AQA GCSE Biology | 8461

SPECIFICATION POINT 4.1.3.3

Active transport

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**9**
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.

4.1.3.3 Active transport

Answer 01 · Mark scheme

Question 6

question	answers	extra information	mark
(a)	any **two** from: • transport up / against concentration gradient / low to high concentration • uses energy • use of protein / carrier		2
(b)	microvilli – large(r) surface area	accept have carriers	1
	mitochondria – release energy **or** make ATP	do **not** accept 'makes energy'	1
total			4

4.1.3.3 Active transport

Answer 01 · Mark scheme January 2008 | BLY3H | Original Q6 | Legacy

BLY3H

Answer 02 · Mark scheme June 2008 | BLY3H | Original Q5 | Legacy

question	answers	extra information	mark
5(a)(i)	protein is large (molecule) / too big to pass through filter		1
5(a)(ii)	glucose is present in the filtrate **or** 0.8 in filtrate	ignore units	1
	no glucose is present in the urine **or** 0 in urine		1
5(a)(iii)	active transport – up / against (concentration) gradient **or** from low to high (concentration)	it = active transport throughout	1
	uses energy / ATP	accept needs specific carrier / specific protein (in cell membrane) for **1** mark	1
5(b)	<u>water</u> <u>re</u>absorption / taken out **or** water taken into blood / body	other substances cancel mark	1
Total			**6**

4.1.3.3 Active transport

Answer 02 · Mark scheme June 2008 | BLY3H | Original Q5 | Legacy

COMPONENT NUMBER: BLY3H

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

4.1.3.3 Active transport

Answer 03 · Mark scheme

January 2009 | BLY3H | Original Q5 | Legacy

question	answers	extra information	mark
5(a)(i)	glucose **and** galactose		1
5(a)(ii)	any **three** from: Evidence: • absorption reduced by cyanide • absorb faster (than other sugars) Explanation: • active transport needs <u>energy</u> • less / no <u>energy</u> available / released if cyanide is there **or** less / no <u>energy</u> if no / less respiration	allow converse allow <u>energy</u> produced ignore cyanide prevents respiration	3
5(b)	all / the sugars / they can be absorbed <u>when gut poisoned</u> / <u>with cyanide</u> **or** <u>when no respiration</u> (diffusion) does not need an <u>energy</u> supply		1 1
Total			**6**

4.1.3.3 Active transport

Answer 03 · Mark scheme

January 2009 | BLY3H | Original Q5 | Legacy

COMPONENT NUMBER: BLY3H

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

4.1.3.3 Active transport

Answer 04 · Mark scheme

June 2010 | BLY3H | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	movement of atoms / molecules / ions	accept particles allow dissolved substances ignore reference to membranes	1
	(substance) moves from high to low concentration	allow down the gradient ignore across / along / with a gradient	1
6(a)(ii)	any **two** from: • movement of molecules / ions	accept particles allow dissolved substances this point once only in (a)(i) and (a)(ii)	2
	• from low to high concentration	allow up / against the gradient ignore across / along / with a gradient	
	• requires energy / respiration	accept requires ATP	

Question 6 continues on the next page

4.1.3.3 Active transport

BLY 3H

Question 6 continues

question	answers	extra information	mark
6(b)	• **filtration** of blood **or** described re small (molecules) through / large not	ignore diffusion	1
	max **four** from:		4
	• **reabsorption** / substances taken back into blood		
	• (reabsorption) of all of the sugar / glucose		
	• (reabsorption) of some of ions / of ions as needed by body		
	• (reabsorption) *of* some *of* water / of water as needed by the body		
	• urea present in urine	accept urea not reabsorbed	
	• reabsorption of water by osmosis / diffusion ***or*** reabsorption of sugar / ions by active transport		
Total			**9**

4.1.3.3 Active transport

Answer 05 · Mark scheme

Question 5

question	answers	extra information	mark
5	active transport needs energy **or** diffusion is <u>not</u> energy-dependent		1
	any **three** from: • (energy from) <u>aerobic respiration</u> • <u>more</u> respiration with $\underline{O_2}$ **or** <u>more</u> energy release with $\underline{O_2}$ • (aerobic) respiration / energy release occurs in mitochondria • xylose / other sugars absorbed by diffusion / not by active transport	do **not** allow anaerobic allow active transport is selective / specific **or** active transport can distinguish glucose and xylose	3
Total			**4**

