AQA GCSE Biology | 8461

SPECIFICATION POINT 4.1.1.3

Cell specialisation

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**24**
Available paper years	**2008–2025**

Using this booklet

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

Name: _____ **Date:** _____

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

4.1.1.3 Cell specialisation

Answer 01 · Mark scheme

January 2008 | BLY2F | Original Q1 | Legacy

Question 1

	answers	extra information	mark
(a)	**A** nucleus **B** (cell) membrane **C** cytoplasm		1 1 1
(b)	any **two** from: • (contain) mitochondria • many (mitochondria) • respiration (occurs in mitochondria)		2
total			5

4.1.1.3 Cell specialisation

Answer 01 · Mark scheme January 2008 | BLY2F | Original Q1 | Legacy

BLY2F

Answer 02 · Mark scheme January 2009 | BLY2F | Original Q1 | Legacy

question	answers	extra information	mark
1(a)(i)	A cytoplasm B nucleus	accept clear indications	1 1
1(a)(ii)	any **two** from: • P • R • T	**two** required for **1** mark accept lower case letters	1
1(b)	sperm cells need a lot of energy to swim		1
Total			**4**

4.1.1.3 Cell specialisation

Answer 02 · Mark scheme January 2009 | BLY2F | Original Q1 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

Answer 03 · Mark scheme March 2010 | BLY1BP | Original Q5 | Legacy

Five	**A**	sexual reproduction	**2**	
	B	tissue culture	**3**	
	C	embryo transplants	**1**	
	D	adult cell cloning	**4**	
	A	**B**	**C**	**D**

4.1.1.3 Cell specialisation

Answer 04 · Mark scheme

June 2010 | BLY2F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	C and D		1
1(a)(ii)	cell wall		1
1(b)(i)	A		1
1(b)(ii)	D		1
1(c)	respiration		1
Total			**5**

4.1.1.3 Cell specialisation

Answer 04 · Mark scheme

June 2010 | BLY2F | Original Q1 | Legacy

BLY2F

4.1.1.3 Cell specialisation

Answer 05 · Mark scheme

June 2012 | BL1FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4 (a)	too cold / very cold **or** oxygen / microbes cannot reach it	allow not enough energy / heat / warmth ignore frozen	1
	for microorganisms / microbes / bacteria / fungi / enzyme / reaction (to work)	ignore other consumers	1
4 (b)	no longer exist **or** no more left **or** died out / all died	ignore died unqualified	1
4 (c)(i)	egg cell		1
4 (c)(ii)	nucleus		1
4 (c)(iii)	given an electric shock		1
4 (c)(iv)	womb		1
4 (d)	has mammoth genes / chromosomes	accept genetic information / DNA / alleles / nucleus accept converse	1
Total			**8**

4.1.1.3 Cell specialisation

Answer 05 · Mark scheme

June 2012 | BL1FP | Original Q4 | Legacy

BL1FP

4.1.1.3 Cell specialisation

Answer 06 · Mark scheme

June 2012 | BL2FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	23		1
4(a)(ii)	nucleus / 'the head'	allow phonetic spelling	1
4(b)(i)	**X** and **X**		1
4(b)(ii)	**X** and **Y**		1
4(c)	150 million / 150,000,000 / half (of them) / 50% / 1in 2		1
Total			**5**

4.1.1.3 Cell specialisation

Answer 06 · Mark scheme

June 2012 | BL2FP | Original Q4 | Legacy

BL2FP

4.1.1.3 Cell specialisation

Answer 07 · Mark scheme

June 2013 | BL2FP | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)(i)	1		1
5(a)(ii)	fertilisation / fusion	allow sexual reproduction allow fertilise / fuse ignore joining	1
5(b)(i)	**Dd**		1
5(b)(ii)	**dd**		1
5(c)(i)	1 in 2		1
5(c)(ii)	0		1
Total			**6**

4.1.1.3 Cell specialisation

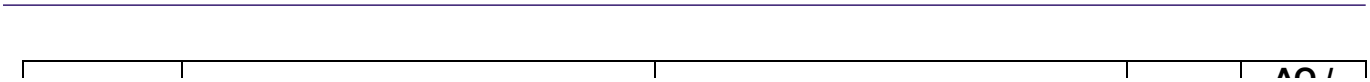
Answer 08 · Mark scheme June 2014 | BL1FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.
5(a)(i)	gamete(s)	ignore reproductive cells	1	AO1 1.7.2a
5(a)(ii)	womb / uterus	allow phonetic spellings	1	AO1 1.7.2c
5(b)(i)	are formed from the same original embryo		1	AO2 1.7.2c
5(b)(ii)	embryo transplantation		1	AO1 1.7.2c
5(b)(iii)	any **one** from: • (calves will have some) genes / DNA from bull / sperm • idea that sexual reproduction produces variation	allow not all genes from the cow allow may be male allow idea that gene for low fat milk may not be passed on	1	AO2 1.7.2a
Total			**5**	

