AQA GCSE Biology | 8461

SPECIFICATION POINT 4.2.3.2

Plant organ system

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**25**
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.

4.2.3.2 Plant organ system

Answer 01 · Mark scheme

January 2008 | BLY3F | Original Q4 | Legacy

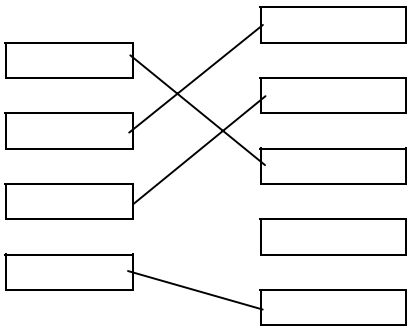
(b)(ii)	4	1
(c)	red blood cells	1
total		5

4.2.3.2 Plant organ system

Answer 01 · Mark scheme

BLY3F

Question 3

question	answers	extra information	mark
		**1** mark for each line extra line from List A Action cancels the mark	4
total			4

4.2.3.2 Plant organ system

BLY3F

Question 4

question	answers	extra information	mark
(a)(i)	<u>on diagram:</u> arrow drawn from cell **X**, through air space and out through stoma above stoma		1
(a)(ii)	transpiration		1
(b)(i)	13 – 15	ignore units	1
(b)(ii)	any **two** from: • warmest / hottest / brightest time of day • water evaporates fastest • stomata open / more open	accept warmer / hotter **or** sun higher in sky	2
total			5

4.2.3.2 Plant organ system

Answer 01 · Mark scheme January 2008 | BLY3F | Original Q4 | Legacy

BLY3F

Answer 02 · 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**

4.2.3.2 Plant organ system

Answer 02 · Mark scheme

June 2008 | BLY3F | Original Q7 | Legacy

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

4.2.3.2 Plant organ system

Answer 03 · Mark scheme

June 2009 | BLY3F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	mineral ions water	each extra box ticked cancels **1** mark	1 1
2(b)(i)	blood plasma		1
2(b)(ii)	dialysis fluid		1
2(b)(iii)	diffusion		1
2(b)(iv)	partially permeable		1
2(b)(v)	small		1
2(c)	drug treatment is needed to suppress the immune system		1
Total			**8**

4.2.3.2 Plant organ system

Answer 03 · Mark scheme

June 2009 | BLY3F | Original Q2 | Legacy

BLY3F

4.2.3.2 Plant organ system

Answer 04 · 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**

4.2.3.2 Plant organ system

Answer 04 · Mark scheme

June 2010 | BLY3F | Original Q1 | Legacy

BLY 3F

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

Answer 05 · Mark scheme

June 2011 | BLY3F | Original Q2 | Legacy

BLY3F

4.2.3.2 Plant organ system

Answer 06 · Mark scheme

June 2011 | BLY3F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	glycogen		1
4(a)(ii)	respiration		1
4(b)(i)	483 kJ		1
4(b)(ii)	oxygen		1
4(b)(iii)	dilate		1
4(c)	supplies more / a lot of oxygen **or** removes more carbon dioxide **or** release more energy / faster respiration		1
Total			**6**

4.2.3.2 Plant organ system

Answer 06 · Mark scheme

June 2011 | BLY3F | Original Q4 | Legacy

BLY3F

4.2.3.2 Plant organ system

Answer 07 · 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**

4.2.3.2 Plant organ system

Answer 07 · Mark scheme

January 2013 | BL2FP | Original Q1 | Legacy

BL2FP

4.2.3.2 Plant organ system

Answer 08 · Mark scheme

June 2013 | BL1FP | Original Q4 | Legacy

Question 4

question	answers	extra information	Mark
4(a)	sulfur dioxide		1
4(b)(i)	mutation		1
4(b)(ii)	pale form now (more) easily seen (by predators) **or** dark form now less easily seen (by predators) so pale form (more) likely to be eaten **or** dark form less likely to be eaten so dark form (more likely to) breed / pass on genes **or** pale form less likely to breed / pass on genes	accept ref to camouflage	1 1 1
4(c)(i)	pyramid of three layers of diminishing size three labels in food chain order	either way up award 2 marks only if the pyramid is correctly labelled accept trees / birch accept (peppered) moth(s) / larvae	1 1
4(c)(ii)	some material is lost in waste from the birds peppered moth larvae do not eat all the leaves from the trees		1 1
Total			9

