** water / solution / liquid do **not** accept if water / solution / liquid was left on (potato) the mass would be lower ignore to remove water / solution / liquid on the outside / surface (of potato)	1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	$\frac{0.2}{2.5} \times 100$ 8(%)	allow $\frac{2.7 - 2.5}{2.5} \times 100$ if no other mark awarded allow **1** mark for $\frac{2.5 - 2.7}{2.5} \times 100 = -8\ (\%)$	1 1	AO2 4.1.3.2 RPA3

4.7.3.3 Land use

Answer 47 · Mark scheme

June 2022 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7 Mark with 07.8	correct scale **and** axis labelled (concentration (of salt solution) in mol/dm^3)	max **3** marks for bar chart scale must take up at least 50% of grid	1	AO2 4.1.3.2 RPA3
	all points plotted correctly	allow a tolerance of ± ½ small square allow 3 or 4 correct plots for **1** mark	2	
	curved line of best fit	ignore line extended beyond 0.4 mol/dm^3 ignore line joined point to point with straight lines	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.8 Mark with 07.7	correct answer from their line drawn on **Figure 9**	allow a tolerance of ± ½ small square ignore line joined point to point with straight lines if a line of best fit is drawn if no line of best fit is drawn, allow an answer in the range 0.31 – 0.33 (mol/dm^3)	1	AO2 4.1.3.2 RPA3

4.7.3.3 Land use

Answer 47 · Mark scheme

June 2022 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.9		allow 'pieces' for potato throughout		AO2 4.1.3.2 RPA3
	water moves out of cells / potato		1	
	by osmosis	allow by diffusion through a partially / selectively / semi permeable membrane	1	
	(because) the solution in the cells / potato is less concentrated than outside **or** (because) the solution in the cells / potato is more dilute than outside	allow (because) the solution outside the cells / potato is more concentrated than inside allow (because) the solution outside the cells / potato is less dilute than inside allow correct references to water concentration / potential ignore reference to amount of water or salt do **not** accept water moves from an area of high (solute) concentration to an area of low (solute) concentration	1	

Total Question 7		**17**

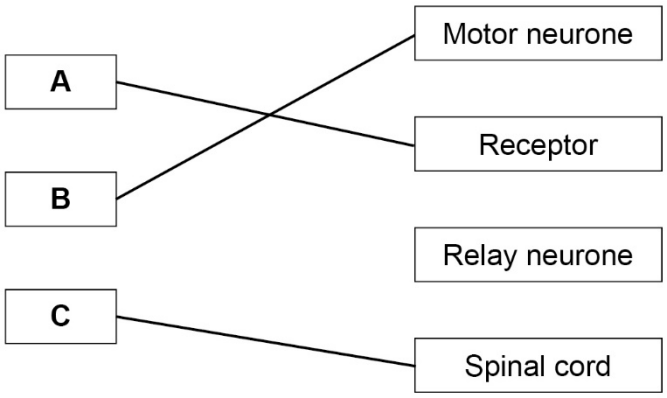
4.7.3.3 Land use

Answer 48 · Mark scheme

June 2022 | 8461/2F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	a reflex action is automatic		1	AO1 4.5.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	 do **not** accept more than one line from a box on the left		1 1 1	AO1 4.5.1 4.5.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	blinking when an insect flies into the eye removing the hand from a hot object		1 1	AO2 4.5.2.1

4.7.3.3 Land use

Answer 48 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4 *View with Table 1 Mark with 02.5*	$\frac{320 + 304 + 315 + 308 + 313}{5}$ 312	allow $\frac{1560}{5}$ if no other mark awarded allow **1** mark for $\frac{315 + 307 + 357}{3} = 326(.3)$	1 1	AO2 4.5.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5 *View with Table 1 Mark with 02.4*	ring drawn around 635 in Table 1	allow 635 or test 5 (next to question) if no ring drawn on Table 1	1	AO3 4.5.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	any **two** from: • age • drugs • tiredness / sleep • sex	allow a named example of a drug such as alcohol / caffeine allow gender allow practice at the test **or** playing computer games allow distractions	2	AO1 4.5.2.1 RPA7

Total Question 2		11

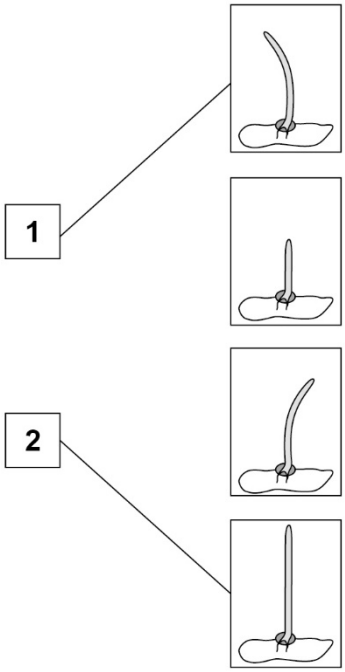
4.7.3.3 Land use

Answer 49 · Mark scheme

June 2022 | 8461/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	tropism		1	AO1 4.5.4.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	 do **not** accept more than one line from a box on the left		1 1	AO3 4.5.4.1 RPA8

4.7.3.3 Land use

Answer 49 · Mark scheme

June 2022 | 8461/2F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	to show the response in experiment **1** is caused by (1-sided) light **or** as a control	allow to compare with experiment **1** allow to show the difference between (1-sided) light and no light do **not** accept control variable	1	AO3 4.5.4.1 RPA8

4.7.3.3 Land use

Answer 49 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	shine light from all sides on the third seedling		1	AO3 4.5.4.1 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	keep each seedling at the same temperature		1	AO3 4.5.4.1 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	any **one** from: • gravity • water • chemicals / minerals / ions	allow moisture allow a named chemical such as nitrate ignore nutrients ignore light	1	AO1 4.5.4.1

4.7.3.3 Land use

Answer 49 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	because of variation (in results) **or** to identify / eliminate anomalies	allow example such as some may not grow	1	AO2 4.5.4.1
	to calculate a mean **or** a mean value would be more representative / typical	allow to calculate an average ignore to improve accuracy / precision / validity	1	

Total Question 3		9

4.7.3.3 Land use

Answer 50 · Mark scheme

June 2023 | 8461/2F | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.1	fungi		1	AO1 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.2	the pH of the milk		1	AO2 4.7.2.3 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.3	put the beaker in a water bath		1	AO2 4.7.2.3 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.4	fatty acid		1	AO1 4.2.2.1 4.7.2.3 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.5	all the fat had been digested		1	AO2 4.7.2.3 4.2.2.1 RPA10

Answer 50 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.6	any **one** from: • (there is) more (kinetic) energy • enzyme activity is higher • bacteria / microorganisms are dividing / reproducing faster	allow converse if clearly describing 5 °C allow particles move faster allow more collisions between particles allow enzymes work faster ignore enzymes work better allow number of bacteria / microorganisms increasing faster allow more bacteria / microorganisms ignore bacteria / microorganisms grow faster ignore it is warmer	1	AO2 4.7.2.3 4.1.1.6 4.2.2.1 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.7	(30 °C, 2 days) 6(.0) **and** (30 °C, 3 days) 4.7 (fall) 1.3 (pH units/day)	allow a tolerance of ±½ small square allow −1.3 (pH units/day) allow correct answer using student's incorrect readings in the range of 5.95 to 6.05 and / or 4.65 to 4.75	1 1	AO2 4.7.2.3 4.2.2.1 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.8	$\frac{1.3}{0.1}$ 13	allow ecf from answer in question **05.7** do **not** accept if a unit is given	1 1	AO2 4.7.2.3 4.2.2.1 RPA10

Total Question 5	10

4.7.3.3 Land use

Answer 51 · Mark scheme

June 2024 | 8461/1F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.1	(physical) barrier **or** stops pathogens entering (blood / body)	allow named pathogen throughout allow produces antimicrobial secretions allow produces oil / sebum / sweat ignore reference to scabs / clots	1	AO1 4.3.1.6

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.2	$\frac{63}{210}$ $\frac{3}{10}$	 allow 0.3 ignore 30% if neither mark awarded allow $\frac{210}{63} = \frac{10}{3}$ for **1** mark	1 1	AO2 4.3.1.6 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.3	*(at pH1)* 187 (killed) *(at pH5)* 31 (killed) (187 – 31) = 156 (more bacteria killed)	ignore negative symbol throughout allow correct subtraction using incorrect calculation at pH1 and/or pH5	1 1 1	AO2 4.3.1.6 4.2.2.1

4.7.3.3 Land use

Answer 51 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.4	(the student) calculated the midpoint (between) 23 and 63 **OR** any **two** from: • $\frac{63 - 23}{2} = 20$ • 20 + 23 = 43 • 63 – 20 = 43	 allow (between values at) pH1 and pH3 allow $\frac{23 + 63}{2} = 43$ for **2** marks allow plot data from **Table 1** on graph (1) then read off value for pH2 (1) allow other correct methods for up to **2** marks	1 1	AO3 4.3.1.6 4.2.2.1

Total Question 2	8

4.7.3.3 Land use

Answer 52 · Mark scheme

June 2024 | 8461/1F | Original Q4

Question 4

Question	Answers	Mark	AO / Spec Ref.
04.1	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3–4	AO1 4.2.2.1 RPA4
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–2	
	No relevant content	0	
	Indicative content: **Starch** • iodine (solution) tests for starch • iodine (solution) turns to blue-black **or** black **or** dark blue (if starch is present) • iodine (solution) remains unchanged / yellow / orange / brown (if no starch is present) **Sugar** • Benedict's (reagent / solution) tests for sugar • boil or heat (to at least 60 °C) • Benedict's (reagent / solution) turns green / yellow / orange / brown / (brick) red (if sugar is present) • Benedict's (reagent / solution) remains unchanged / blue (if no sugar is present) For **Level 2**, the response must give details of the tests for starch and sugar.		