4.1.1.3 Cell specialisation

Answer 08 · Mark scheme

June 2014 | BL1FP | Original Q5 | Legacy



4.1.1.3 Cell specialisation

Answer 09 · Mark scheme June 2014 | BL2FP | Original Q5 | Legacy

5(a)(i)	fertilisation		1	AO1 2.7.1i
5(a)(ii)	in sequence: 1 gene 2 chromosome 3 nucleus	accept 1 next to gene, 2 next to chromosome and 3 next to nucleus in box allow 1 mark for smallest **or** largest in correct position	2	AO2 2.1.1a, 2.7.1b,e, 2.7.2f,g
5(a)(iii)	DNA		1	AO1 2.7.2f
5(b)(i)	On diagram: tick drawn next to **X** and / or **Y** from Parent 1	tick(s) must be totally outside grid squares allow ticks around "parent 1" extra ticks elsewhere cancel	1	AO1 2.7, 2.7.2a,b
5(b)(ii)	0.5 / ½ / 50% / 1:1 / 50:50 / 1 in 2 2 (out of 4) boxes are **XX** **or** half of the sperm contain an **X**-chromosome	allow 2/4 / 2 in 4 / 2 out of 4 / 'even(s)' / 'fifty – fifty' do **not** allow 1:2 or '50 / 50' or '50 – 50' allow **XY** is male and 2 (out of 4) boxes are **XY**	1 1	AO2 2.7, 2.7.2a,b
Total			**7**	

4.1.1.3 Cell specialisation

Answer 09 · Mark scheme

June 2014 | BL2FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.1.1.3 Cell specialisation

Answer 10 · Mark scheme June 2016 | BL3FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)	diffusion active transport	this order only	1 1	AO2 3.1.1a/g
7(b)(i)	concentration (of sugar) in the bag was higher (than in the drink) **or** higher concentration of water outside the bag **or** in the drink / boiling tube (so) water moved in (to the tubing) by osmosis	allow concentration (of sugar) in the drink was lower (than in the bag) allow higher water potential outside the bag **or** lower water potential inside the bag allow water moves down **its** concentration gradient do **not** allow sugar moving allow diffusion (of water) do **not** allow sugar moving by osmosis **or** water moving by active transport	1 1 1	AO2 3.1.1.a/b/c
7(b)(ii)	**B**		1	AO3 3.1.1a/b/c
7(b)(iii)	close(st) to the concentration in the bag **or** to 5% (so rate of) diffusion / osmosis is slow	allow small(est) diffusion gradient **or** close(st) to an equilibrium allow (so) less water moves in (to the bag) ignore ref. to sugar	1 1	AO2/3 3.1.1a/b/c
Total			**8**	

4.1.1.3 Cell specialisation

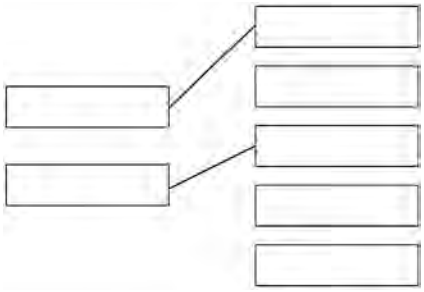
Answer 10 · Mark scheme

June 2016 | BL3FP | Original Q7 | Legacy



4.1.1.3 Cell specialisation

Answer 11 · 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

4.1.1.3 Cell specialisation

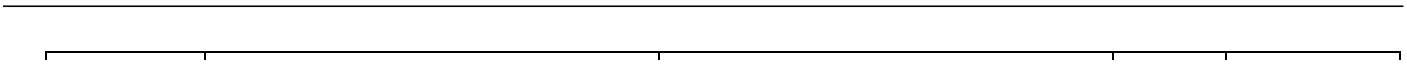
Answer 11 · Mark scheme

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**	

4.1.1.3 Cell specialisation

Answer 11 · Mark scheme

June 2018 | 8461/1F | Original Q2



4.1.1.3 Cell specialisation

Answer 12 · Mark scheme June 2018 | 8461/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	diffusion		1	AO2 4.1.3.1
06.2	A		1	AO2 4.1.3.1
06.3	B		1	AO3 4.1.3.1
06.4	(earthworm) can absorb more oxygen (in a given time) **or** increases / more gas exchange	allow get / obtain / take in more oxygen ignore easier absorption of oxygen ignore references to food	1	AO2 4.1.3.1
06.5	lipase		1	AO1 4.2.2.1
06.6		reference to more is only needed once for the first two marking points		AO2 4.4.2.1 4.7.2.2
	more oxygen (in soil with earthworms)	allow earthworms bring oxygen to soil	1	
	(for) more (aerobic) respiration	do **not** accept anaerobic respiration	1	
	(of) bacteria / fungi / microorganisms / microbes / decomposers		1	
06.7	fertilisation	ignore sexual reproduction	1	AO1 4.6.1.1 4.6.1.2

4.1.1.3 Cell specialisation

Answer 12 · Mark scheme

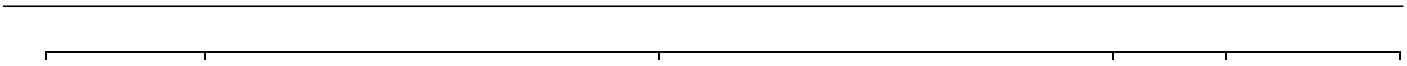
June 2018 | 8461/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.8	asexual (reproduction)	allow cloning	1	AO2 4.6.1.1
Total			**10**	

