AQA GCSE Biology | 8461

SPECIFICATION POINT 4.2.3.1

Plant tissues

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**18**
Available paper years	**2008–2023**

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.

4.2.3.1 Plant tissues

Answer 01 · Mark scheme

June 2008 | BLY3F | Original Q7 | Legacy

question	answers	extra information	mark
7(a)	**B**		1
	(**B** has) low(est) number of stomata **or** no stomata on upper surface **or** only 800 (on lower surface)		1
	less transpiration / evaporation / water loss owtte **or** water (vapour) is lost via stomata	only allow zero water loss if linked to no stomata on upper surface / linked to leaf B upper surface ignore references to leaf surface area	1
7(b)	reduce loss / amount of water (vapour) **or** reduced transpiration (from upper surface)	accept converse do **not** allow no water is lost	1
	warmer above leaf **or** wilted leaf folds over lower surface **or** lower leaf in shade **or** less light / heat / sun on lower side	accept converse ignore reference to dust	1
Total			**5**

4.2.3.1 Plant tissues

Answer 01 · Mark scheme

June 2008 | BLY3F | Original Q7 | Legacy

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

4.2.3.1 Plant tissues

Answer 02 · Mark scheme

June 2010 | BLY3F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	root hair		1
1(a)(ii)	any **two** from: • water • ions / minerals / nutrients / salts / correct named eg nitrates • oxygen	ignore food ignore N,P,K	2
1(b)(i)	stomata		1
1(b)(ii)	diffusion		1
Total			**5**

4.2.3.1 Plant tissues

Answer 02 · Mark scheme

June 2010 | BLY3F | Original Q1 | Legacy

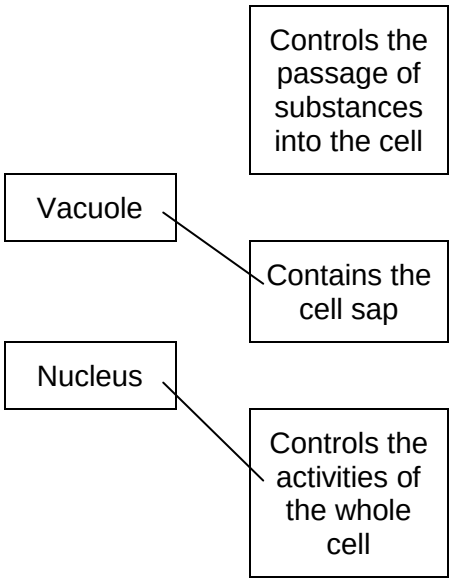
BLY 3F

4.2.3.1 Plant tissues

Answer 03 · Mark scheme

June 2011 | BLY2F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	tissue	extra box ticked cancels the mark	1
1(a)(ii)	organ	extra ring drawn cancels the mark	1
1(b)(i)	Layer B Layer C	each extra box ticked cancels **1** mark	1 1
1(b)(ii)	(contain) chloroplasts / chlorophyll	other parts disqualify	1
1(c)		two correct = **2** marks one correct = **1** mark extra line from a part of a cell cancels the mark	2
Total			**7**

4.2.3.1 Plant tissues

Answer 03 · Mark scheme

June 2011 | BLY2F | Original Q1 | Legacy

BLY2F

4.2.3.1 Plant tissues

Answer 04 · Mark scheme

June 2011 | BLY2F | Original Q9 | Legacy

Question 9

question	answers	extra information	mark
9(a) E	because water enters (the cell / it / named cell)	do **not** accept salt / sugar / solution entering	1
	by osmosis / diffusion	if osmosis / diffusion not given accept concentration inside cell greater than outside cell assume concentration refers to solute concentration unless answer indicates otherwise allow water goes <u>up</u> the concentration gradient allow water goes <u>down its</u> concentration gradient do **not** accept if diffusion of salt / sugar	1
	through a partially permeable membrane	allow semi / selectively permeable membrane **or** description	1
9(b) E	(plant cells) have (cell) <u>wall</u>	accept animal cells have no (cell) <u>wall</u> ignore reference to cell membrane do **not** accept reference to other organelles **or** any implication that animal cells have a cell wall eg plant cells have a thicker cell wall	1
Total			**4**