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.2	amylase sugar	must be in this order	1 1	AO1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.3	the type of bread		1	AO2 4.2.2.1

4.7.3.3 Land use

Answer 52 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.4	any **two** from: • white bread tastes sweet in the least time • wholemeal bread takes most time to taste sweet • brown bread takes more time than white bread to taste sweet	allow answers in terms of rate, such as fastest / slowest to taste sweet allow to break down for to taste sweet, throughout allow a correct comparison of time to taste sweet for two types of bread, for **1** mark allow any two correct comparisons of time to taste sweet for two types of bread, for **2** marks ignore use of figures, unqualified	2	AO3 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.5	repeated (each type of bread) calculated a mean		1 1	AO3 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.6	$\frac{58 + 55 + 61}{3}$ 58 (seconds)	allow $\frac{174}{3}$ allow student's total correctly divided by 3 if no answer given in answer space allow answer written in **Table 3**	1 1	AO2 4.2.2.1

4.7.3.3 Land use

Answer 52 · Mark scheme

June 2024 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.7	each person's sense of taste is different		1	AO3 4.2.2.1

Total Question 4	**14**

4.7.3.3 Land use

Answer 53 · Mark scheme

June 2024 | 8461/1F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.1	any **two** from: • size of piece of potato • the (type of) potato • volume / 100 cm^3 of salt solution • time (pieces of potato are kept) in the solution / beaker • the potato was uncooked	ignore size of potato allow amount of salt solution allow 20 minutes (the pieces of potato are kept) in the solution / beaker ignore time unqualified	2	AO1 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.2	blot **or** dry (the surface)	allow descriptions of blotting allow descriptions of drying (the surface)	1	AO3 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.3	balance **or** weighing scale		1	AO1 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.4	0.1 g		1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.5	D		1	AO3 4.1.3.2 RPA3

4.7.3.3 Land use

Answer 53 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.6	$\frac{1.1}{6.0} \times 100$ 18.333… 18.3(%)	ignore minus sign throughout allow correct conversion to 1 decimal place from student's incorrect calculation using figures from potato piece **D**	1 1 1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.7	line graph		1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.8	water osmosis permeable (membrane)	must be in this order allow diffusion	1 1 1	AO2 AO1 AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.9	answer in the range 0.15 to 0.25 (mol/dm^3)		1	AO3 4.1.3.2 RPA3

Total Question 6	14

4.7.3.3 Land use

Answer 54 · Mark scheme

June 2024 | 8461/2F | Original Q10

Question 10

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.1	lack of oxygen for (aerobic) respiration	do **not** accept ref to respiration in dead plants	1	AO3
	(so) less / no energy (released)	do **not** accept energy produced / made / created	1	AO2
	(for) microorganisms / bacteria / fungi / microbes / decomposers **OR** low pH denatures enzymes (1)	allow low pH / acidity reduces enzyme activity	1	AO2 4.2.2.1 4.4.2.1 4.7.1.2 4.7.2.3
	(so) less / no (chemical) reactions / metabolism / respiration **or** less **/** no energy released (1)	do **not** accept energy produced / made / created		
	in microorganisms / bacteria / fungi / microbes / decomposers (1)			

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.2	34 g/m^2/year		1	AO2 4.7.4.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.3	DNA		1	AO1 4.6.1.5 4.7.1.2 4.7.1.4

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.4	protein		1	AO1 4.4.1.1 4.4.2.1 4.4.2.3 4.7.1.2 4.7.1.4

4.7.3.3 Land use

Answer 54 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.5	increase in temperature	allow global warming allow heat (energy) is trapped ignore reference to greenhouse gases	1	AO3
	(because) carbon dioxide is released (from the peat bog)		1	AO2
	(because) carbon dioxide is produced by burning / decay of peat	ignore methane is released from burning / decay of peat allow fewer plants to take in carbon dioxide (for photosynthesis)	1	AO2
	(because) methane is released (from the peat bog)		1	AO2 4.4.2.1 4.7.2.3 4.7.3.3 4.7.3.5

Total Question 10	10

4.7.3.3 Land use

Answer 55 · Mark scheme

June 2024 | 8461/2F | Original Q11

Question 11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.1	any **one** from: • collect more samples each time • collect samples more frequently • use a bigger bucket / sample • do not return tadpoles until after the fourth sample • sample at the same time of day • randomise collecting positions • collect at range of depths • standardised sweeps with a net instead of a bucket	allow suggested time interval allow a method to avoid double counting tadpoles	1	AO3 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.2	6	if no answer on line, allow answer in **Table 1**	1	AO2 4.7.2.1 RPA9

4.7.3.3 Land use

Answer 55 · Mark scheme

June 2024 | 8461/2F | Original Q11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.3	correct linear scale and axis labelled weeks	scale must use at least half available space	1	AO2 4.7.2.1 RPA9
	all points plotted correctly	allow a tolerance of ±½ small square allow 4 or 5 correct plots for **1** mark	2	
	curved line of best fit	ignore line drawn point to point	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.4	correct value at 0 and 4 weeks from line on student's graph, eg 60 and 22	allow a tolerance of ± ½ small square	1	AO2 4.7.2.1
	correct calculation eg $\frac{22}{60} \times 100$		1	
	36.7	allow 37 or 36.6... allow correct calculation using values from the student's graph if no line drawn on Figure allow a calculation based on values of 60 and 24 for up to full marks if line drawn on Figure but data from table used (60 and 24) only mp2 and mp3 can be awarded	1	

4.7.3.3 Land use

Answer 55 · Mark scheme

June 2024 | 8461/2F | Original Q11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.5	any **two** from: • disease / (named) pathogens • being eaten **or** predators • lack of food • low oxygen (concentration in water) • change in temperature • change in pH • (some of the) pond dried out • toxic chemical	allow competition for food ignore competition unqualified allow eutrophication allow lack of space allow named example such as sewage / fertiliser ignore pollution ignore waste	2	AO2 4.7.1.2 4.7.1.3

Total Question 11	11

4.7.3.3 Land use

Answer 56 · Mark scheme

June 2025 | 8461/1F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.1	temperature of pondweed		1	AO1 4.4.1.2 RPA6

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.2	oxygen chlorophyll	in this order only	1 1	AO1 4.4.1.1 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.3	 (time) decreases then (time) increases	ignore use of data allow rate / speed increases allow then rate / speed decreases	 1 1	AO3 4.4.1.2 RPA6

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.4	$\frac{10}{33}$ 0.3030… 0.3	 do **not** accept 0.30 allow correct rounding to 1 dp from a calculation using an incorrect value for time from **Table 2**	1 1 1	AO2 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.5	40 °C		1	AO3 4.4.1.2 RPA6

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.6	more than 77 seconds		1	AO3 4.4.1.2

4.7.3.3 Land use

Answer 56 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.7	concentration of carbon dioxide light intensity		1 1	AO1 4.4.1.2 RPA6

Total Question 2	12

4.7.3.3 Land use

Answer 57 · Mark scheme

June 2025 | 8461/1F | Original Q4

Question 4

Question	Answers	Mark	AO / Spec Ref.
04.1	**Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5-6	AO2
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3-4	AO1
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1-2	AO1 4.1.1.6 RPA2
	No relevant content.	0	

	Indicative content: *preparation of agar plate* • melt agar • pour agar into Petri dish • allow agar to cool / set *transfer of bacteria* • transfer bacteria to agar / Petri dish **or** spread bacteria on agar / Petri dish • transfer bacteria using (inoculating) loop **or** by pouring (liquid) bacterial culture *techniques to ensure sterile conditions (aseptic technique)* • wipe table with a disinfectant / antibacterial solution **or** sanitise hands using sanitiser gel • sterilise agar by heating **or** using autoclave / UV **or** pressure cooker • sterilise Petri dish by heating **or** using autoclave / UV **or** pressure cooker **or** ethanol • sterilise neck of agar / bacteria bottle by passing through a flame • only open lid of agar bottle minimally **or** only lift lid of Petri dish minimally • work next to a Bunsen flame • sterilise inoculating loop before use by dipping in alcohol / ethanol • sterilise inoculating loop before use by passing through a flame *growth of bacteria* • incubate Petri dish upside down • tape lid (correctly) • incubate at 25 °C **or** leave bacteria to grow For **Level 3**, a valid method must include preparation of the agar plate and transfer of the bacteria using sterile techniques. For **Level 2**, a method must include preparation of the agar plate and transfer of the bacteria.		