4.1.1.3 Cell specialisation

Answer 12 · Mark scheme

June 2018 | 8461/1F | Original Q6



4.1.1.3 Cell specialisation

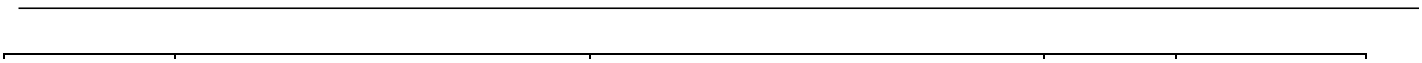
Answer 13 · Mark scheme June 2019 | 8461/1F | Original Q2

02.1	the movement of particles from a high concentration to a low concentration		1	4.1.3.1 AO1
02.2	(gills) have (many) projections (for) large(r) surface / area **or** (gills) are on the outside of the body (1) for good access to water (1)	allow description of projections allow have lots of / five gills	1 1	4.1.3.1 AO2
02.3	differentiation		1	4.1.2.3 AO1
02.4	mitosis	do **not** accept meiosis	1	4.1.2.2 AO1
02.5	hair		1	4.1.2.2 4.1.2.3 AO1
02.6	axolotls are cheap to feed axolotls are easy to breed		1 1	4.1.2.3 AO3
02.7	D		1	4.2.2.2 AO1
02.8	trachea	allow windpipe allow cartilage (ring)	1	4.2.2.2 AO1
02.9	pulmonary artery		1	4.2.2.2 AO1
Total			**11**	

4.1.1.3 Cell specialisation

Answer 13 · Mark scheme

June 2019 | 8461/1F | Original Q2



4.1.1.3 Cell specialisation

Answer 14 · Mark scheme June 2019 | 8461/2F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	46		1	AO1 4.6.1.2 4.6.1.8
03.2	half the mass of the DNA in cell **A**		1	AO2 4.6.1.2
03.3	meiosis		1	AO1 4.6.1.2
03.4	mutation		1	AO1 4.6
03.5	any **two** from: • different egg / sperm each time • genes from two parents • each gamete / egg / sperm has different alleles / genes / DNA / genetic information	ignore different chromosomes ignore the children have different genes / alleles	2	AO2 4.6 4.6.1.1
03.6	8		1	AO2 4.1.2.2 4.6.1.2
03.7	40	allow in range 39 to 41	1	AO2 4.6.1.2
03.8	$\frac{40}{500}$ × 1000 80	an answer of 80 scores **3** marks allow ecf from Question **03.7** for **3** marks an answer of 0.08 scores **2** marks allow $\frac{\text{answer to Question 03.7}}{500}$ an answer from mp1 but not × 1000 scores **2** marks	1 1 1	AO2 4.6.1.2

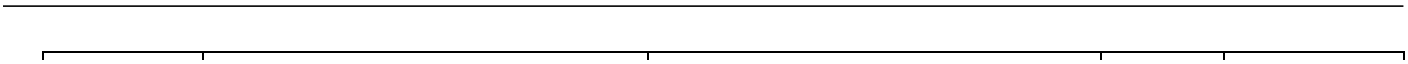
4.1.1.3 Cell specialisation

Answer 14 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.9	embryo is (very) small		1	AO2 4.5 4.5.3.4
	(so) embryo not seen / felt **or** lost in normal menstrual flow	ignore not noticed	1	AO3
Total			**13**	

4.1.1.3 Cell specialisation

Answer 14 · Mark scheme June 2019 | 8461/2F | Original Q3



Answer 15 · Mark scheme November 2020 | 8461/1F | Original Q6

The full source mark scheme begins on page 49. Follow original question 6 in that document.

Answer 16 · Mark scheme November 2020 | 8461/1F | Original Q8

The full source mark scheme begins on page 49. Follow original question 8 in that document.

4.1.1.3 Cell specialisation

Answer 17 · Mark scheme November 2020 | 8461/2F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	4 / four		1	AO1 4.6.1.2
03.2	23 / twenty three	do **not** accept 23 pairs	1	AO1 4.6.1.2
03.3	a different form of a gene		1	AO1 4.6.1.6
03.4	heterozygous		1	AO2 4.6.1.6
03.5 mark with 3.6 and 3.7	<table><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td>**Dd / dD**</td></tr><tr><td></td><td>**dd**</td><td>**dd**</td></tr></table>	allow 2 correct for **1** mark	2	AO2 4.6.1.1 4.6.1.2 4.6.1.6
03.6 mark with 3.5 and 3.7	ring around any **Dd**	allow ecf from question **03.5**	1	AO2 4.6.1.6
03.7 mark with 3.5 and 3.6	percentage must match answer given to questions **03.5** and **03.6**	if no answer in question **03.5** allow 50 %	1	AO3 4.6.1.6
03.8	mutation / mutated	do **not** accept mutant	1	AO1 4.6.2.1

4.1.1.3 Cell specialisation

Answer 17 · Mark scheme

November 2020 | 8461/2F | Original Q3

03.9	any **one** from: • to help them prepare • to inform whether to consider having an abortion • to find out if they have passed on the disorder	allow to see if the child / embryo has the disorder allow answers referring to genetic disorders, or specific example such as Dupuytren's / cystic fibrosis	1	AO3 4.6.1.7
Total			**10**	