The AQA UMS Conversion Calculator is available on the Results statistics page of the AQA Website

4.2.3.1 Plant tissues

Answer 05 · Mark scheme

June 2011 | BLY3F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	guard cells		1
2(b)(i)	2.00 / 2.0 / 2		1
2(b)(ii)	0.05 or 1/20		1
2(b)(iii)	(Q has) large(r) surface area / more stomata / thinner cuticle / larger leaves	it = Q accept other sensible answers	1
2(b)(iv)	wind 30	extra box ticked cancels the mark	1
2(c)	wilting	extra ring drawn cancels the mark	1
Total			6

4.2.3.1 Plant tissues

Answer 05 · Mark scheme

June 2011 | BLY3F | Original Q2 | Legacy

BLY3F

4.2.3.1 Plant tissues

Answer 06 · Mark scheme

Question 1

question	answers	extra information	mark
1(a)(i)	A = nucleus B = (cell) membrane		1 1
1(a)(ii)	any **two** from: • no (cell) wall • no (large / permanent) vacuole • no chloroplasts / chlorophyll	ignore shape	2
1(b)	because high to low oxygen / concentration **or** down gradient	allow 'more / a lot of oxygen molecules outside' ignore along / across gradient	1
1(c)	a tissue		1
Total			**6**

4.2.3.1 Plant tissues

Answer 06 · Mark scheme

January 2013 | BL2FP | Original Q1 | Legacy

BL2FP

4.2.3.1 Plant tissues

Answer 07 · 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>6</td></tr>
<tr><td>0 marks</td><td>Level 1 (1-2 marks)</td><td>Level 2 (3-4 marks)</td><td colspan="2">Level 3 (5-6 marks)</td></tr>
<tr><td>No relevant content.</td><td>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 colspan="2">There is a detailed description of most of the structures and their functions.</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></tr>
<tr><td>Total</td><td colspan="3"></td><td>9</td></tr>
</table>

4.2.3.1 Plant tissues

Answer 07 · Mark scheme

January 2013 | BL2FP | Original Q7 | Legacy

BL2FP

4.2.3.1 Plant tissues

Answer 08 · Mark scheme

June 2013 | BL2FP | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	xylem **and** phloem	either order allow words ringed in box allow mis-spelling if unambiguous	1
7(b)(i)	movement / spreading out of particles / molecules / ions / atoms	ignore names of substances / 'gases'	1
	from high to low concentration	accept down concentration gradient ignore 'along' / 'across' gradient ignore 'with' gradient	1
7(b)(ii)	oxygen / water (vapour)	allow O_2/O2 ignore O^2/O allow H_2O/H2O ignore H^2O	1
Total			**4**

4.2.3.1 Plant tissues

Answer 09 · Mark scheme

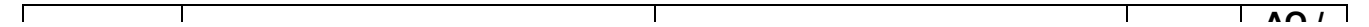
June 2014 | BL3FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.
4(a)(i)	xylem		1	AO1 3.2.3a
4(a)(ii)	phloem		1	AO1 3.2.3a
4(a)(iii)	transpiration		1	AO1 3.2.3a
4(a)(iv)	stomata		1	AO1 3.1.3d
4(b)(i)	any **one** from: • reduce / prevent evaporation of water from flask • holds plant shoot in place • prevent damage to the plant		1	AO2 3.2.3
4(b)(ii)	same surface area **or** number of leaves from which (the same amount of) water evaporates	(because if they used larger / smaller size shoots) there would be a larger / smaller surface area **or** a larger/ smaller number of leaves allow same number of stomata (and therefore) more / less water would escape allow from which water escapes	1 1	AO2 3.2.3
4(b)(iii)	4.5	look for answer written in table	1	AO2 3.2.3
4(b)(iv)	increasing temperature / heat increases (rate of) water loss / evaporation		1	AO3 3.2.3
4(b)(v)	having moving air / a fan increases (rate of) water loss / evaporation		1	AO3 3.2.3
4(c)(i)	0.3 g		1	AO2 3.2.3
4(c)(ii)	plastic bag reduces air flow across leaves **or** air is humid around the leaves	allow plastic bag stops water (vapour) leaving allow air (in plastic bag) becomes saturated (with water)	1	AO3 3.2.3
Total			12	