4.7.3.3 Land use

Answer 57 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.2	to prevent growth of pathogens	allow to prevent growth of harmful bacteria / fungi / microorganisms	1	AO2 4.1.1.6 RPA2

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.3	to show the effect of no antibiotics		1	AO2 4.1.1.6 RPA2

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.4		ignore ring drawn around blank / water disc ignore shading / hatching within rings		AO3 4.1.1.6 RPA2
	larger ring drawn around antibiotic **A** than **B**		1	
	smaller ring drawn around antibiotic **C** than **B**	ignore no ring drawn around antibiotic **C**	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.5	none of the bacteria would have been killed		1	AO3 4.1.1.6 4.3.1.8

Total Question 4	11

4.7.3.3 Land use

Answer 58 · Mark scheme

June 2025 | 8461/1F | Original Q8

Question 8

Question	Answers	Mark	AO / Spec Ref.
08.1	**Level 3**: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5–6	AO3
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.	3–4	AO3
	Level 1: Relevant points are made. They are not logically linked.	1–2	AO3
	No relevant content.	0	4.1.3.2 RPA3

Answer 58 · Mark scheme

	Indicative content: *(strengths)* • same / a / one plant / potato used • all potato pieces used were cubes • mass was recorded before and after • change in mass was calculated • different concentrations of salt solution were used *(improvement and reason)* • use the same / a / one potato for all pieces o (because the student) may have used different potatoes • remove skin **or** peel the potato o (because) skin (may still be) present • blot / dry cube before measuring mass o (because) cube will have excess water on surface • use same / set size / surface area of potato piece each time o (because) size / surface area of cubes not controlled / specified • repeat (whole investigation **or** at each concentration) o (because there were) no repeats o to spot anomalies • calculate mean (from repeats) o (because there was) no mean calculated • same time for each piece to be in solution o (because) length of time in solution not specified • control temperature of solution using water bath o (because) temperature (of solution) not controlled / specified • use same volume of solution for each piece of potato **or** ensure all pieces are completely submerged o (because) volume of solution not specified / controlled • calculate percentage change in mass o (because) percentage change in mass not calculated **or** (because) each potato piece had a different starting mass • include control experiment with boiled cube o (because) no control experiment included • increase the number of concentrations (of salt solution) used o (because) only 3 different concentrations (of salt solution) used For **Level 3**, a strength and improvements / reasons must be included.		

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.2	the solution in the potato cells was more concentrated than the distilled water		1	AO2 4.1.3.2

4.7.3.3 Land use

Answer 58 · Mark scheme

June 2025 | 8461/1F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.3	any **one** from: • requires energy • (transports substances) against / up a concentration gradient • transports minerals / ions (and not water)	ignore it is active allow it is not passive allow (transports substances) from low concentration to high concentration ignore (transports substances) along / across the concentration gradient do **not** accept (transports substances) down a concentration gradient allow transports other named substances such as glucose allow does not transport water	1	AO2 4.1.3.2 4.1.3.3

Total Question 8	8

4.7.3.3 Land use

Answer 59 · Mark scheme

June 2025 | 8461/2F | Original Q9

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	to remove all / the water	allow to make sure there is no water left allow to make sure the soil is (completely) dry ignore to remove water unqualified	1	AO3 4.7.1.2 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	$\frac{71}{252} \times 100$ 28.1(746…) 28 (%)	 allow student's incorrectly calculated percentage using mass data for 20 metres, rounded to nearest whole number	1 1 1	AO2 4.7.1.2 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.3	as distance increases the percentage of water increases	allow positive correlation allow as one increases the other increases allow as one decreases the other decreases ignore directly proportional	1	AO3 4.7.1.2 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	any **two** from: • repeat (at each distance) **and** calculate a mean • test at intermediate / further distances • test around more / different trees • test at different angles around the (same) tree	allow repeat (at each distance) **and** remove / identify anomalies allow test more areas	2	AO3 4.7.1.2 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	any **three** from: • light (intensity) • temperature • type of soil • pH (of soil) • minerals / ions (in soil) • wind (intensity / direction) • oxygen in soil	if neither awarded allow shade for **1** mark ignore sun allow acidity / alkalinity (of soil) allow salts **or** named examples of ions, such as nitrate allow fertiliser ignore nitrogen / nutrients ignore (availability of) space ignore carbon dioxide	3	AO2 4.7.1.1 4.7.1.2 4.7.2.1 RPA9

Total Question 9	10

4.7.3.3 Land use

AQA

GCSE
BIOLOGY
8461/1F

Paper 1 Foundation Tier

Mark scheme

June 2020

Version: 1.0 Final Mark Scheme

jun2084611F/MS

4.7.3.3 Land use

MARK SCHEME – GCSE BIOLOGY – 8461/1F – JUNE 2020

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Copyright information

For confidentiality purposes acknowledgements of third-party material are published in a separate booklet which is available for free download from www.aqa.org.uk after the live examination series.

Copyright © 2020 AQA and its licensors. All rights reserved.

MARK SCHEME – GCSE BIOLOGY – 8461/1F – JUNE 2020

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols/formulae

If a student writes a chemical symbol/formula instead of a required chemical name, full credit can be given if the symbol/formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. Full marks can, however, be given for a correct numerical answer, without any working shown.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ecf in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

3.10 Do <u>not</u> accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1: Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2: Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this.

The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

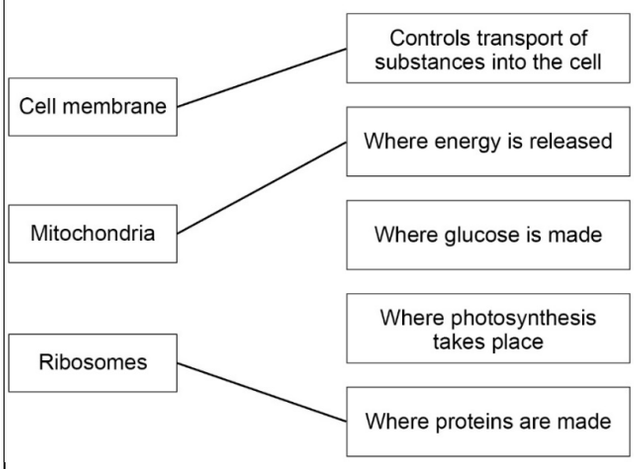
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

4.7.3.3 Land use

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	bacterium		1	AO2 4.1.1.1
01.2	to strengthen the cell		1	AO1 4.1.1.1 4.1.1.2
01.3	chloroplast		1	AO2 4.1.1.2 4.2.3.1
01.4	**Structure** **Function**  additional line from a box on the left negates the mark for that box		3	AO1 4.1.1.2 4.1.3.1
01.5	adjust the focus knob		1	AO3 4.1.1.2 RPA1
01.6	(A =) 15 (mm) (B =) 60 (mm)	allow a tolerance of ± 1mm	1 1	AO2 4.1.1.2 RPA 1
01.7	$\frac{60}{15} = 4(.0)$	allow ecf from question **01.6**	1	AO2 4.1.1.2 RPA 1

4.7.3.3 Land use

01.8	40 / 0.1 400	 do **not** accept if a unit is given	1 1	AO2 4.1.1.5 RPA 1
Total			**12**	

4.7.3.3 Land use

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	mitosis		1	AO1 4.1.2.2
02.2	all lines correct = **2** marks 1 or 2 lines correct = **1** mark **Stage of cell cycle** / **What happens during that stage** Stage 1 → The cell grows and the chromosomes replicate Stage 2 → One set of chromosomes is pulled to each end of the cell Stage 3 → The cytoplasm and cell membrane divide to form two new cells additional line from a box on the left negates the credit for that box		2	AO1 4.1.2.2
02.3	$\frac{7}{10} \times 100$ 70(%)	allow $\frac{252}{300} \times 100$ allow answer calculated from angle in range 250° to 254° if no other mark awarded, allow 0.7 for **1** mark	1 1	AO2 4.1.2.2
02.4	3		1	AO2 4.1.2.2
02.5	DNA	allow deoxyribonucleic acid	1	AO1 4.1.2.1 4.1.2.2
02.6	a gene		1	AO1 4.1.2.1

4.7.3.3 Land use

02.7	(bone marrow) cells differentiate into many / other types of (named) cell (so) will cure diseases where new cells are needed **or** will cure diseases where cells are damaged	allow (bone marrow) cells can become many / other types of (named) cell allow (so) will cure anaemia / leukaemia **or** blood cancer **or** blood disorders allow (so) will cure paralysis / diabetes	1 1	AO1 AO2 4.1.2.3
Total			**10**	

4.7.3.3 Land use

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	any **one** from: • bacteria • fungi • protists	allow singular allow names of pathogens e.g. Salmonella ignore virus / germ	1	AO1 4.3.1.1 4.3.1.3 4.3.1.5
03.2	hydrochloric acid is produced by the stomach the skin is a barrier covering the whole body		1 1	AO1 4.2.2.1 4.3.1.6
03.3	white blood cells engulf the microorganisms.		1	AO1 4.2.2.3 4.3.1.6
03.4	weakened fast	in this order only	1 1	AO1 4.3.1.7
03.5	by coughs / sneezes	allow 'by droplets in the air' do **not** accept other means of transmission e.g. touch	1	AO1 4.3.1.1 4.3.1.2
03.6	(from day) 10 (to day) 18	allow (from day) 18 (to day) 10	1	AO2 4.3.1.2
03.7	14 (days)	allow in the range 13 to 15 (days)	1	AO3 4.3.1.2
03.8	any **one** from: • they had been vaccinated • they already had antibodies • they were immune • they had had it before • they did not get any / enough virus from infected child • they did not play (much) with the infected child	 ignore they were resistant ignore they wore a mask unqualified	1	AO3 4.3.1.2 4.3.1.7

4.7.3.3 Land use

03.9	antibiotics do not kill viruses	allow antibiotics do not work on viruses allow antibiotics only kill bacteria	1	AO3 4.3.1.8
Total			**11**	