4.1.3.3 Active transport

Answer 05 · Mark scheme

January 2011 | BLY3H | Original Q5 | Legacy

BLY3H

4.1.3.3 Active transport

Answer 06 · Mark scheme

June 2013 | BL3HP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)	solution in soil is more dilute (than in root cells)	concentration of water higher in the soil (than in root cells)	1
	so water moves from the dilute to the more concentrated region	so water moves down (its) concentration gradient **or** water moves from a high concentration of water to a lower concentration	1
	concentration of ions in soil less (than that in root cells)		1
	so energy needed to move ions **or** ions are moved against concentration gradient	the direction of the concentration gradient must be expressed clearly accept correct reference to water potential or to concentrations of water	1
4(b)	any **three** from: • movement of water from roots / root hairs (up stem) • via xylem • to the leaves • (water) evaporates • via stomata		3
4(c)(i)	0.67/0.7	accept 0.66, 0.6666666... or ⅔ or $0.\dot{6}$ correct answer gains **2** marks with or without working if answer incorrect allow evidence of $\frac{100}{150}$ for **1** mark do **not** accept 0.6 or 0.70	2

Question 4 continues on the next page . . .

Question 4 continued

question	Answers	extra information	mark
4(c)(ii)	during the first 30 minutes any **one** from: • it was warmer • it was windier • it was less humid • there was more water (vapour) in the leaves		1
	so there was more evaporation **or** stomata open during first 30 minutes **or** closed after 30 minutes (1) so faster (rate of) evaporation in first 30min **or** reducing (rate of) evaporation after 30min (1)	ignore 'water loss'	1
Total			**11**

4.1.3.3 Active transport

Answer 07 · Mark scheme

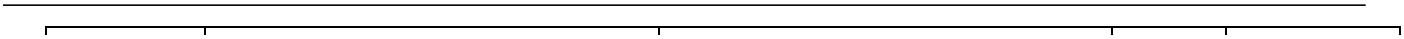
June 2017 | BL3HP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	any **two** from: • (shorter villi gives) a smaller surface area • (thicker cells give) a longer diffusion path • (capillaries are further from the lining) giving a longer diffusion path • fewer capillaries **or** less blood flow	allow converse if clearly explaining about healthy person if no marks awarded in this section allow one mark for two unqualified features eg there are shorter villi and thicker cells or capillaries are further from the lining 'longer diffusion pathway' unqualified only gains 1 mark	2	AO2/3 3.1.1a/h/k/l
	and (therefore) lower rate of diffusion / active transport / absorption		1	
	(so) less glucose / vitamins / minerals are absorbed	allow correct named example	1	
	(and) fat (stores) are broken down (to release glucose for energy so lose weight)		1	
8(b)	against the concentration gradient	allow from a low concentration to a high concentration **or** up the concentration gradient do **not** allow along the concentration gradient	1	AO1 3.1.1g
	requires energy	allow using ATP do **not** allow making energy allow correct use of terms carrier **or** transport proteins	1	
Total			**7**	

4.1.3.3 Active transport

Answer 07 · Mark scheme

June 2017 | BL3HP | Original Q8 | Legacy



4.1.3.3 Active transport

Answer 08 · Mark scheme

June 2019 | 8461/1H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	plasma		1	4.2.2.3 AO1
06.2	Benedict's (reagent / solution)	allow Fehling's (reagent / solution)	1	4.2.2.1 AO1
06.3	add chemical / Benedict's (reagent to urine) **and** boil / heat positive result – (colour changes from blue to brick) red	allow ecf from question **06.2** allow any temperature above 65 °C ignore water bath unqualified allow orange / yellow / green / brown if no other mark awarded, allow **1** mark for reference to glucose testing stick / strip	1 1	4.2.2.1 AO1
06.4	the blood is more concentrated **or** less dilute (than the solution in the cells) (so) water moves out of cells by osmosis water moves through a partially permeable membrane	allow the solution in the cells is less concentrated **or** more dilute than the blood allow correct references to water concentration **or** water potential **or** hypotonic / hypertonic ignore reference to amount of water or glucose allow (so) water moves into the blood by osmosis allow semi-permeable / selectively permeable membrane	1 1 1	4.1.3.2 AO2