4.2.3.2 Plant organ system

Answer 09 · 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**

4.2.3.2 Plant organ system

Answer 10 · Mark scheme

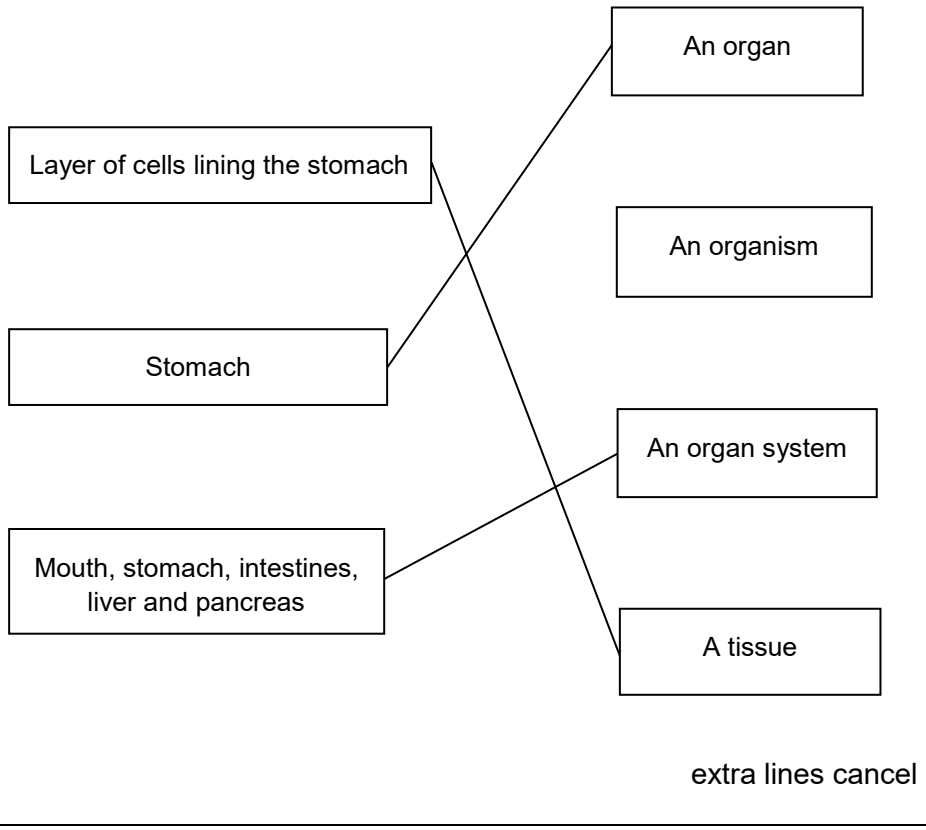
June 2013 | BL3FP | Original Q2 | Legacy

Question 2

question	Answers	extra information	mark
2(a)(i)	root hairs	if clear which word then allow	1
2(a)(ii)	xylem	if clear which word then allow	1
2(a)(iii)	stomata	if clear which word then allow	1
2(a)(iv)	storage organs phloem	in this order	1 1
2(b)(i)	23.2		1
2(b)(ii)	loss of water (from flask with plant) from leaves / plant via transpiration / via evaporation	 if no other marks allow used in photosynthesis for one mark	1 1
Total			8

4.2.3.2 Plant organ system

Answer 11 · Mark scheme June 2014 | BL2FP | Original Q1 | Legacy

1(a)(i)	A = (cell) membrane B = cytoplasm	 do **not** accept cytoplast	1 1	AO1 2.1.1a
1(a)(ii)	To control the activities of the cell		1	AO1 2.1.1a
1(b)	 extra lines cancel		3	AO1 2.2.1b, c,d
Total			**6**	