4.7.3.3 Land use

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	increased (at first) until 4 minutes **or** 50 breaths per minute (then) stayed constant (from 4 minutes **or** at 50 breaths per minute)		1 1 1	AO2 4.4.2.2
04.2	175 (beats per minute)		1	AO2 4.4.2.2
04.3	140 (beats per minute)		1	AO2 4.4.2.2
04.4	because his rate is lower than the maximum safe rate	allow ecf for incorrect values in question **04.2** and question **04.3**	1	AO3 4.2.2.2 4.4.2.2

MARK SCHEME – GCSE BIOLOGY – 8461/1F – JUNE 2020

04.5	**Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO3
	Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO2
	No relevant content	0	

	Indicative content
	
	• heart rate increased
	  ○ to increase blood flowing to muscles / lungs
	  ○ to provide more oxygen (to muscles)
	  ○ to provide more glucose (to muscles)
	  ○ to remove carbon dioxide more quickly (from the muscles / blood)
	  ○ to remove lactic acid more quickly (from the muscles)
	
	• breathing rate increased
	  ○ supplies more oxygen / air to lungs
	  ○ so more oxygen to blood
	  ○ more carbon dioxide removed
	
	• more oxygen to muscles
	  ○ needed for (increased) respiration
	  ○ to release / provide energy
	  ○ for muscle contraction
	
	• anaerobic respiration occurs
	  ○ due to lack of oxygen
	  ○ which causes a build-up of lactic acid
	  ○ oxygen debt
	  ○ muscle fatigue / pain
	
	To reach **Level 3**, there must be reference to heart rate, breathing rate and respiration
			4.2.2.2
			4.2.2.3
			4.4.2.1
			4.4.2.3
			4.4.2.2

Total			**12**

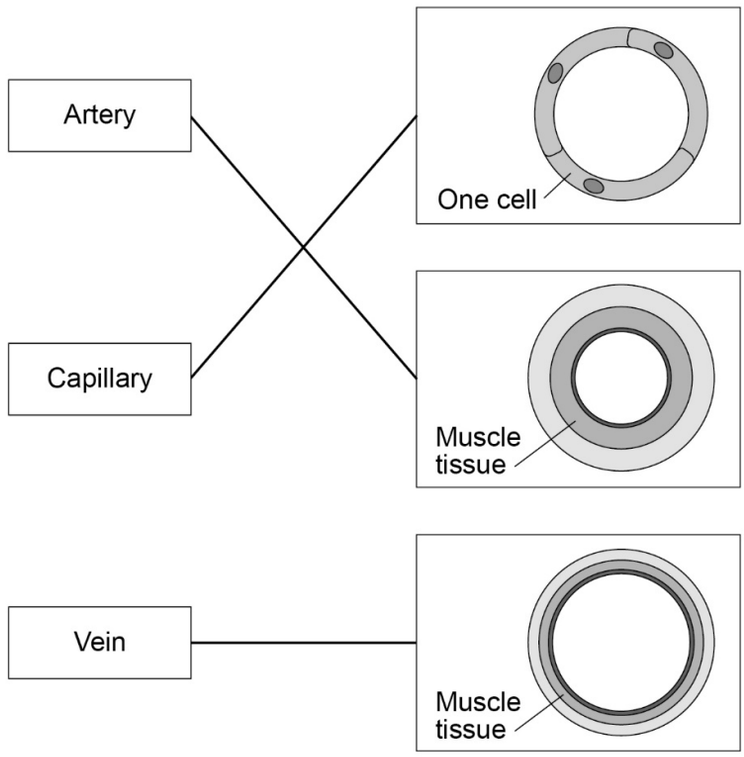
4.7.3.3 Land use

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	will stop animals / herbivores eating it	allow it will not be eaten	1	AO3 4.3.3.2
05.2	chemical		1	AO1 4.3.3.2
05.3	thorns / spikes / spines / prickles (to stop animals / herbivores eating it)		1	AO3 4.3.3.2
05.4	for respiration to store as starch		1 1	AO1 4.4.1.3 4.4.2.1
05.5	add Benedict's (solution / reagent to the liquid) boil / heat (if glucose is present the blue) colour changes to yellow / green / orange / brown / (brick)red	 allow any temperature of 65 °C or above	1 1 1	AO1 4.2.2.1 RPA 4
05.6	(nitrate ions are needed) to make proteins / amino acids which are needed for growth / enzymes / new cells	allow to make chlorophyll / DNA / ATP / nucleic acid allow correct process for named molecule in mp1	1 1	AO1 AO2 4.1.3.3 4.4.1.3 4.4.2.3
05.7	in / on the (soil) water	allow through air (spaces) in the soil	1	AO3 4.3.1.1 4.3.1.4
05.8	dosage toxicity		1 1	AO1 4.3.1.9

4.7.3.3 Land use

05.9	placebos		1	AO1 4.3.1.9
Total			**14**	

4.7.3.3 Land use

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	all lines correct = **2** marks 1 **or** 2 lines correct = **1** mark **Type of blood vessel** / **Structure of blood vessel**  additional line from a box on the left negates the credit for that box		2	AO2 4.2.2.2

4.7.3.3 Land use

06.2	any **one** from: • thick(er) (muscle) walls / tissue (1) to push blood (all) around the body (1) **or** • thick(er) elastic walls / tissue (1) to maintain / withstand high (blood) pressure **or** to retain / regain shape (1) **or** • narrow lumen (1) to maintain high (blood) pressure (1)	 allow to withstand high (blood) pressure do **not** accept to pump blood (all) around the body	2	AO1 4.2.2.2
06.3	(A) – white (blood) cell(s) (B) – platelet(s)	allow any named white (blood) cell(s)	1 1	AO2 4.2.2.3
06.4	(no nucleus) more space for haemoglobin / oxygen (has haemoglobin) to bind / carry oxygen	allow to carry more oxygen ignore carries carbon dioxide	1 1	AO3 4.1.1.2 4.1.1.3 4.2.2.3
06.5	plasma		1	AO1 4.2.2.3
06.6	platelets		1	AO3 4.2.2.3

4.7.3.3 Land use

06.7	any **one** from: • (continued) bleeding • (more) bruising	allow described allow blood does not clot (at cuts) allow ecf from answer to question **06.6**	1	AO3 4.2.2.3
Total			**11**	

4.7.3.3 Land use

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	*before arrow* carbon dioxide **and** water *after arrow* glucose	allow correct chemical symbols ignore any attempt at balancing equation ignore light / chlorophyll either order ignore sugar / carbohydrate do **not** accept starch	 1 1	AO1 4.4.1.1
07.2	<u>light</u> (light) is captured / trapped / absorbed by chlorophyll / chloroplasts	ignore description of subsequent parts of the photosynthesis reaction allow sun<u>light</u> ignore sun allow (light) is used by chlorophyll / chloroplasts	 1 1	AO1 4.1.1.2 4.4.1.1
07.3	$\frac{(18.5 + 19.3 + 19.5)}{3}$ **or** $\frac{57.3}{3}$ 19.1 (cm^3/hour)	 allow an answer correctly calculated using only two correct values	1 1	AO2 4.4.1.2 RPA 6
07.4	a ring around 14.2	allow clear indication of correct result	1	AO3 4.4.1.2 RPA 6

4.7.3.3 Land use

07.5	any **one** from: • scale / value was misread • there was air / oxygen in the syringe / measuring cylinder / apparatus • the lamp / light was moved • temperature changed • had different mass / length of pondweed • pondweed had not acclimatised	ignore human error ignore references to counting bubbles or time allow measurement error allow light intensity changed ignore different bulb / lamp unqualified	1	AO3 4.4.1.2 RPA 6
07.6	did not use it in calculation (of mean)		1	AO3 4.4.1.2 RPA 6
07.7	any **one** from: • light (intensity) • carbon dioxide (concentration) • pondweed size / amount • pondweed species	do **not** accept temperature ignore time allow distance / power / colour of lamp / light allow same (piece of) pondweed	1	AO3 4.4.1.2 RPA 6
07.8	enzyme(s) lose the shape of the active site	allow enzyme(s) (start to) denature allow enzyme(s) destroyed / damaged do **not** accept enzyme(s) killed	1	AO2 4.2.2.1

4.7.3.3 Land use

07.9	y-axis labelled '(rate of) photosynthesis in cm^3/hour'		1	AO2 4.4.1.2 RPA 6
	suitable scale on y-axis	must take up half or more of grid provided	1	
	all points plotted to within ± ½ small square	allow 3 or 4 correct plots for **1** mark ignore any attempt to plot a point at 20 °C	2	
	correct curved line of best fit	ignore line joined point to point with straight lines ignore extrapolation	1	
Total			**16**	

4.7.3.3 Land use

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	movement / spreading out of molecules / particles	allow movement / spreading out of (named) substances / chemicals / gases / liquids ignore reference to membranes / cells	1	AO1 4.1.3.1
	from (an area of) high(er) concentration to (an area of) low(er) concentration	allow down / with the concentration gradient ignore along / across the concentration gradient do **not** accept movement from / to a concentration gradient	1	
08.2	increased carbon dioxide concentration in the air		1	AO2 4.1.3.1 4.2.3.2
	increased number of stomata that are open		1	

MARK SCHEME – GCSE BIOLOGY – 8461/1F – JUNE 2020

08.3	**Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.1.3.1 4.2.2.2 4.2.2.3
	Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	

	Indicative content
	• (many) alveoli
	  • provide a large(r) surface area (**:** volume)
	