4.2.3.1 Plant tissues

Answer 09 · Mark scheme

June 2014 | BL3FP | Original Q4 | Legacy



4.2.3.1 Plant tissues

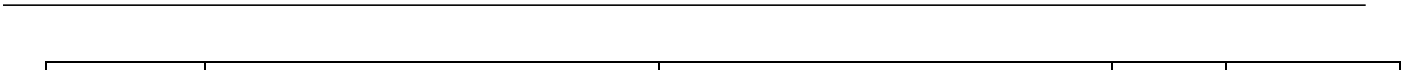
Answer 10 · Mark scheme June 2015 | BL3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	water / H_2O	accept oxygen allow H_2O do **not** allow H^2O or H2O	1	AO1 313a
5(a)(ii)	the mineral ions are absorbed by active transport the absorption of mineral ions needs energy		1 1	AO1 / AO2 311a/g, 313a
5(a)(iii)	have (many root) <u>hairs</u> (which) give a large surface area (for absorption)		1 1	AO2 313b
5(b)	carbon dioxide in **or** oxygen out **or** control water loss	accept gas exchange ignore gases in and out ignore gain / lose water	1	AO1 313c
5(c)(i)	guard cells		1	AO1 313e
5(c)(ii)	(stomata are) closed	allow there is no gap / space	1	AO2 313d/e
5(c)(iii)	plant will wilt / droop	ignore die	1	AO3 313d/e
Total			**9**	

4.2.3.1 Plant tissues

Answer 10 · Mark scheme

June 2015 | BL3FP | Original Q5 | Legacy



4.2.3.1 Plant tissues

Answer 11 · Mark scheme

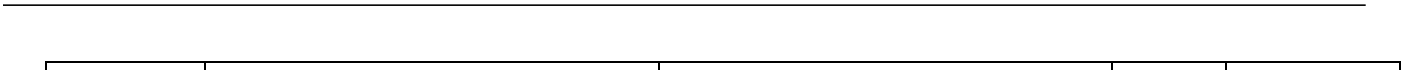
June 2017 | BL2FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	photosynthesis		1	AO1 2.3
1(a)(ii)	light		1	AO1 2.3
1(b)(i)	chlorophyll	allow phonetic spelling	1	AO1 2.1.1b 2.3.1b
1(b)(ii)	traps / absorbs light **or** traps / absorbs energy	ignore provides energy ignore stores energy	1	AO1 2.1.1b 2.3.1b
1(b)(iii)	transport	ignore names of substances but do **not** allow large molecules – e.g. starch / protein do **not** allow energy allow support (of leaf)	1	AO1 2.2.2b
1(b)(iv)	carbon dioxide / CO_2 water / H_2O	in either order ignore light do **not** allow CO^2 / H^2O	1 1	AO1 2.3.1a/b
Total			**7**	

4.2.3.1 Plant tissues

Answer 11 · Mark scheme

June 2017 | BL2FP | Original Q1 | Legacy



4.2.3.1 Plant tissues

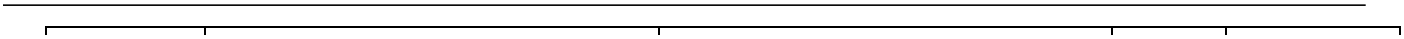
Answer 12 · Mark scheme June 2017 | BL3FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)	The movement of water from a dilute solution to a more concentrated solution through a partially permeable membrane.		1	AO1 3.1.1b
2(b)	**A** = phloem **B** = xylem		1 1	AO2 3.2.3a
2(c)	transpiration		1	AO1 3.2.3a
2(d)(i)	mass before – mass after		1	AO2 3.2.3a
2(d)(ii)	**A** has the largest surface area		1 1	AO2/3 3.1.3b/ d
2(d)(iii)	any **two** from: • hot / warm(er) • dry / drier • windy	allow turn on a heater / increase temperature allow turn on a fan	2	AO1 3.1.3d
Total			**9**	