4.1.1.3 Cell specialisation

Answer 17 · Mark scheme

November 2020 | 8461/2F | Original Q3

4.1.1.3 Cell specialisation

Answer 18 · Mark scheme November 2020 | 8461/2F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	(A) cerebellum (B) pituitary gland (C) cerebral cortex		1 1 1	AO1 4.5.2.2 AO1 4.5.3.1 AO1 4.5.2.2
05.2	cerebellum		1	AO1 4.5.2.2
05.3	coordinator		1	AO1 4.5.1 4.5.2.1
05.4	neurone	allow nerve (cell) ignore names of neurone	1	AO1 4.5.2.1
05.5	retina		1	AO1 4.5.2.3
05.6	can see fruit / food (so) get more food	allow can find fruit / food	1 1	AO2 4.5.2.3 4.7.1.4
05.7	accommodation		1	AO1 4.5.2.3
05.8	light rays are refracted less		1	AO1 4.5.2.3
05.9	any **one** from: • myopia • short-sightedness	allow near-sightedness	1	AO1 4.5.2.3
Total			**12**	

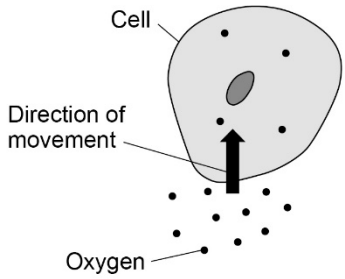
4.1.1.3 Cell specialisation

Answer 18 · Mark scheme

November 2020 | 8461/2F | Original Q5

4.1.1.3 Cell specialisation

Answer 19 · Mark scheme November 2021 | 8461/1F | Original Q1

01.1			1	AO3 4.1.3.1
01.2	water mineral ions energy	in this order only allow minerals / ions	1 1 1	AO1 4.1.3.2 4.1.3.3 4.2.3.2
01.3	root hair (cell)	ignore root / hair unqualified	1	AO1 4.1.1.3 4.2.3.2
01.4	large surface / area	allow it has a long projection allow the walls are thin allow it has lots of mitochondria	1	AO1 4.1.1.3 4.2.3.2
01.5	**Feature of sperm cell** / **How the feature helps** Contains a nucleus → To provide the chromosomes for fertilisation Has a long tail → To help the cell to swim to the egg To break the outer layer of the egg To release energy do **not** accept more than one line from a box on the left		1 1	AO1 4.1.1.3

4.1.1.3 Cell specialisation

Answer 19 · Mark scheme

01.6	nerve (cell) any **one** from: • long • has branches • has insulation	allow neuron(e) ignore motor / sensory / relay allow myelin / fat	1 1	AO1 4.1.1.3
Total			**10**	

4.1.1.3 Cell specialisation

Answer 19 · Mark scheme

November 2021 | 8461/1F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.1.1.3 Cell specialisation

Answer 20 · Mark scheme November 2021 | 8461/1F | Original Q7

07.1	any **two** from: • (microscope) slide • cover slip • dye / stain • (mounted) needle • pipette / dropper • scalpel • forceps / tweezers	allow named dye / stain ignore water ignore knife allow swab (to collect cells)	2	AO1 4.1.1.5 RPA1
07.2	eyepiece / lens	do **not** accept objective lens	1	AO1 4.1.1.5 RPA1
07.3	to focus (the image / cells)	allow to make the cells / image clear(er) allow to improve resolution (of the image) ignore to move the stage up / down do **not** accept reference to magnification	1	AO1 4.1.1.5 RPA1
07.4	any **one** from: • no cells in the field of view • slide not in the correct position • mirror not in correct position • (objective) lens not clicked into place **or** (objective) lens dirty • (student is) looking at a (large) air bubble • (the microscope is) not focussed	allow light / microscope not switched on / plugged in allow student did not stain the cells allow idea of magnification not being high enough	1	AO3 4.1.1.5 RPA1

07.5	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar/different is made clear and (where appropriate) the magnitude of the similarity/difference is noted.		4–6	AO2
	Level 1: Relevant features are identified and differences noted.		1–3	AO1
	No relevant content		0	
	Indicative Content **Differences:** • red blood cell has no nucleus **or** plant cell has a nucleus • red blood cell has no cell wall **or** plant cell has a cell wall • red blood cell is a biconcave disc **or** there are many different shapes of plant cell • red blood cell contains haemoglobin **or** plant cells do not contain haemoglobin • red blood cells do not contain chlorophyll **or** plant cells (may) contain chlorophyll • red blood cell has no chloroplasts **or** plant cell has chloroplasts • red blood cell has no (permanent) vacuole **or** plant cell has (permanent) vacuole • red blood cells are (much) smaller than plant cells **Similarities:** both have: • cytoplasm • cell membrane • pigments (although they are different) ignore references to mitochondria and ribosomes for **Level 2**, consideration of both red blood cells and plant cells is required.			4.1.1.2 4.2.2.3
07.6	water enters (the cells) by osmosis / diffusion	allow water enters **and** the cell starts to swell ignore explanations of osmosis	1	AO2
	plant cell has a cell wall (which prevents it from bursting)	allow red blood cell has no cell wall (so it swells and bursts)	1	AO1 4.1.3.2 4.1.1.2
Total			**13**	