	• capillaries are thin
	  or alveoli / capillary walls are thin **or** one cell thick
	  or capillaries are close to the alveoli
	  • which provides short diffusion path (for oxygen / carbon dioxide)
	
	• breathing (mechanism) moves air in and out
	or lungs are ventilated
	  • to bring in (fresh) oxygen
	  • to remove carbon dioxide
	  • to maintain a concentration / diffusion gradient`
	
	• large capillary network (around alveoli)
	or good blood supply
	  • to remove oxygen(ated blood) quickly
	  • to bring carbon dioxide to the lungs quickly
	  • to maintain a concentration / diffusion gradient		

08.4	Osmosis	allow diffusion	1	AO1 4.1.3.1 4.2.3.2 4.1.3.2
08.5	active transport (because) energy is needed (to move nitrate ions) from a low(er) concentration (in the soil) to a high(er) concentration (in the root / cell)	 allow (to move nitrate ions) against / up the concentration gradient allow (because) there is a lower concentration (of nitrate ions) in the soil **or** (because) there is a higher concentration (of nitrate ions) in the root / cell ignore reference to amount / number of nitrate ions ignore along / across the concentration gradient do **not** accept if reference to molecules / atoms moving	1 1 1	AO3 AO2 AO2 4.1.1.3 4.2.3.2 4.1.3.3
Total			**14**	

4.7.3.3 Land use

Answer 39 · Examiner comments November 2020 | 8461/1F | Original Q7

Question 7 (standard demand)

The equation for photosynthesis had been generally well learnt, with two-thirds of students scoring at least one mark. **07.2** was not answered well, with the reference to 'energy' leading some students to write confused accounts about respiration. Nearly two-thirds of students were able to identify the anomalous result in **07.4**. In **07.5**, reference to 'human error' on its own was insufficient.

The concept of denaturation in **07.8** was not acknowledged by most students, as they were unable to make the link between photosynthesis and enzymes. Students are advised to read and follow all of the instructions given when asked to draw a graph, as in **07.9**, many students missed key tasks despite them being listed clearly. Students need to understand how to draw a line/curve of best fit when the plots do not fall on a straight line and students generally could be more accurate when plotting points, particularly those that are not whole numbers. A few students plotted the three individual repeats for each temperature rather than the mean, which meant that no plotting marks could be awarded.

Answer 40 · Examiner comments November 2020 | 8461/2F | Original Q7

Question 7 (low & standard demand)

This question was about DNA. In **07.1** many students knew the term 'double helix' and gained both of the available marks. Other students attempted to describe the figure lower down on the page, but usually did so in terms of the labelled components of the structure. Various acceptable terms were used as synonyms for 'helix'.

For **07.5** all sorts of mathematical manipulations were carried out with the two numbers in the question. Although these often correctly involved multiplication, the values were sometimes written down incorrectly or the million in the question was interpreted as thousands or billions or anything in between. Consequently, the correct answer was not commonly given. The answer line showed that it was unnecessary to expand the millions in the question, although many attempted to do so. In **07.6** many students carried out further calculations with no reference to the answer they had given in the previous part, introducing all sorts of numbers with no evidence as to their origin. Some multiplied by a factor of 10^9, whilst others omitted the millions in question 07.5 and simply divided what they had written by 10^9.

4.7.3.3 Land use

Answer 41 · Examiner comments — November 2020 | 8461/2F | Original Q8

Question 8 (standard demand)

The question was about the decay of milk. In **08.4**, the need to control the volume of milk was frequently recognised, although some students forgot the aim of the investigation and qualified their answer unsuitably as cows' milk. Very few other correct answers were offered, the most common being the time of day when the pH should have been measured. A significant number of students repeated information already provided, including the duration of the investigation, or incorrectly suggested 'temperature' (which was the independent variable).

A large majority of students in **08.6** either misinterpreted the graph itself or the aim of the investigation. Thus, there were many descriptions of temperature and pH falling as time progressed. It was particularly common for students to interpret the y-axis as showing pH, despite it being clearly labelled as the time taken. Thus, a very small proportion of students gained both marks here, and many students omitted any reference to data.

Answer 41 · Examiner comments — November 2020 | 8461/2F | Original Q8

In **08.7** most students did little more than repeat the information that the time taken is less at 10 °C than at 5 °C. Some contradicted the information and described the reverse relationship, whilst others again compared pH10 with pH5. Those who did gain the mark usually referred to enzyme activity. Hardly any referred to a higher rate of division of microorganisms at the higher temperature.

In **08.8** some students recognised that one possible cause was due to differences in composition between the different types of milk, however many of these did not go into detail about what those differences might be. Higher-attaining students picked up on the information and referred to lipid content, different bacteria present or differences in starting pH; however very few were able to offer two acceptable ideas.

4.7.3.3 Land use

Answer 42 · Examiner comments

November 2020 | 8461/2F | Original Q9

Question 9 (standard demand)

The question was about human population increase and the problem of provision of sufficient food. For the calculation in **09.2**, both of the values required were given in the information, so it was not necessary to determine figures from the graph. Despite this, many students did attempt to, often incorrectly. For those who did show the correct numbers in their calculations, a large proportion used them incorrectly, often adding them and very few did the necessary calculation of dividing the difference by 50. Some just left the value at '0.9' and a significant number divided this by 5, rather than by 50. Others calculated the mean of the two given values rather than the mean annual increase.

In **09.3** most students attempted to draw some sort of extrapolation on the graph; however, this was often not linked to the trend shown by the line, rising a little, then plateauing or even taking a downturn. Students could still gain the second mark for reading the correct value from their own line. Often this was not done accurately, particularly by students who continued their extrapolation beyond 2050 and read off the final population value. It was clear that students who simply read the scale, and gave answers such as '10' had not considered the implication that their answer of a human population of only 10, rather than 10 billion, is unlikely.

Of the more successful students in **09.4** these showed some understanding of the term 'quota' and described limiting fishing in one way or another. However, this was as far as some got as they omitted the idea that the remaining fish would be able to reproduce, in order to maintain stocks. Lower-attaining students often suggested that a quota referred to the amount of fish that people could buy or eat. In **09.5** many students did not link the need for more farmland to an increasing population needing more food. References to the use of chemicals to enhance growth were only given very occasionally. In terms of reduced biodiversity, hardly any students went beyond 'cutting down trees' and habitat loss. Few students referred to methane production but these rarely went any further. Whilst many students filled up the available space, most of these simply repeated the same vague points in order to do so.

4.7.3.3 Land use

Answer 42 · Examiner comments

November 2020 | 8461/2F | Original Q9

Concluding Remarks

Particular problems which occurred quite frequently included:

- confusion of certain terms, eg mitosis / meiosis, reabsorption / filtration / excretion
- paying insufficient attention to information provided in the stem of a question in order to guide a reasoned response, avoid misconceptions and the inclusion of irrelevant information
- repeating, rather than using, information given in the question, for which no marks are available
- careless reading of the question resulting in an inappropriate answer, or not following instructions in multiple-choice items, such as to tick the correct number of boxes
- careless reading of data from a graph
- omitting numbers when a question asks for the use of data
- missing a question when no answer lines were provided and the answer needed to be in a table or a Punnett square
- poor handwriting, for example with numerals – especially the distinction between the numbers 1 and 2
- not checking whether the answer to a calculation is sensible – for example, in converting units over an appropriate order of magnitude, such as the conversion of nanometres to metres.

4.7.3.3 Land use

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.7.3.3 Land use

Answer 46 · Examiner comments

June 2022 | 8461/1F | Original Q4

Question 4 (Low and standard demand)

04.1 Over 70% of students gained full marks in this question, correctly identifying the parts of the microscope and their functions.

04.2 Nearly 80% of students were able to identify that iodine solution was used to stain the cells.

04.3 Over 90% of students were able to identify that a thin layer of onion allowed light to pass through the cells.

04.4 Over two thirds of students gained full marks in this question. Of those that did not, the most common error was calling a first aider for the plan to minimise the risk.

04.5 Inaccurate measurements of line A-B resulted in some incorrect final lengths of cell Z. However, in the main, most students used the scaffolding provided well and scored well in this question part. Errors in measurement from the line given were largely due to students attempting conversions or calculations on their measurement before completing the answer line. Some responses contained a final solution that was incorrect and would indicate that a calculator was not used in the examination.

04.6 It was common to see only one box ticked in this question, and in **04.7**; students are reminded to read the instructions given in the question carefully. Nearly 50% of students scored full marks and just under 50% scored 1 mark in this question.

04.7 Over 70% of students gained both marks in this question with the most common incorrect answers being to ‘use a ruler to draw the cells’ and to ‘add colour’.

4.7.3.3 Land use

Answer 47 · Examiner comments

June 2022 | 8461/1F | Original Q7

Question 7 (Standard demand)

07.1 Students' knowledge of sub-cellular structures was generally well evidenced in this question, however, the common error of referring to energy production / creation in the mitochondria was still seen. In addition, students often referred to energy being released 'for respiration', which is not creditworthy. There was also frequent confusion between cell membranes and cell walls. Just under a third of students gained 2 marks in this question.

07.2 Less than 45% of students were able to correctly reference the function of chloroplasts. Of those that did, most referred to the role in absorbing sunlight, rather than referencing photosynthesis. A few students simply stated that the role was to make the cell or plant green, which was insufficient.

07.3 Only 15% of students were able to name a plant cell that was lacking in chloroplasts, with the majority often giving other types of cell (such as a bacterium), or other sub-cellular structures, as an answer.