4.2.3.2 Plant organ system

Answer 11 · Mark scheme

June 2014 | BL2FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.2.3.2 Plant organ system

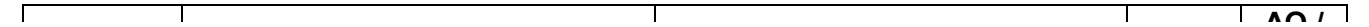
Answer 12 · Mark scheme June 2014 | BL3FP | Original Q4 | Legacy

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	

4.2.3.2 Plant organ system

Answer 12 · Mark scheme

June 2014 | BL3FP | Original Q4 | Legacy



4.2.3.2 Plant organ system

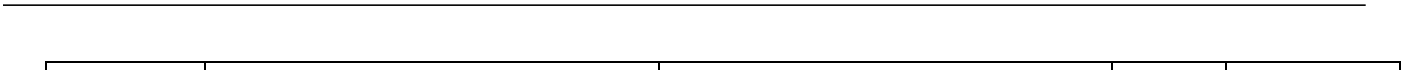
Answer 13 · Mark scheme June 2015 | BL3FP | Original Q5 | Legacy

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**	

4.2.3.2 Plant organ system

Answer 13 · Mark scheme

June 2015 | BL3FP | Original Q5 | Legacy



4.2.3.2 Plant organ system

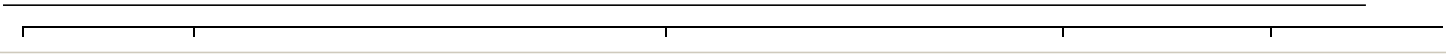
Answer 14 · Mark scheme June 2016 | BL3FP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	guard (cells)	allow phonetic spelling	1	AO1 3.1.3e
8(b)(i)	as carbon dioxide (concentration) increases, the (mean) number of stomata decreases (there is a) rapid drop initially	allow there is a negative correlation allow use of any number between 1.5 and 3.0 to indicate "initially"	1 1	AO2 3.1.3
8(b)(ii)	(there is) more carbon dioxide so plant doesn't need as many stomata (to obtain the amount needed) **or** (there is) less carbon dioxide so the plant needs more stomata (to obtain enough)		1	AO3 3.1.3c
8(c)(i)	may lose too much water	allow plant may wilt ignore references to oxygen / carbon dioxide plants lose a lot of water is insufficient ignore flaccid	1	AO3 3.1.3d
8(c)(ii)	any **one** from: • hot • dry • windy	ignore environments unqualified eg desert	1	AO3 3.1.3d
Total			**6**	

4.2.3.2 Plant organ system

Answer 14 · Mark scheme

June 2016 | BL3FP | Original Q8 | Legacy



4.2.3.2 Plant organ system

Answer 15 · Mark scheme June 2016 | BL3FP | Original Q9 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9			6	AO1 3.1.1a/b/g 3.1.1a/d 3.2.3a

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 points are made	At least **one** process (P) for obtaining a material is given **or** at least **one** vessel (V) and the material it carries is given **or** there is a description of the direction of movement (M) for at least **one** material	At least **one** process for obtaining a specified material is given **and** is correctly linked to the vessel that the material is transported in **or** correctly linked to a description of the direction of movement of the material	Processes used for obtaining specified materials are given. **and** correctly linked to the vessels that the materials are transported in **or** correctly linked to a description of the direction of movement of the materials. **For full credit,** in addition to the above descriptors at least **one** of the processes must be linked to the vessel that the material is transported in **and** the direction of the movement of the material.

examples of points made in the response Ions:	extra information
Water: (P) taken up by osmosis • from an area of low to high concentration (V) travels in the xylem (M) to the leaves **or** from the roots / soil (P) transpiration stream • movement replaces water as it evaporates from leaves (V) in the xylem	allow high concentration of water to low concentration of water allow from high water potential to low water potential ignore along a concentration gradient
Sugar: (P) made during photosynthesis (V) travels in the phloem (M) to other parts of the plant **or** to storage organs **or** travels up and down	