4.1.1.3 Cell specialisation

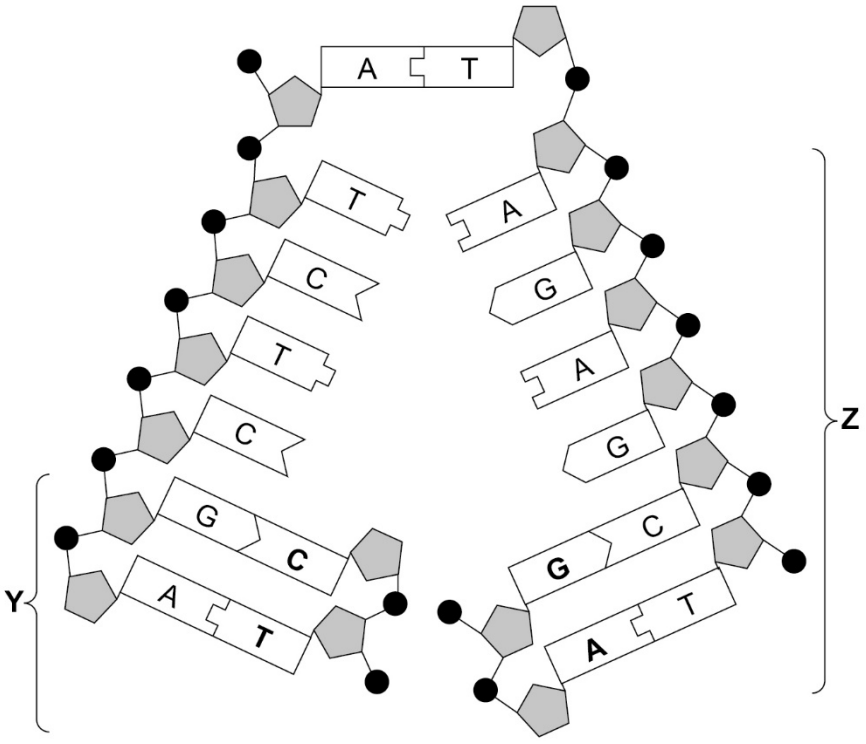
Answer 20 · Mark scheme

November 2021 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.1.1.3 Cell specialisation

Answer 21 · Mark scheme November 2021 | 8461/2F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	chromosome(s)	allow chromatid(s) / gene(s) / allele(s)	1	AO1 4.6.1.4
08.2	sugar	allow deoxyribose allow pentose do **not** accept ribose	1	AO1 4.6.1.5
08.3	base(s)	allow nitrogenous base(s) allow adenine **and** cytosine **and** guanine **and** thymine	1	AO1 4.6.1.5
08.4	 all four required for the mark		1	AO3 4.6.1.5

4.1.1.3 Cell specialisation

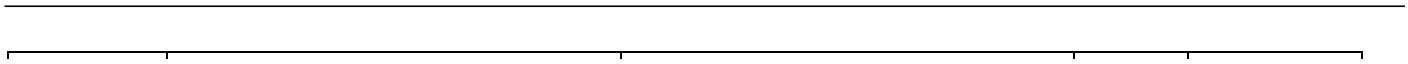
Answer 21 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	replication		1	AO3 4.6.1.5 4.1.2.2
08.6	protein	allow polypeptide	1	AO1 4.6.1.4
08.7	3×10^{-12} grams		1	AO2 4.6.1.2
08.8	meiosis		1	AO1 4.6.1.2
Total			**8**	

4.1.1.3 Cell specialisation

Answer 21 · Mark scheme

November 2021 | 8461/2F | Original Q8



4.1.1.3 Cell specialisation

Answer 22 · Mark scheme

June 2022 | 8461/2F | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	oestrogen progesterone		1 1	AO1 4.5.3.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	FSH causes an egg to mature in the ovary		1	AO1 4.5.3.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	(from day) 9 (to day) 15	do **not** accept (from day) 15 (to day) 9	1	AO2 4.5.3.5

4.1.1.3 Cell specialisation

Answer 22 · Mark scheme

Question	Answers	Mark	AO / Spec. Ref.
05.4	**Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.5.3.4 4.5.3.5
	Level 2: Relevant points (reasons/causes) are identified and there are attempts at logical thinking. 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 thinking.	1–2	
	No relevant content	0	
	Indicative content • oral contraceptive / the 'pill' ○ (contains hormones / oestrogen / progesterone) to prevent egg / follicle maturing **or** prevents ovulation • injection / implant / skin patch ○ (contains hormones / oestrogen / progesterone) to prevent egg / follicle maturing **or** prevents ovulation • condom / femidom ○ prevents sperm reaching egg or prevents sperm entering woman's body / vagina • diaphragm ○ prevents sperm reaching egg / womb / oviduct • IUD ○ prevents implantation **or** releases hormone / progesterone to prevent ovulation **or** (releases copper ions to) thicken mucus and prevent sperm passage • spermicide ○ kills sperm • sterilisation / vasectomy / tubular ligation ○ prevents passage of sperm / egg • rhythm method ○ no egg available for fertilisation		

Total Question 5		**10**

4.1.1.3 Cell specialisation

Answer 23 · Mark scheme

June 2025 | 8461/1F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.1	cytoplasm		1	AO1 4.1.1.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.2	any **one** from: • chromosome(s) • gene(s)	allow DNA / allele allow genetic material ignore genetic information	1	AO1 4.1.1.1 4.1.1.2 4.1.2.1