07.4 Just under 45% of students were able to correctly identify the independent variable in the investigation.

07.5 It was clear that many students had carried out the required practical on osmosis assessed in this question. However, this did not always translate to an articulate answer regarding blotting. The 45% of students who gained credit in this question were able to articulate the need to remove excess water, or that any extra water would add to the mass recorded, rather than just repeat the stem of the question, as was commonly seen.

07.6 The majority of students were able to use the equation provided to correctly calculate the percentage increase. Some students used an alternative method which would have led to a correct value if they had remembered to subtract 100 from their final answer. Students should therefore be reminded that, in questions where they are given an equation to use, they should use that equation to avoid missing out on vital marks.

07.7 Graph drawing skills still prove difficult for some students, and many make their lives more difficult by using unusual scales or, as often seen in this question, by shifting their x-axis scale. These ideas in themselves are acceptable, but only when the scales remain even and

4.7.3.3 Land use

Answer 47 · Examiner comments

June 2022 | 8461/1F | Original Q7

the zero is clearly identified, which often, they were not. While many students were able to plot accurately, a number incorrectly transcribed the reading of (0.3, 0.4) from the table, instead plotting the x-value at 4.0. Many students were unable to draw a correct curve of best fit, either drawing a straight line, or a curve that did not hit all of the points, or that was broken or 'feathered'. Curves of best fit should fall within ½ a small square of all of the points and should be a single, unbroken line. Students should also be reminded that their scale should take up at least 50% of the grid space provided.

07.8 Very few students understood the idea that where the curve crosses the x-axis is where there is no net loss or gain of water in osmosis, and those that did often did not gain credit because of inaccurate readings. Again, readings must be within ½ a small square to be creditworthy. 76% of students scored zero in this question.

07.9 As in previous years, many students continue to make the same error when describing 'concentration' in osmosis explanations. If water concentration is not specified, it is assumed that solute concentration is being described and this often results in an incorrect answer (for example, 'water moves from an area of high concentration to an area of low concentration' is **not** correct). Some students correctly articulate themselves in terms of water concentration, but then go on to contradict themselves with incorrect references to concentration gradients (again, solute is assumed unless water is specifically quoted). A number of students did not make the link to osmosis, instead describing how the salt absorbed the water, dissolved the potato pieces or dried them up. Over two thirds of students scored zero in this question.

4.7.3.3 Land use

Answer 48 · Examiner comments — June 2022 | 8461/2F | Original Q2

Question 2

This question was about reflexes and an investigation into the measurement of reaction times.

02.1 Nearly all students correctly selected the option that a reflex action is automatic.

02.2 There was some confusion over the naming of the various components of the reflex arc shown in **Figure 3** and, although the vast majority got at least one correct, only one fifth correctly selected the names of all three.

02.3 Although the instruction was to select *two* examples of reflexes from the five actions listed, one percent of students selected just one. However, almost 90 percent correctly selected both blinking when an insect flies into the eye and removing the hand from a hot object.

02.4 Around three-quarters of students were able to calculate the correct mean value for the reaction time from the data in **Table 1**. Those who did not, sometimes calculated the mean of the other mean values and so gained just one of the two marks available for demonstrating the method of calculating a mean. A few students transferred the numbers from the table incorrectly, ending up with the wrong answer and so could gain no credit.

02.5 Most students correctly ringed '635' in the table as the anomalous result, although some ringed the mean for student **R**, possibly believing that the mean value had been incorrectly calculated from the raw data.

02.6 Tiredness, or a synonym thereof, and drugs were the most common correct answers as possible factors affecting a person's reaction time. Some students suggested two named drugs, such as caffeine and alcohol, but only gained one mark as these were considered to be too closely related. Several suggested 'distractions' or gave an example of one.

Answer 49 · Examiner comments — June 2022 | 8461/2F | Original Q3

Question 3

This question was about an investigation into phototropism.

03.1 Just over half correctly selected *tropism* as the name of the response by a plant shoot to light shining from one side.

4.7.3.3 Land use

Answer 49 · Examiner comments

03.2 Only a quarter of students knew that a shoot exposed to one-sided light would grow towards the light and that a shoot is darkness would increase in length as well as remaining vertical.

03.3 The most common answer to this was simply to 'see how the plant grows in the dark', so there were relatively few who explained the purpose of experiment **2** as an experimental control. The term 'control', so often seen in previous examinations, was noticeable for its almost complete absence, and even the idea of it being a comparison was not common.

03.4 Almost three-quarters of the students selected the suggestion of shining light from all sides on an extra seedling as a means of increasing the validity of the investigation.

03.5 Almost three-quarters also chose keeping each seedling at the same temperature as a suitable control variable.

03.6 Despite *gravity* being referred to in the Specification, by far the most common correct answer for a stimulus to which plant roots are sensitive was 'water'. 'Light' was not an unusual answer, despite it being specifically excluded by the question.

03.7 Considering that students would have completed questions 02.4 and 02.5 not long before they answered this question, it was surprising how few could give correct answers here for reasons why scientists often repeat investigations several times. Reference to calculating a *mean* (or sometimes 'average') often gained a mark, but reference to *anomalies* was much less common. Ideas about validity, accuracy and repeatability were not uncommon, but were not credited.

4.7.3.3 Land use

Answer 50 · Examiner comments

June 2023 | 8461/2F | Original Q5

Question 5

This question was about the decay of milk and an investigation into the effects of temperature on the rate of decay.

05.1 Given that bacteria can cause decay, three-quarters of students correctly selected fungi as another type of organism that could do the same.

Questions 05.2 to 05.8 related to a laboratory investigation of pH changes in milk as it decayed at different temperatures.

05.2 Just over half the students were able to select the pH of the milk as the dependent variable in the investigation.

05.3 Approximately half the students selected putting the beaker of milk in a water bath as the method for keeping milk at 30 °C for 7 days.

05.4 Given the choice of amino acids, fatty acids or hydrochloric acid, nearly 60 percent of students correctly opted for fatty acids as the product of digestion of fats in the milk.

Answer 50 · Examiner comments

June 2023 | 8461/2F | Original Q5

05.5 The graph in Figure 9 showed the pH changes in milk at 5 °C, 20 °C and 30 °C over 7 days. Most students correctly selected the option that all the fat had been digested as the reason for the pH not falling below pH 4.5

05.6 Explanations of why the rate of fat digestion was higher at 30 °C than at 5 °C were often rather weak – such as ‘the enzymes work better’ or ‘the enzymes are at their optimum temperature’ or ‘chemical reactions are faster’, none of which really went beyond what had been stated in the question. Only about 1 in 6 could add a proper explanation in terms of more energy being available at the higher temperature or particles colliding more frequently or the enzyme having a higher activity or the bacteria reproducing faster.

05.7 This question was a structured calculation requiring reading two pH values on the 30 °C line on the graph in Figure 9 and then subtracting one from the other. Around three-quarters of students were successful but errors included incorrect values being read from the graph and an inability to do the subtraction.

05.8 Given that the fall in pH at 5 °C was 0.1 pH units per day, students had to calculate how many times faster their answer to question 05.7 was than 0.1. Just under half were successful. Many made the error of subtracting the values instead of dividing.

4.7.3.3 Land use

Answer 51 · Examiner comments

June 2024 | 8461/1F | Original Q2

Question 2 (low demand)

02.1 This question specifically asked how the skin protects against pathogens and not how the human body in general is able to defend itself. References to white blood cells, antibodies, mucus and stomach acid were therefore, not creditworthy. Some students made incorrect suggestions such as 'the hairs on the skin catch pathogens' or 'the pores are small so that pathogens cannot pass through them'. Others used descriptions that lacked specificity such as 'it has many layers' or 'it is thick and strong'. Nearly 60% of students gave the correct idea of the skin being a barrier or stopping pathogens from entering.

02.2 Just over 40% of students were awarded full marks in this question, with nearly 60% gaining the first marking point for a correct fraction but an incorrect simplification. A number of students found the fraction that killed rather than the fraction surviving, and therefore gained no credit.

02.3 Nearly 73% of students gained full marks in this question, and most made good use of the scaffolding provided. A number of students missed out on the third marking point due to not accurately copying their answer from parts 1 and/or 2 correctly and to complete the correct subtraction.

02.4 Students' ability to express themselves clearly, frequently limited their access to the marks available in this question. As a result, just under 27% of students achieved both marks. Some students found explanations difficult and gave answers that lacked clarity, such as 'it just fitted the pattern'. A frequent confused use of mean, mode, median and average was also seen.

4.7.3.3 Land use

Answer 52 · Examiner comments

Question 4 (low and standard demand)

04.1 This extended response question on the Required Practical Activity about food tests was not answered well. Many students confused the tests for starch and sugar either with one another, or with other tests such as that for protein. It is clear that some students have knowledge of food tests that are not covered in the specification, and for some, this led to further confusion about which chemical should be used to test for which food group. The most common correct test given as an answer was the use of iodine solution for starch and whilst many students gave a correct end colour, blue and purple as incorrect colours were seen frequently. A large proportion of responses lacked an attempt at both the positive and negative tests for each food.

Students who only recalled details of one test could achieve a mark in Level 1, whilst to reach Level 2, both tests needed to be correctly described. The higher mark within this level could only be matched if both the tests, together with the correct expected positive and negative results, were given. Very few students could recall that Benedict's reagent needed to be heated or boiled.

04.2 46% of students gained two marks in this question. The most common error was in the first sentence, where students had to name the enzyme that breaks down starch.

04.3 68% of students answered this question correctly.