Total		6

4.2.3.2 Plant organ system

Answer 16 · Mark scheme

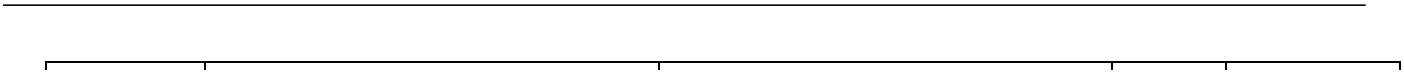
June 2017 | BL2FP | Original Q1 | Legacy

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**	

4.2.3.2 Plant organ system

Answer 16 · Mark scheme

June 2017 | BL2FP | Original Q1 | Legacy



4.2.3.2 Plant organ system

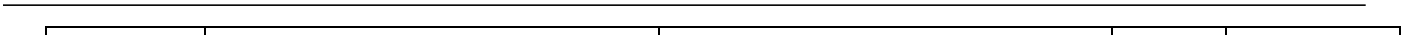
Answer 17 · Mark scheme June 2017 | BL3FP | Original Q2 | Legacy

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**	

4.2.3.2 Plant organ system

Answer 17 · Mark scheme

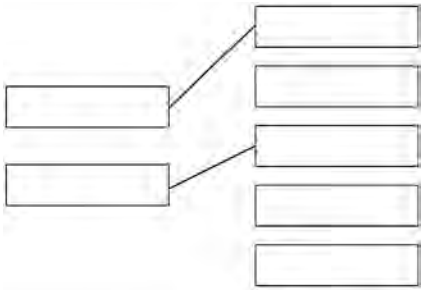
June 2017 | BL3FP | Original Q2 | Legacy



4.2.3.2 Plant organ system

Answer 18 · 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

4.2.3.2 Plant organ system

Answer 18 · Mark scheme

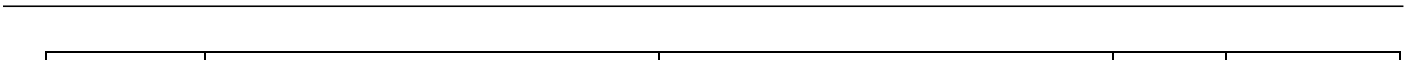
June 2018 | 8461/1F | Original Q2

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**	

4.2.3.2 Plant organ system

Answer 18 · Mark scheme

June 2018 | 8461/1F | Original Q2



4.2.3.2 Plant organ system

Answer 19 · Mark scheme

June 2018 | 8461/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	phloem		1	AO2 4.2.3.2
05.2	translocation		1	AO1 4.2.3.2
05.3	either: less (sugars for) respiration (so) less energy released **or** less amino acids made (1) (so) less protein produced **or** less protein synthesis (1) **or** less cellulose made (1) (so) weaker cell walls (1)		 1 1	AO2 4.4.1.3 4.4.2.1
05.4	(aphids) can fly to another plant **or** part of the plant to get (more) food	ignore to fly unqualified allow to find a mate allow idea of less competition for food allow to escape predators do **not** accept escape prey	1 1	AO2 4.3.3.1
05.5	(oil) prevents aphids from attaching to leaf **or** causes aphids to slide off leaf **or** idea that oil may harm / kill the aphid	ignore 'the leaf is slippery' allow oil may be unpleasant to the aphid	1	AO2 4.3.3.2