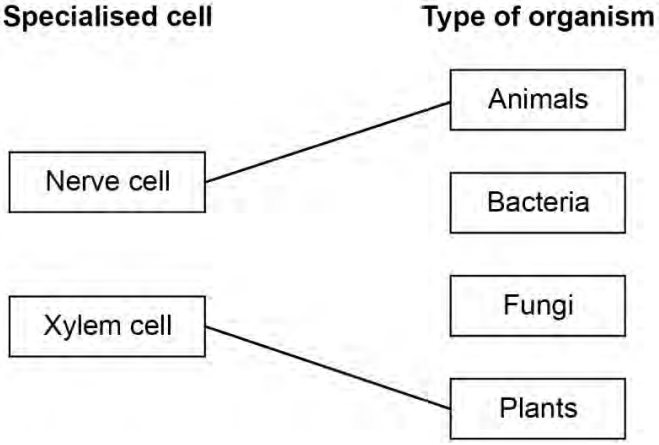
Question	Answers	Extra information	Mark	AO / Spec Ref.
01.3	any **one** from: • (cell) wall • (permanent / large) vacuole • chloroplast	ignore cellulose ignore chlorophyll	1	AO1 4.1.1.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.4	water		1	AO1 4.1.3.3 4.2.3.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.5	any **one** from: • fertilisation • to swim to the egg • to provide chromosomes / DNA for the egg • to carry chromosomes / DNA from the male	allow to fuse / join with an egg allow to penetrate the egg allow to reach the egg ignore swim unqualified allow to provide genetic material / information for the egg	1	AO1 4.1.1.3

4.1.1.3 Cell specialisation

Answer 23 · Mark scheme

Question	Answers	Mark	AO / Spec Ref.
01.6	 do **not** accept more than one line from a box on the left	1 1	AO1 4.1.1.3 4.2.3.1 4.2.3.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.7	active transport diffusion		1 1	AO1 4.1.3.1 4.1.3.3 4.1.1.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.8			1 1 1	AO2 4.1.3.1 4.1.3.2 4.4.2.1

Substance	Direction of movement of substance		
	ONLY from blood to muscle cells	ONLY from muscle cells to blood	From blood to muscle cells AND from muscle cells to blood
Carbon dioxide		✓	
Oxygen	✓		
Water			✓

do **not** accept more than one tick in any row

Total Question 1	12

4.1.1.3 Cell specialisation

Answer 24 · Mark scheme

June 2025 | 8461/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	testis / testes / testicle(s)		1	AO1 4.5.3.4 4.6.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	**A** = 46 **D** = 23	if no other mark awarded allow **1** mark for **A** = 92 **and D** = 46	1 1	AO1 4.6.1.2 4.6.1.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	fertilisation		1	AO1 4.6.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	pollen		1	AO1 4.6.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	mitosis		1	AO1 4.1.1.6 4.1.2.2 4.6.1.1 4.6.1.2 4.6.1.3

4.1.1.3 Cell specialisation

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	sugar water		1 1	AO2 4.4.1.3 4.2.3.2 4.6.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	any **one** from: • produces (genetic) variation (in offspring) • (seeds / fruits) can be dispersed (to new areas) • many seeds / offspring produced • offspring not competing (for light / water / ions) • can survive in a new environment • enables evolution	allow offspring are not (genetically) identical allow description of an advantage of variation eg not all killed by one pathogen / disease	1	AO1 4.6.1.1 4.6.1.3 4.6.2.2 4.6.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	any **one** from: • fast • many offspring produced • (genetically) identical offspring • only one parent needed • offspring less vulnerable (as attached to parent) • offspring receive water from parent • can out-compete other species • can colonise local area • less energy is needed	allow they are clones allow offspring receive named example of nutrient from parent allow pollinators / bees not required	1	AO1 4.6.1.1 4.6.1.3 4.6.2.2 4.6.3.1

Total Question 3	10

4.1.1.3 Cell specialisation

AQA

GCSE
BIOLOGY
8461/1F

Paper 1 Foundation Tier

Mark scheme

June 2020

Version: 1.0 Final Mark Scheme

jun2084611F/MS

4.1.1.3 Cell specialisation

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

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

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

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

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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.

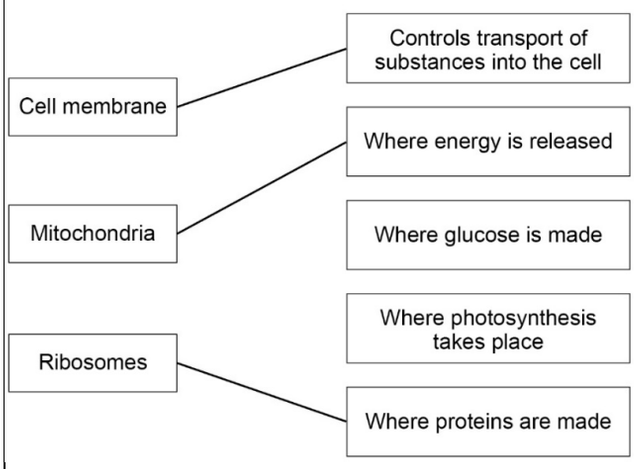
Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

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.