4.2.3.1 Plant tissues

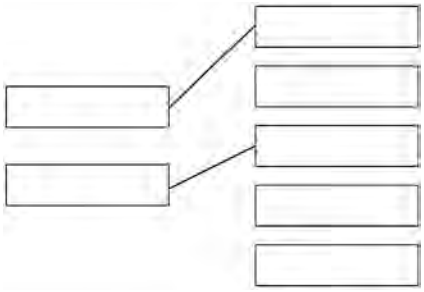
Answer 12 · Mark scheme

June 2017 | BL3FP | Original Q2 | Legacy



4.2.3.1 Plant tissues

Answer 13 · Mark scheme June 2018 | 8461/1F | Original Q2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1		additional line from a level of organisation negates the mark for that level of organisation	2	AO1 4.2.1 4.2.3.1
02.2	palisade mesophyll		1	AO2 4.2.3.1
02.3	$\frac{50}{8}$ 6 / 6.25 / 6.3 (micrometres)	an answer of 6 / 6.25 / 6.3 scores **2** marks	1 1	AO2 4.1.1.2
02.4	they have no chloroplasts / chlorophyll	allow they are underground allow they don't get (access to) light allow (because) photosynthesis needs light allow they can't absorb light ignore 'sun' ignore 'it is dark'	1	AO2 4.1.1.3 4.4.1.1
02.5	differentiation		1	AO1 4.1.1.4 4.1.2.3
02.6	to protect endangered plants from extinction		1	AO1 4.1.2.3

4.2.3.1 Plant tissues

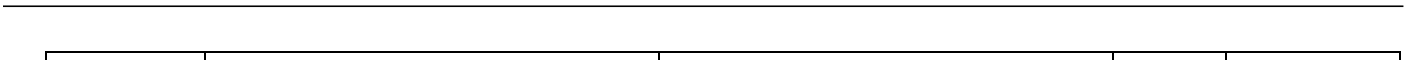
Answer 13 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	plants can be produced quickly		1	AO1 4.1.2.3
02.8	any **one** from: • glucose / sugars / starch • amino acids / protein • hormones • ions / minerals • vitamins • water	allow named hormones eg auxin allow magnesium / nitrate allow named vitamins e.g. vitamin B allow H_2O / H2O ignore oxygen / carbon dioxide / agar / nutrients / fertiliser	1	AO2 4.1.2.3
Total			**10**	

4.2.3.1 Plant tissues

Answer 13 · Mark scheme

June 2018 | 8461/1F | Original Q2



4.2.3.1 Plant tissues

Answer 14 · Mark scheme

June 2019 | 8461/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	epidermis palisade mesophyll xylem	 allow palisade / mesophyll	3	4.2.3.2 4.2.3.1 AO1
03.2	guard cells		1	4.2.3.2 4.2.3.1 AO1
03.3	to let carbon dioxide into the leaf		1	4.2.3.2 AO1
03.4	by evaporation		1	4.2.3.2 AO1
03.5	 evidence of correct graph readings (5 and 1) 4 (cm^3)	an answer of 4 (cm^3) scores **2** marks allow in range 4.8 to 5.2 and 0.8 to 1.2 allow correct subtraction from their graph readings allow their calculated value from readings in the range 4.6 to 5.4 and 0.6 to 1.4	 1 1	4.2.3.2 AO2
03.6	plant **A** has more leaves		1	4.2.3.2 AO3
03.7	any **one** from: (the new room was) • windier • warmer • drier / less humid • brighter	answers must be comparative allow sunnier ignore more sun	1	4.2.3.2 AO2

4.2.3.1 Plant tissues

Answer 14 · Mark scheme

June 2019 | 8461/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	any **one** from: • spikes / points / thorns / sharp • poisonous / toxic • brightly coloured berries • leaves are tough / leathery **or** leaves are hard to chew	ignore reference to predators eating holly allow unpleasant taste	1	AO2 4.3.3.2
Total			**11**	

4.2.3.1 Plant tissues

Answer 14 · Mark scheme

June 2019 | 8461/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.2.3.1 Plant tissues