4.2.3.2 Plant organ system

Answer 19 · Mark scheme

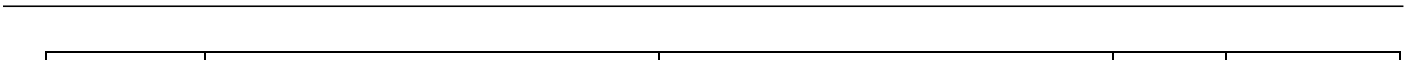
June 2018 | 8461/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	(plant / stem has) thorns	allow spines / spikes / prickles ignore stings do **not** accept thorns protect (the plant) from predators	1	AO1 4.3.3.2
05.7	C (fungi / spores) blown by / in direction of the wind **or** it's the closest plant (to A)	if any other letter given then no marks for the question allow black spot / disease is blown by / in direction of the wind do **not** accept reference to bacteria / viruses / pollen being blown	1 1	AO3 4.3.1.4 4.3.3.1 AO2 4.3.1.4 4.3.3.1
05.8	any **one** from: • spread rose bushes out more • remove any infected parts of the plant • use a fungicide	 allow isolate the infected plant allow idea of barrier around infected plant ignore separate unless qualified allow remove infected plant / A ignore pesticide do **not** accept insecticides / herbicide	1	AO2 4.3.1.4 4.3.3.1
Total			11	

4.2.3.2 Plant organ system

Answer 19 · Mark scheme

June 2018 | 8461/1F | Original Q5



4.2.3.2 Plant organ system

Answer 20 · 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

4.2.3.2 Plant organ system

Answer 20 · 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**	

4.2.3.2 Plant organ system

Answer 20 · Mark scheme

June 2019 | 8461/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.

Answer 21 · Mark scheme

November 2020 | 8461/1F | Original Q8

The full source mark scheme begins on page 51. Follow original question 8 in that document.

4.2.3.2 Plant organ system

Answer 22 · 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**	

4.2.3.2 Plant organ system

Answer 22 · Mark scheme

November 2021 | 8461/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.2.3.2 Plant organ system

Answer 23 · 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

4.2.3.2 Plant organ system

Answer 23 · 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**

4.2.3.2 Plant organ system

Answer 24 · 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

4.2.3.2 Plant organ system

Answer 24 · 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**

Answer 25 · 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

4.2.3.2 Plant organ system

Answer 25 · Mark scheme

June 2023 | 8461/1F | Original Q6

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		

4.2.3.2 Plant organ system

Answer 25 · Mark scheme

June 2023 | 8461/1F | Original Q6

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

4.2.3.2 Plant organ system

AQA

GCSE
BIOLOGY
8461/1F

Paper 1 Foundation Tier

Mark scheme

June 2020

Version: 1.0 Final Mark Scheme

jun2084611F/MS

4.2.3.2 Plant organ system

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

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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.

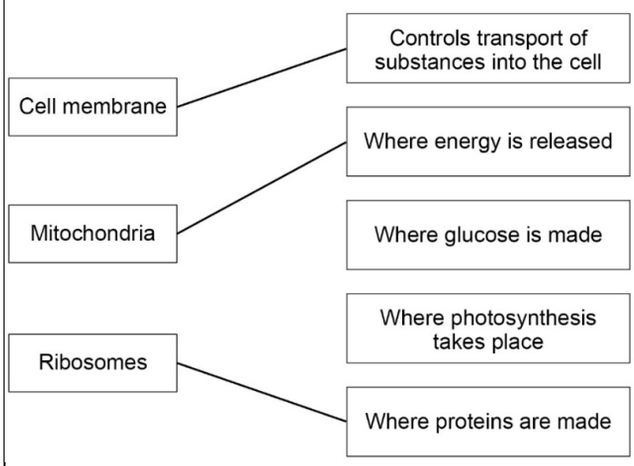
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

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.

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

01.8	$\frac{40}{0.1}$ 400	 do **not** accept if a unit is given	1 1	AO2 4.1.1.5 RPA 1
Total			**12**	