4.1.3.3 Active transport

Answer 08 · Mark scheme

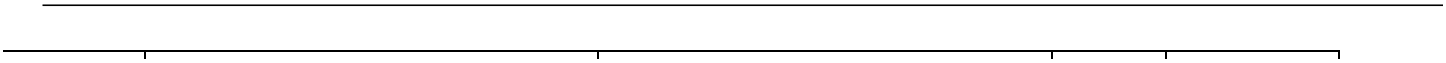
June 2019 | 8461/1H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	projections / folds / villi provide a large surface area	ignore small intestine has a large surface area do **not** allow cilia	1	4.1.3.1 4.1.3.3 4.2.2.1 4.1.1.2 AO1
	walls of projections / folds / villi / capillaries are thin / one cell thick for shorter absorption / diffusion distance		1	AO2
	(small intestine is) very long, increasing time (for absorption)		1	AO1
	good / efficient blood supply to maintain concentration gradient	allow many capillaries to maintain concentration gradient	1	AO2
	cells have many mitochondria for (aerobic) respiration for active transport **or** cells have many mitochondria for energy release for active transport	do **not** accept anaerobic do **not** accept producing energy	1	
Total			**12**	

4.1.3.3 Active transport

Answer 08 · Mark scheme

June 2019 | 8461/1H | Original Q6



4.1.3.3 Active transport

Answer 09 · Mark scheme

June 2025 | 8461/1H | Original Q3

Question 3

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

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

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

4.1.3.3 Active transport

Answer 09 · Mark scheme

June 2025 | 8461/1H | Original Q3

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

Total Question 3	8

4.1.3.3 Active transport

Answer 09 · Examiner comments

June 2025 | 8461/1H | Original Q3

Question 3 (standard demand)

03.1 This was a levelled, extended response question based on a required practical. Students were asked to evaluate a given method to investigate osmosis in pieces of potato. Students achieving Level 1 (11%) made very few relevant points. Students achieving Level 2 (78%) suggested further improvements to the method and often gave reasons as to why these might be required, but judgements were always incomplete. Students achieving Level 3 (10%) made full use of the command word 'evaluate' and considered both strengths and weaknesses of the method in addition to indicating the ways the method could be improved.

Few students gave responses which allowed them to match the Level 3 requirements. Most omitted any consideration of strengths, and their judgements were incomplete. Many, nevertheless, seemed confident in their attempts at answers and this was pleasing to see.

The question asked for ways to improve the validity of results, and these needed to be clear. Discussion of controlled variables such as size, time and volume required quantification, or clarification that they needed to be the same or specific on each occasion, rather than just 'similar', 'recorded' or 'precise'. A large number of students suggested that the mass of the cubes should be kept the same, but this was neither plausible, nor required.

The use of specific pieces of equipment only gained credit if they were linked to clear improvements to validity. Several responses referred to the use of a cork borer to obtain cylinders of potato but then did not add anything about the control of length; others suggested the use of stop watches but with no link to control of time.
Points which were frequently seen from the indicative content included drying the cubes before measuring mass, repeats and calculation of mean values and the use of more different concentrations. Some students focused on aspects such as safety considerations, tables of results, graphs or explanations of osmosis. These were not appropriate additions to an evaluation, which asked for ways to improve the validity of results. Discussion of a 'wider range' of concentrations was only relevant if mention was made of 'more than 3' values within it.

03.2 39% of students scored the mark in this question.

03.3 This question asked for one way in which active transport differs from osmosis. It was most easily answered by one clear, distinctive point about active transport being given, without any further mention of osmosis. 82% of students achieved the mark in this question. For BP2, it was common for students not to gain credit for including incorrect biology when describing osmosis, for example 'active transport goes from low to high concentration, but osmosis goes from high to low'. Incorrect reference to particles moving from a low concentration gradient to a high concentration gradient were seen more commonly than in previous years.