Answer 15 · Mark scheme November 2021 | 8461/1F | Original Q3

03.1	(has) spikes / thorns / prickles	allow (has a) tough outer layer	1	AO2 4.3.3.2
03.2	chemical		1	AO1 4.3.3.2
03.3	the plant will not lose as much water		1	AO2 4.2.3.2
03.4	chlorophyll / chloroplasts		1	AO2 4.1.1.2
03.5	to allow it to photosynthesise **or** to make sugar / glucose / carbohydrate / starch		1	AO2 4.4.1.1
03.6	organ		1	AO1 4.2.1
03.7	water / mineral ions	allow named mineral ions allow minerals / ions	1	AO1 4.2.3.1 4.2.3.2
03.8	phloem (tissue)		1	AO1 4.1.1.3 4.2.3.1 4.2.3.2
Total			**8**	

4.2.3.1 Plant tissues

Answer 15 · Mark scheme

November 2021 | 8461/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.2.3.1 Plant tissues

Answer 16 · Mark scheme

June 2022 | 8461/1F | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1		in either order		AO1 4.4.1.1
	oxygen	allow O_2	1	
	glucose	allow $C_6H_{12}O_6$	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2		must be in this order		AO1
	xylem		1	4.1.1.3 4.2.3.1
	stomata		1	4.2.3.2
	phloem		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	$\frac{310}{254}$		1	AO2 4.2.3.2
	1.22047…		1	
	1.2	allow an answer of 0.82 if numerator and denominator reversed	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	each leaf of species **A** has more stomata		1	AO3 4.2.3.2

4.2.3.1 Plant tissues

Answer 16 · Mark scheme

June 2022 | 8461/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	increased temperature		1	AO1 4.2.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	C		1	AO2 4.2.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.7	(spines) stop the plant being eaten **or** (spines) prevent animals damaging the plant	allow any named animal allow to reduce water loss	1	AO2 4.3.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.8	it looks like the hornet (so) animals avoid the risk of being stung	allow animals think it is a hornet allow (so) animals avoid the risk of pain	1 1	AO3 AO2 4.3.3.2

Total Question 5		**14**

4.2.3.1 Plant tissues

Answer 17 · Mark scheme

June 2023 | 8461/1F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.1	a leaf		1	AO2 4.2.1 4.2.3.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.2	$\frac{1.1 + 1.1 + 1.4}{3}$ **or** $\frac{3.6}{3}$ 1.2 (grams)	if no answer given on answer lines, allow an answer in **Table 1**	1 1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.3	ring around −32.4 (grams)	table takes precedence allow (−)32.4 (grams) written by question	1	AO3 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.4	did not include it	allow ignored it	1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.5	control variable		1	AO1 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.6	time in the salt solution		1	AO3 4.1.3.2 RPA3

4.2.3.1 Plant tissues

Answer 17 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.7	osmosis		1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.8	some particles		1	AO1 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.9	use more concentrations of salt solution		1	AO3 4.1.3.2 RPA3

Total Question 1	10

4.2.3.1 Plant tissues

Answer 18 · Mark scheme

June 2023 | 8461/1F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.1	a group of the same / similar cells **or** a group of cells with a (similar / specific) function	ignore a group of cells unqualified ignore examples of tissue functions	1	AO1 4.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.2	meristem (tissue)		1	AO1 4.1.1.4 4.1.2.3 4.2.3.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.3	willow	ignore named parts of willow	1	AO1 4.3.1.9

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.4	any **one** from: • (berries are) easy to access / pick • easier to extract chemical • taking berries will not harm the plant	ignore berries are not underground allow taking leaves / roots might damage / kill the plant (so it cannot produce more chemical) allow idea that the lower mass / amount (of chemical) will be less toxic / harmful allow greater mass of berries than of leaves / roots	1	AO3 4.2.3.1

Answer 18 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.5	(0.6 × 1.2 =) 0.72	allow conversion to mg at any point in calculation	1	AO2 4.3.3.1
	(0.72 × 2 =) 1.44		1	
	1.44 × 1000	allow conversion of a correct mass calculated for berries / roots	1	
	1440 (mg)	allow a correct answer using an incorrect conversion factor of a multiple of 10	1	
	alternative route (2 × 1.2 =) 2.4 (1) (2.4 × 0.6 =) 1.44 (1) 1.44 × 1000 (1) 1440 (mg) (1)			