04.4 This question was not well answered because many students did not appreciate exactly how to make conclusions from results. 47% of students did not score any marks and 35% achieved both marks. The results showed comparative times taken for different types of bread to taste sweet and by far the biggest error made by students was that they were not comparative in their answers. Many simply reiterated the results in the table by quoting data while others, instead, tried to explain the results by referring to amylase action. Neither of these routes actually compared the times taken and failed to gain credit. Several students incorrectly implied that the results reflected the sugar content or health value of the different breads. Of those who did attempt conclusions based on comparisons, some seemed to wrongly think that brown bread, at the top of the table, was the quickest to taste sweet.

04.5 Students were clearly familiar with the idea assessed in this question of how an investigation could be improved, and most answers correctly identified the need to repeat the test and find a mean. 64% of students achieved full marks in this question, and in the 27% of responses achieving one mark, the idea of calculating a mean was the more frequently omitted point, with answers sometimes mentioning increased accuracy instead.

© 2024 AQA and its licensors. All rights reserved.

4.7.3.3 Land use

Answer 52 · Examiner comments June 2024 | 8461/1F | Original Q4

04.6 81% of students scored both marks in this question. In all calculation questions, students should be encouraged to show their working as some incorrect final responses may well have gained one mark for working, had this been evident.

04.7 85% of students gained credit in this question.

4.7.3.3 Land use

Answer 53 · Examiner comments

June 2024 | 8461/1F | Original Q6

Question 6 (low and standard demand)

06.1 Less than 20% of students were able to correctly identify two control variables the student used in the investigation in the question, with 43% managing one. Any variable which might have been controlled but which had not been referred to in the method, such as temperature, was, therefore, inappropriate. Students should be encouraged to qualify their suggestions in answers to questions of this nature. Credit was not given, for example for time, unless this was clearly associated with time 'in the solution or beaker'. Similarly, volume had to be linked with the 'salt solution' and size to the actual 'pieces' of potato. Several answers referred to 'mass' but this was clearly not controlled.

06.2 62% of students understood the need for drying the pieces of potato in this question, but answers such as 'let it dry out' were not credited as they implied possible complete desiccation. Similarly, marks were not awarded for other suggestions such as the piece should be 'washed and cleaned' or its 'length and width should be measured'. Those responses which mentioned taring or zeroing the balance before weighing gained no credit as the question asked for what should be done to each 'piece of potato'.

06.3 36% of students were able to name the correct piece of apparatus in this question, with many giving the uncreditworthy answer of 'scale'.

06.4 61% of students achieved the mark in this question.

06.5 57% of students achieved the mark in this question.

06.6 60% of students achieved full marks in this calculation question. Those who did not often made simple transfer errors from the table of results or reversed the numerator and denominator in the equation. The final marking point was given for a correct conversion to 1 decimal place. Students who wrote 18.3 with a dot over the 3 did not gain credit as it clearly suggested an answer of 18.3 recurring.

06.7 58% of students achieved the mark in this question, with the most common incorrect answer being 'bar chart'.

06.8 Despite this being a 'sentence completion' question, as the words were not provided, some students found it difficult to access. 25% of students gained three marks, with just over 20% gaining two marks and another 20% gaining one mark. Common incorrect answers for the first marking point included 'salt', 'starch', 'mass', 'moisture' and 'solution'. Incorrect answers for the second marking point included 'transpiration', 'translocation' and 'respiration'. For the third marking point, a frequently seen wrong suggestion was 'broken' or 'damaged'.

06.9 42% of students were able to offer a response within the creditworthy range.

© 2024 AQA and its licensors. All rights reserved.

Answer 54 · Examiner comments

Question 10 (standard demand)

10.1 Some students appeared to be confused as to how decay happens, believing that the dead plant matter would decay itself. However, around 10% of students did indicate that some sort of microorganism is involved in the decay process, gaining the third mark in the mark scheme. Some students spent time unnecessarily describing the factors needed for decay and often needed to extend their answers onto the additional pages.

There were two routes students could use to gain marks. Many students' answers included elements of both routes, so examiners awarded marks for the described route which gave the higher mark. In most cases this was the first route given in the mark scheme.

The information in the question told students that layer B contains 'very little oxygen' and 'has a low pH'; thus, simply repeating either of these was insufficient to gain credit. To gain the first mark, students needed to link one of these pieces of information to their own knowledge: either in terms of respiration or in terms of enzymes being denatured or reducing in activity. Many students also gained this first marking point, although some who took the second route demonstrated confusion about what a 'low pH' constitutes, describing it as 'low acidity' or 'being 'alkaline'.

Achieving marking point 2 proved to be more problematic for many students. Most simply by omitting any reference to energy or metabolism. Students should be advised that when referring to respiration in their answers (as many did), they should then go on to describe the role of respiration: 'releasing energy'. For those who did refer to energy, it was noted that very few described energy being 'produced', which is never acceptable as this would contradict the principle of conservation of energy.

10.2 40% of students identified the correct answer regarding the approximate biomass of moss that becomes biomass in primary consumers.

10.3 Fewer than a tenth of students identified DNA as a substance that can be made using phosphates.

10.4 Around 20% of students could identify protein as the substance that can be made using nitrogen.

10.5 Almost 65% of students gained at least one mark in this question, and a quarter of those gained three of the four available marks. A number of students described a rise in temperature of the Earth's atmosphere, gaining marking point 1.

It should be noted that the 'greenhouse effect' and 'climate change' are not equivalent to 'global warming'. A significant number of students attempted to describe the mechanism of global warming. This was often confused, including references to the 'ozone layer' and incorrect descriptions of long and short-wave radiation. However, such descriptions are beyond the requirements of the specification, so were ignored.

Students who merely repeated the information that the peat bog 'contains' carbon dioxide and methane could not be awarded marking points 2 or 4. Instead further added value was required, in that these gases would be 'released' from the peat when the bog was destroyed. A significant number of students omitted any reference to methane, so were unable to gain marking point 4.

© 2024 AQA and its licensors. All rights reserved.

4.7.3.3 Land use

Answer 54 · Examiner comments June 2024 | 8461/2F | Original Q10

Again, students should be advised that repeating the information in the question will not gain credit, thus those that described 'the use of peat as a fuel' releasing carbon dioxide. To gain credit here, students needed to indicate that the peat would have to be 'burned' to produce carbon dioxide. In this case, examiners ignored the idea that burning would also release (trapped) methane, as this would inevitably also be burned, releasing more carbon dioxide.

Answer 55 · Examiner comments

June 2024 | 8461/2F | Original Q11

Question 11 (standard demand)

11.1 Just under 40% of students successfully identified an improvement to the method. The most common creditworthy responses were 'repeats', 'collect more water' or a description of avoiding double counting of the tadpoles. As the experimental time frame given was 8 weeks, improvements that suggested extending this time period were not given credit.

11.2 Almost 80% of students correctly carried out the simple calculation. Students using the row rather than the column was the main reason to not score marks.

11.3 Students were asked to complete a graph to show how the total number of tadpoles changed over the 8-week period. Almost 50% of students scored three or more marks, with a marks commonly not achieved for either not labelling the *x*-axis or failing to use a linear scale.

Plotting the points was mostly done well and students that did miss out on these marks was due to accuracy as each small square vertically was 2 units. The line of best fit should have been a smooth curve through the points, but many students used a ruler to draw a straight line of best fit or simply joined the plots dot-to-dot – neither of which were correct. 15% of students did not attempt this question.

11.4 Students are asked to calculate the percentage of the tadpoles that would still be found in the pond at four weeks compared to zero weeks using the data from their graph. 25% of students did not attempt this calculation. Many students achieved marking point 1 only for using the values from their graph at 0 and 4 weeks. They could not then use the values correctly to determine the answer.

A common incorrect approach was to take the answer for 4 weeks away from 60 before multiplying by 100. A noticeable number of students chose not to use their graph but instead used data from the table, allowing some credit to be given as long as the values from the table were correct.

11.5 Almost one third of students gained full marks in this question for correctly suggesting two reasons why the tadpoles died. The most common correct answers were 'not enough food', and then reference to predators or disease. The most common uncreditworthy responses seen were vague references to changes in environment/conditions, lack of parental care and natural selection. Effects of the experimental method were ignored.

© 2024 AQA and its licensors. All rights reserved.

4.7.3.3 Land use

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

© 2024 AQA and its licensors. All rights reserved.

Answer 56 · Examiner comments — June 2025 | 8461/1F | Original Q2

Question 2 (low demand)

02.1 Two thirds of students were able to correctly identify the independent variable.

02.2 77% of students scored full marks in this question. The most frequently seen errors were nitrogen for MP1 and cellulose for MP2.

02.3 A third of students scored 2 marks, a third 1 mark and a third zero marks in this question. Many students did not realise that the data recorded was the time taken to release 10 bubbles, rather than the number of bubbles released in a set time. A significant proportion of students, therefore, struggled to articulate their ideas, with a lot of confusion over time and speed seen. Answers given, therefore, incorrectly described an increase followed by a decrease. Many gained MP1 but fewer went on to match MP2. They referred, instead, to the overall decrease up to 60 °C rather than giving consideration to the 'describe' command word which encompassed the whole span of the investigation. Credit was given for correct references to rate, rather than directly to time itself, but answers such as 'it gets quicker or slower' were too vague. Mention of an optimum temperature without any other information about time taken

Answer 56 · Examiner comments — June 2025 | 8461/1F | Original Q2

before or after this value was insufficient. Explanations were not asked for in this question.