4.1.1.3 Cell specialisation

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

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

4.1.1.3 Cell specialisation

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**	

4.1.1.3 Cell specialisation

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

4.1.1.3 Cell specialisation

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**	

4.1.1.3 Cell specialisation

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

4.1.1.3 Cell specialisation

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**	

4.1.1.3 Cell specialisation

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

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**

4.1.1.3 Cell specialisation

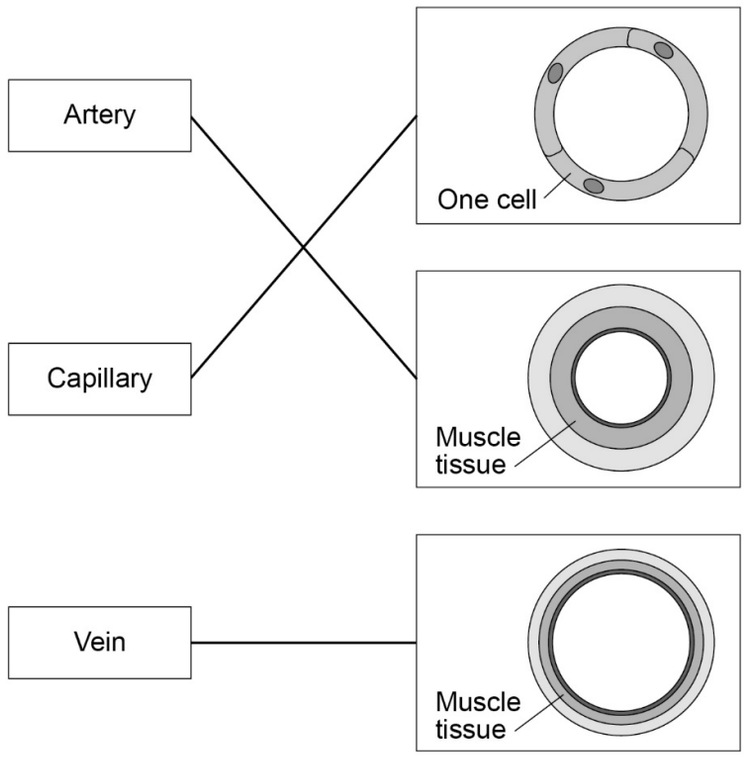
Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	will stop animals / herbivores eating it	allow it will not be eaten	1	AO3 4.3.3.2
05.2	chemical		1	AO1 4.3.3.2
05.3	thorns / spikes / spines / prickles (to stop animals / herbivores eating it)		1	AO3 4.3.3.2
05.4	for respiration to store as 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

4.1.1.3 Cell specialisation

05.9	placebos		1	AO1 4.3.1.9
Total			**14**	

4.1.1.3 Cell specialisation

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

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

4.1.1.3 Cell specialisation

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

4.1.1.3 Cell specialisation

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**	

4.1.1.3 Cell specialisation

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

4.1.1.3 Cell specialisation

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

4.1.1.3 Cell specialisation

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**	

4.1.1.3 Cell specialisation

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	

4.1.1.3 Cell specialisation

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		

4.1.1.3 Cell specialisation

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**	

4.1.1.3 Cell specialisation

Answer 15 · Examiner comments

November 2020 | 8461/1F | Original Q6

Question 6 (low & standard demand)

A lack of specificity in use of scientific language meant that few students were able to accurately articulate their ideas in **06.2**, resulting in a high level of discrimination between lower- and higher-attaining students. Many students referenced thick cell walls, lots of muscle in cells, as well as arteries having a large surface area.

06.3 highlighted that some students may not have been exposed to alternative images of blood cells, and many thought that the blood cells were actually cell parts, such as nuclei and cytoplasm. Half of the students gained marks in this question.

In **06.7** several students were able to make the link between platelets and blood clotting, but many incorrectly stated that the blood would clot too much as a result of reduced platelets.

4.1.1.3 Cell specialisation

Answer 16 · 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.

4.1.1.3 Cell specialisation

Answer 16 · 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.

4.1.1.3 Cell specialisation

Answer 16 · 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.

4.1.1.3 Cell specialisation

Answer 17 · Examiner comments November 2020 | 8461/2F | Original Q3

Question 3 (low & standard demand)

This question was about meiosis, chromosomes and an inherited disorder in humans. A little over one-third of students gave the correct answer of '4' cells being formed by meiosis in **03.1**. There were many other alternatives offered: '2' was, not unexpectedly, a common incorrect response and other suggestions included '8' and as many as '50 million' as these last students presumably either misread the question or misunderstood the process of meiosis.

For **03.6** most students ringed an appropriate offspring genotype although a significant minority (about 1 in 15) did not answer this question. The most likely reason for this is that students missed the question, rather than not understanding what they had to do. The lack of answer lines, spaces or boxes to tick should not be seen by students to mean that nothing needs to be done. Students should be reminded to read all of the words on the paper and respond accordingly. Those students who gave incorrect responses often ringed contradictory genotypes, showing a lack of understanding of genetic principles.

Answer 18 · Examiner comments November 2020 | 8461/2F | Original Q5

Question 5 (low & standard demand)

This question was about the brain and vision. In **05.6**, whilst many students realised that being able to detect UV light would enable a bird to feed, very few went on to explain that this would mean they would get more food (than their competitors). Some students suggested that this ability would enable the birds to detect predators, although there was no information that would lead them to this conclusion. Whilst others thought that only rotten fruit would reflect UV light, so being able to detect this would prevent them eating such fruit. **05.8** was not answered well, with the correct response, 'light rays are refracted less' when looking at a distant object being by far the least commonly chosen answer. More light being reflected was the preference of nearly half of the students.

4.1.1.3 Cell specialisation

Answer 22 · Examiner comments — June 2022 | 8461/2F | Original Q5

Question 5

This question was about the menstrual cycle and methods of contraception.