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

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**	

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

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**	

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

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**

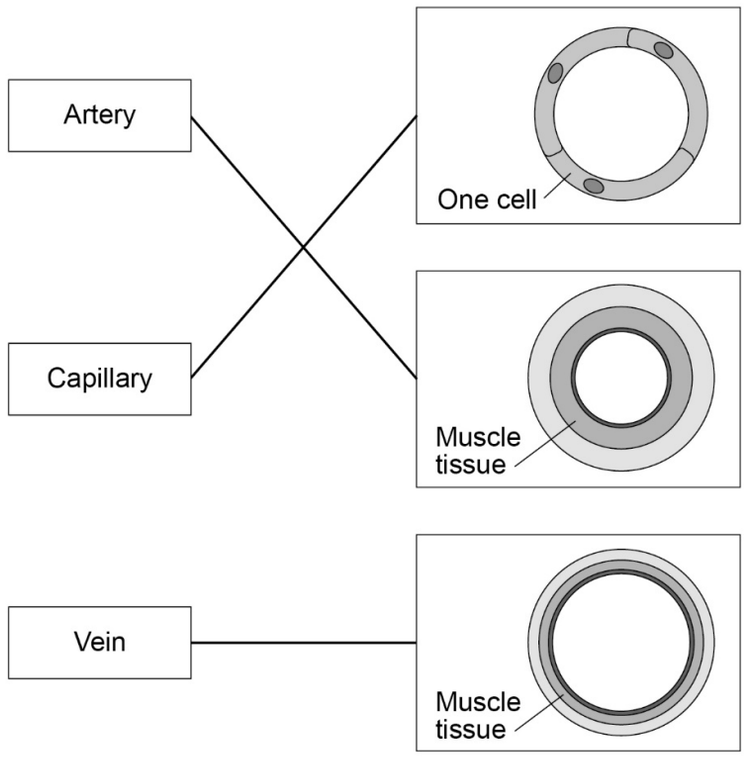
4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

05.9	placebos		1	AO1 4.3.1.9
Total			**14**	

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

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**	

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

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

4.2.3.2 Plant organ system

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**	

4.2.3.2 Plant organ system

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	

4.2.3.2 Plant organ system

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		

4.2.3.2 Plant organ system

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**	

4.2.3.2 Plant organ system

Answer 21 · Examiner comments

November 2020 | 8461/1F | Original Q8

Question 8 (standard demand)

The use of the term concentration gradient was confused by many students throughout this question. Movement 'along/across' a concentration gradient gives no clear indication of direction and requires further qualification; movement to/from a high/low concentration 'gradient' is incorrect. Some students described cells moving, instead of ions or particles. Some students had simply not learnt the definition.

Students should take care when reading the command word for each question. **08.3** asked for explanation(s), and without this, Level 2 and Level 3 could not be accessed. Very few students showed any detailed knowledge of the adaptations of the lungs; few could name the alveoli and the term 'bronchioli' as a hybrid of bronchioles and alveoli was commonly seen. Some students also stated that the alveoli contained villi. It is important to note that the alveoli having 'moist linings' is not a creditworthy answer to a question about adaptations for gas exchange. The gas exchange surfaces are moist **due** to diffusion, and therefore, a moist surface is a feature of the lungs but not a feature that maximises the diffusion of gases.

Osmosis and active transport were often confused in **08.5** and whilst nearly half of students were able to name active transport as the method of transport in **08.6**, less than 20% were able to go on to explain the process in the context of the question.

4.2.3.2 Plant organ system

Answer 21 · Examiner comments

November 2020 | 8461/1F | Original Q8

Concluding Remarks

Generally, performance on this paper was broadly comparable to previous years. Students generally scored well on simple recall of knowledge questions (AO1) and the topics of cell structure and immunity were well answered. Students were less confident in their knowledge and understanding of stem cells and differentiation and many could not apply their knowledge to new situations effectively (AO2).

Many students lacked the ability to articulate their thoughts logically and clearly on paper and a lack of comparative answers was common. As in previous years, details of the Benedict's test for sugar had been poorly learnt and students continue to struggle to understand how protein is used in living organisms. Students' understanding of command words was weak. Many 'explain' questions throughout the paper were answered in descriptive terms and students are advised to check the command word for each question before putting pen to paper.

4.2.3.2 Plant organ system

Answer 21 · 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.

4.2.3.2 Plant organ system

Answer 23 · 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 23 · 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.

4.2.3.2 Plant organ system

Answer 24 · 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 24 · 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.

4.2.3.2 Plant organ system

Answer 25 · 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 25 · 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.