02.4 Nearly 60% of students scored full marks in this question, but of the 20% awarded zero marks, the most common incorrect response seen was to use 50 as the numerator, despite the equation being given in the question. Common errors included:

- giving a final answer of 0.30 or 0.3 with a dot to indicate a recurring number, in which case a maximum of 2 marks was considered.
- use of a time from a temperature other than 50 °C, in which case a maximum of 1 mark was given if the correctly calculated value was rounded to 1dp.
- incorrect calculation of a correct substitution (10÷33) giving an answer of 3.3, in which case a maximum of 1 mark was given for MP1.
- use of the figure for temperature, 50 °C, instead of 33 in the equation, in which case no marks were awarded.

02.5 74% of students achieved the mark in this question.

02.6 Three quarters of students achieved the mark in this question.

02.7 Nearly 70% of students scored full marks in this question, with a further 26% scoring one mark.

4.7.3.3 Land use

Answer 57 · Examiner comments

June 2025 | 8461/1F | Original Q4

Question 4 (low and standard demand)

04.1 This was a levelled, extended response question based on a required practical. Students were asked to describe a method to grow bacteria on a sterile agar plate. Around 20% of responses were awarded a mark within Level 3, 50% in Level 2 and 15% in Level 1. Students achieving Level 1 gave one or more appropriate points from the indicative content, but these were insufficient to allow a valid outcome to their method.

4.7.3.3 Land use

Answer 57 · Examiner comments

To enter Level 2, students had to make clear how an agar plate could be prepared to grow a sample of bacteria. This was the minimum requirement to match the Level 2 descriptor of 'identifying most steps in the method'.
To enter Level 3, students had to go further and give examples of aseptic techniques; by doing this, they were able to fulfil the other requirements of the question, including preparing a plate that was 'sterile' and growing a sample of 'uncontaminated' bacteria. Those students who matched the Level 3 criteria generally showed excellent knowledge and understanding of the steps involved. Their descriptions were detailed and appropriately sequenced. The responses of many students, however, remained in Level 2. They appreciated the fundamental steps of preparing and inoculating a plate but struggled to give clear mention of the aseptic techniques that should be followed. Reference to heating the inoculating loop (or some other, identifiable, description) was frequently seen but, without further points, Level 3 was not achievable. Other indicative content was often hinted at but was too vague to be considered. So, answers such as 'other bacteria from the air should be prevented from entering the plate', 'the rod should be sterilised' or 'the bench should be cleaned' were all insufficient as they did not describe how these steps should actually be carried out.

Fewer answers remained in Level 1 and those that did were either very limited in content or made confused comments such as using the Bunsen burner to heat the plate after bacteria had been added. The statements students make in these extended response questions do not need to be long or complex and it is never necessary to include all the points listed in the indicative content on the mark scheme to achieve the highest level. Neither do responses have to be written in complete sentences - succinct bullet points often suffice and may even help students to organise their ideas more effectively. As is always the case with extended response questions, however, answers are considered holistically and always in a positive framework. It was pleasing here to see some students entering Level 3 and achieving high marks.

04.2 Few students (just under 10%) gave a correct answer to this question. The reference to temperature triggered lines of thought which were inappropriate and gained no credit such as:

- a higher temperature could lead to faster growth of bacteria and this could be dangerous.
- a higher temperature might be too high and cause the bacteria to be killed / enzymes to be denatured / the antibiotics not to work.
- a higher temperature might cause the agar to melt.

Answers which suggested that the higher temperature might cause the bacteria to 'become' dangerous were also not creditworthy.

04.3 65% of students were able to identify the purpose of the control disc in the investigation.

04.4 Some students struggled to appreciate that the *difference* in the effectiveness of each antibiotic had to be reflected in their answers and simply drew rings, as requested, around A and C but without any distinctions at all. Others gave a smaller ring around A

4.7.3.3 Land use

Answer 57 · Examiner comments

June 2025 | 8461/1F | Original Q4

but a larger one around C. Many, however, clearly understood this RPA and gave clear and correct answers. Students should be encouraged to use a pencil, at least in the first instance, when answering questions involving drawing. Answers often showed that students had changed their minds but were unable to erase and correct a first attempt. It was, therefore, difficult for examiners to appreciate their final intentions. Over 11% of students did not attempt this question and students are encouraged to check that all questions have been answered, particularly where no answer lines are provided.

Answer 58 · Examiner comments

June 2025 | 8461/1F | Original Q8

Question 8 (standard demand)

08.1 This was a levelled, extended response question based on a required practical. Students were asked to evaluate a given method to investigate osmosis in pieces of potato.
Students achieving Level 1 (35%) made very few relevant points. Students achieving Level 2 (33%) suggested further improvements to the method and often gave reasons as to why these might be required, but judgements were always incomplete.
Students achieving Level 3 (1%) made full use of the command word 'evaluate' and considered both strengths and weaknesses of the method in addition to indicating the ways it could be improved.
Few students gave responses which allowed them to match the Level 3 requirements. Most omitted any consideration of strengths, so their judgements were incomplete. Many, nevertheless, seemed confident in their attempts at answers and this was pleasing to see.
The question asked for ways to improve the validity of results, and these needed to be clear. Discussion of controlled variables such as size, time and volume required quantification, or clarification that they needed to be the same or specific on each

occasion, rather than just 'similar', 'recorded' or 'precise'. A large number of students suggested that the mass of the cubes should be kept the same, but this was neither plausible, nor required.
The use of specific pieces of equipment only gained credit if they were linked to clear improvements to validity. Several responses referred to the use of a cork borer to obtain cylinders of potato but then neglected to add anything about the control of size; others suggested the use of stop watches but with no link to control of time.
Points which were frequently seen from the indicative content included drying the cubes before measuring mass, repeats and calculation of mean values and the use of more, different concentrations. Some students focused on aspects such as safety considerations, tables of results, graphs or explanations of osmosis. These were not appropriate additions to an evaluation, which asked for ways to improve the validity of results. Discussion of a 'wider range' of concentrations was only relevant if mention was made of 'more than 3' values within it.

08.2 23% of students scored the mark in this question.

08.3 This question asked for one way in which active transport differs from osmosis. It was most easily answered by one clear, distinctive point about active transport being given, without any further mention of osmosis. 33% of students achieved the mark in this question.

The most common correct answer seen was BP1, relating to energy. BP2 was more problematic, as answers often showed confusion in understanding. Some students gave the correct description of active transport being movement from low to high concentration but then continued to make an incorrect statement about osmosis; others gave incorrect descriptions of active transport in the first place. The following examples did not gain credit:

- 'active transport goes from low to high concentration, but osmosis goes from high to low'.
- 'active transport goes down a concentration gradient'.
- 'active transport goes from a high concentration gradient to a low concentration gradient'.

Other answers were not necessarily incorrect but lacked the further detail or qualification required to warrant the mark. These included 'active transport goes along (or across) the concentration gradient' or 'active transport goes from low to high'.
Fewer students referred to the ideas in BP3 and answers which could not gain credit were either incomplete or incorrect. They included those which:

- discussed the vague 'involvement' of minerals rather than their 'transport' or 'movement'.
- stated that 'molecules' or 'substances' were transported rather than, or as well as, water.
- suggested that 'water' was 'actively', rather than passively, transported.

4.7.3.3 Land use

Answer 58 · Examiner comments June 2025 | 8461/1F | Original Q8

Some students mistakenly thought that active transport happened in both directions whereas osmosis was only one-way. References to partially permeable membranes and to the speed of movement were not, on their own, creditworthy.

4.7.3.3 Land use

Answer 58 · Examiner comments

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.7.3.3 Land use

Answer 59 · Examiner comments

June 2025 | 8461/2F | Original Q9

Question 9 (Standard demand)

09.1
Students were given a method for an investigation into numbers of daisy plants growing in a field at different distances from the tree. A quarter of students knew that the steps were repeated to remove all the water, or to ensure all the water had evaporated. Common incorrect answers seen included 'to improve accuracy', 'to identify anomalies' and 'to remove excess water'.

09.2
Students were given data from an investigation into the number of daisy plants growing at different distances from a tree. They were asked to calculate a percentage and give their answer to the nearest whole number. This calculation was attempted by around 80% of students, with 20% being awarded the full 3 marks. Of those students that did not gain all 3 marks, those that showed their working out were able to gain one or two marks. Students should be encouraged to always show their working out for calculations.

Answer 59 · Examiner comments

June 2025 | 8461/2F | Original Q9

09.3
A pleasing number of students was able to describe the effect of distance from the tree on the percentage of water in the soil – with almost 45% gaining credit. Students who simply stated 'it increased' did not gain credit as both reference to the distance and the percentage of water were required for the mark.

09.4
Students were asked to consider changes to the investigation that would increase the validity of the conclusion. Bullet point 1 was most commonly seen, although students stating simply to 'repeat it' without qualification could not be given credit at this level of demand. Around a third of students gained at least one mark for this question.

09.5
Around a third of students were able to suggest at least two abiotic factors that might have caused more daisy plants to grow further from the tree, with a further 7% of students gaining all three marks. The full range of possible correct responses outlined on the mark scheme were seen, with light being the most common. A few students negated a correct abiotic factor by suggesting the tree (biotic) was the cause – for example 'shade from the tree'.
Vague answers such as 'soil' or 'weather' did not gain credit, and despite being told in the question not to refer to water, a small number of students referred to rainfall, humidity or drought which again could not be credited.