05.1 Almost two-thirds of students correctly selected *oestrogen* and *progesterone* as the female reproductive hormones. One in eight students included testosterone in their selection.

05.2 The role of FSH in causing eggs to mature in the ovary was known by almost two-thirds of students, although many thought it caused the breakdown of the uterus lining.

05.3 Given that a sperm cell could survive inside a woman's reproductive organs for five days and an egg for one day, with ovulation on day 14, the range of days when intercourse could result in fertilisation (i.e. 9 to 15) was correctly calculated by only one in twenty students. A wide range of suggestions was made, many of which bore little resemblance to the correct answer and it was difficult to understand how they had been arrived at.

05.4 Students who showed sufficient knowledge to get to Level 3 (about a quarter of students) frequently referred to condoms and the pill and how each of these works. Reference to the patch, an implant or the diaphragm were commonly made. Some students went somewhat over the top and suggested that castration (often in the vernacular) was an appropriate method of contraception and although this would be effective, the method was not credited. Weaker students often gave a list of methods but were unable to explain how they work. The most commonly understood method was the use of the condom, often described as stopping sperm from reaching the woman's body, the vagina or the egg.

Answer 23 · Examiner comments — June 2025 | 8461/1F | Original Q1

Question 1 (low demand)

01.1 84% of students were able to identify the cytoplasm of the animal cell.

01.2 Just over two thirds of students were able to identify one structure found in the nucleus, with the most common answer seen being DNA. Students should be reminded that at all levels of demand, reference to 'genetic information' is not creditworthy. A small number of students did not read the question properly, giving the function of the nucleus instead.

01.3 Nearly 80% of students answered correctly with the most common incorrect responses being nucleus, cytoplasm or cell membrane, indicating that students had misread the question.

01.4 Nearly 80% of students answered correctly.

01.5 75% of students answered this question correctly, but this question was an example of where ineffective articulation of language was seen, such as 'to impregnate the egg' or

4.1.1.3 Cell specialisation

Answer 23 · Examiner comments

'to ferment the egg by swimming'. Most students who did not gain credit here gave answers that were incomplete or too vague. The function of a sperm cell is more than the function of its flagellum, and so 'to swim' was insufficient. Other answers which were unable to gain credit included 'for reproduction' or 'to make a baby'. Similarly, reference to DNA / genetic material required the additional qualification of provision 'for the egg' or 'from the male' and, without this, the mark could not be awarded. Some responses referred only to the adaptations of the sperm cell. Although correct, adaptations alone were insufficient. Occasionally, students misread the question and answered in terms of 'stem cells', and confusion between 'egg cell' and 'embryo' was sometimes seen.

01.6 70% of students scored full marks in this question, however, a small number drew more than one line from a box on the left. The most common incorrect answer was a line connecting xylem to fungi. Students should be advised to make very clear any changes they may decide to make in their answers - ambiguous responses gain no credit.

01.7 50% of students scored full marks in this question, with a further 40% scoring one mark.

01.8 Students found this question quite challenging with only 35% scoring full marks, and around a third scoring one mark. Students were required to apply their knowledge in a slightly different context than usual. Gas exchange is, perhaps, most frequently considered in the lungs and this may have led some students to answer in terms of carbon dioxide going out from the blood and oxygen going into it. The idea that water might move anywhere other than from the soil into root hair cells added to the general level of uncertainty. Students were specifically asked to tick the selected boxes, but they occasionally wrote words instead, and these were usually impossible to interpret.

Answer 24 · Examiner comments

June 2025 | 8461/2F | Original Q3

Question 3 (Low and Standard demand)

03.1
Three quarters of students knew that sperm are produced in the testes/testicles. There were many alternative phonetic spellings of testes and testicles seen which were given credit. The most common incorrect answers were ovaries and penis along with other parts of the male and female reproductive organs. 'Genitalia' and colloquial terms were also frequently seen uncreditworthy answers, along with a few unexpected parts such as pancreas, stomach and spine.

03.2
All combinations of numbers were seen, including that for the compensation mark. Just under 40% of students gained both marks.

03.3
95% of students knew that fertilisation was the process where a sperm cell joins with an egg cell.

03.4
Over 50% of students knew that pollen is the male gamete in a flower.

03.5
60% of students knew that mitosis produces new cells in runners.

03.6
Over half of students could identify at least one substance that passes through the runners, with a further 25% being able to identify both sugar and water.

03.7
A third of students were able to give one advantage of reproducing sexually.
The most commonly awarded mark was for the idea of variation, either given in those terms or that the offspring would not be the same. All other bullet points were seen, with the idea of dispersal being the next most common. The most frequent reason for not gaining the mark here was for giving an advantage of asexual reproduction, possibly through having misread the question.

03.8
Over 50% of students were able to give one advantage of reproducing asexually with bullet points 1, 3 and 4 most commonly seen. Several students gave more than one idea in a single sentence e.g. ' it is faster because there is no need to find a mate'. A few students implied the idea of the offspring gaining resources from the parent plant but did not specify water or a named nutrient, instead referring to 'nutrients', so were unable to gain credit for bullet point 6. Others referred to asexual reproduction as being 'easier' without elaborating as to how this manifested itself. As with question **03.7** some students were unable to gain this mark because they gave an advantage of the other type of reproduction.