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.6	any **one** from: • lack of chlorophyll	allow lack of chloroplasts	1	AO1 4.3.3.1 4.3.1.2 4.3.1.4
	• lack of magnesium (ions)	allow lack of mineral (ions) **or** named example such as iron / nitrate / potassium / zinc (ions) ignore lack of nutrients / nitrogen allow lack of water allow incorrect pH of soil allow acidic / alkaline soil allow (named) infection allow lack of light allow other correct suggestions		

4.2.3.1 Plant tissues

Answer 18 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.7	any **two** from: • to check toxicity • to check dosage • to check its efficacy	allow to check it is safe allow to check for side effects allow to check it is not poisonous / dangerous / harmful allow to check how much is needed allow to check it works allow to check it does not interact with other drugs	2	AO1 4.3.1.9

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.8	(writers / companies may get) financial gain **or** (competitor may suffer) financial loss	ignore because the report has not been peer reviewed ignore have not used a double-blind trial	1	AO3 4.3.1.9

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.9	have the claims peer reviewed		1	AO1 4.3.1.9

Total Question 1	13

4.2.3.1 Plant tissues

Answer 16 · Examiner comments — June 2022 | 8461/1F | Original Q5

Question 5 (Low and standard demand)

05.1 Over 90% of students were able to recall the equation for photosynthesis, however, there were still some unusual spellings of oxygen seen, despite the word being provided.

05.2 The structure of plant parts is still a difficult concept for many students, particularly at Foundation tier. Less than 20% of students gained full marks in this question, with over 35% gaining no marks at all.

05.3 For those students who performed the correct calculation in this question, many were not credited with MP3 as they mistakenly thought that 1.22 (2 decimal places) was the same as 2 significant figures. Other common errors included reversing the numerator and denominator in the calculation and simply subtracting the two values from the table, rather than dividing them.

05.4 Nearly 60% of students answered correctly.

Answer 16 · Examiner comments — June 2022 | 8461/1F | Original Q5

05.6 Only 45% of students were able to identify that increased temperature would increase the rate of transpiration. The most common incorrect answer was increased humidity, a concept that many students continue to find difficult.

05.7 Nearly 85% of students correctly identified plant **C** as most likely to live in a desert.

05.8 Over 60% of students were able to describe that the spines on the gorse plant would stop the plant from being eaten, but there were many vague and uncreditworthy answers seen also, such as ‘they defend / protect the plant’ or ‘they warn things off’. Answers relating to water loss were rarely, if ever, seen.

05.9 When faced with the context of mimicry in this question, many students struggled, often coming up with ideas about the similarity of the colours of both insects, that the hornet moth possessed poisons / venom / toxins, carried bacteria or diseases or that they possessed an internal 'stinger' which would harm predators. None of these ideas could be ascertained from the figure provided and therefore were not creditworthy. Over 50% of students scored zero marks on this question.

4.2.3.1 Plant tissues

Answer 17 · Examiner comments

June 2023 | 8461/1F | Original Q1

Question 1 (Low demand)

01.1 Over 70% of students correctly selected the leaf as the largest part of the plant.

01.2 Students were asked to calculate a mean and nearly 75% were able to do this correctly. Errors included multiplication (rather than addition) of the three numbers before dividing by 3, and the selection of tests 1 and 2 only, reflecting the anomaly in the 3rd test for concentrated salt solution. Students are always asked to show their working out and if this was correct, but linked with a final wrong answer, one mark could still be awarded.

01.3 Almost 6% of students did not attempt this question possibly because they did not read the instruction and missed the mark unintentionally. Answers that ambiguously showed a ring around more than one result failed to gain credit.

01.4 Two thirds of students were able to gain the mark here. Some failed to answer the question, however, which specifically asked for what they should do with the result when calculating the mean. The idea of doing another test was clearly inappropriate. Others gave general descriptions of how to work out mean values; others suggested using a figure of 0.7 (the mean of the first 2 tests); others attempted to 'explain' the anomaly instead. None of these answers gained credit.

01.5 A pleasing number of students correctly identified the control variable here, with around 40% of students missing out on the mark.

01.6 Only 20% of students failed to identify the variable that students kept the same as 'Time in the salt solution'.

Answer 17 · Examiner comments

June 2023 | 8461/1F | Original Q1

01.7 Almost 80% of students knew that osmosis was the process described.

01.8 Over 85% of students knew that some particles can pass through a partially permeable membrane.

01.9 Over two thirds of students correctly identified 'use more concentration of salt solution' as a means to improving the investigation.

4.2.3.1 Plant tissues

Answer 18 · Examiner comments

June 2023 | 8461/1F | Original Q6

Question 6 (Standard demand)

06.1 Whilst most students could describe a tissue as being 'a group of cells', with many of these going on to state that these cells were 'working together'; this was insufficient for credit. Further qualification in respect of the cells being 'similar' or of the cells 'having a particular function' was required to gain this mark. Thus, relatively few students were rewarded. It was evident that some students struggled, as ideas such as tissues being 'parts of organs' were not uncommon. Almost 79% of students failed to gain the mark.

06.2 Many answers referred to parts of the plant, such as xylem or root hairs. Knowledge of 'meristem' as being the tissue in plants where stem cells are found was by no means widespread. Some students had not read the question carefully enough and suggested animal tissues, most commonly 'bone marrow'. Just over 10% of students knew that meristem tissue contains stem cells and gained the mark.

06.3 A wide variety of plants were suggested, along with some suggestions of plant tissues and even fictitious plants such as 'the aspirin tree', perhaps as students struggled to recall the answer and had been trained to write down something, rather than nothing – that said, 17% of students did not attempt a response at all. Of the plants given in responses, 'willow' was

Answer 18 · Examiner comments

by far the most common and gained the mark for over 18% of students. Others such as 'foxglove' were mentioned, indicating a recollection of plants named in the specification.

06.4 Many answers simply repeated information given in the table, such as 'berries have the least mass of the chemical', but this was not sufficient as it does not explain why the berries are picked in preference to leaves or roots. Vague answers such as there being 'more berries' were also insufficient to gain credit. Around a quarter of students gain the mark, with common correct answers referring to the idea that picking berries would not harm the plant, that berries would be 'easier to collect' or that 'the chemical would be easier to extract'.

06.5 Relatively few students managed to complete the calculation correctly, with only 4% gaining all 4 marks. The most common error was by students who did not know the conversion factor for grams to milligrams. Fortunately, this usually only cost students 1 of the 4 marks, as answers which had used the incorrect conversion factor (whether this involved multiplying or dividing by an incorrect multiple of 10) were still able to gain the final mark. Students often got only part way through the calculation, stopping at 0.72 or 2.4, for 1 mark only; however, the 3rd and 4th marking points could still be gained if correctly addressed. Some students divided values, rather than multiplying, as was needed, whilst others arrived at somewhat unlikely answers equivalent to many hundreds of grams, far exceeding the 200 g mass of plant tissue it was extracted from. Nearly half of all responses gained no credit – either because it was not attempted – or completely incorrect.

06.6 Around 30% of students gained the mark in this question. A lack 'of magnesium' or 'of chlorophyll' was quite well known and many students gained this mark. Answers often implied a degree of speculation by students, but those who did attempt an answer may have been rewarded for this, as, for example, a lack 'of light' or of water' were both credited. A description of 'an infection' along with naming any plant disease also gained credit, as students are not expected to know, for example, that the tobacco mosaic virus does not infect nightshade plants. A not infrequent suggestion was that having chlorosis would 'put animals off from eating them', as students interpreted the question as asking for an advantage of having chlorosis, rather than what had caused the condition.

06.7 There were many good answers to this question, with frequent references to toxicity, dosage and efficacy. Some students, though, offered two ideas relating to toxicity, with descriptions regarding safety and side effects: thus, gaining only the one mark. However, over 90% of students gained some marks in this question, which was pleasing.

06.8 Many responses referred to writers of the report, or companies who might want the public to use or avoid the drug, however relatively few references to one party or another making financial loss or gain were made and as such only around 10% of students were awarded the mark. Other insufficient responses referred to ethics of using plants or the possibility that habitats might be destroyed by large nightshade plantations. Students only needed to refer to people 'buying' or someone 'selling' the product, to gain the mark or alternatively the idea that the writer of the biased report might have been 'paid' for their work.

06.9 Nearly 64% of students correctly indicated that scientists should 'have the claims peer reviewed' to be sure claims are valid.