AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.3.3

Maintaining water and nitrogen balance in the body (biology only)

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**49**
Available paper years	**2007–2025**

Using this booklet

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

Name: _____ **Date:** _____

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

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 01 · Mark scheme

March 2007 | BLY1A | Original Q4 | Legacy

Four	**A**	total water loss from the body	**1**
	B	water loss from the kidneys	**2**
	C	water loss from the lungs	**4**
	D	water loss from the skin	**3**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 02 · Mark scheme

January 2008 | BLY1F | Original Q3 | Legacy

Question 3

	answers	extra information	mark
(a)(i)	lungs		1
(a)(ii)	skin		1
(a)(iii)	kidneys		1
(b)(i)	(as sweat lost,) performance falls		1
(b)(ii)	drink water / sports drink	ignore antiperspirant	1
total			5

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 02 · Mark scheme

January 2008 | BLY1F | Original Q3 | Legacy

BLY1F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 03 · Mark scheme January 2008 | BLY2F | Original Q2 | Legacy

Question 2

	answers	extra information	mark
(a)	4000	award **both** marks for correct answer, irrespective of working 1500 + 2000 + 500 gains **1** mark	2
(b)	day 2 (no mark) any **two** from: • more (water in) breath / breathing • more (water in) sweat / sweating • less (water in) urine	max **1** mark if correct day not identified or if no day given accept a lot of sweating if no other marks awarded allow **1** mark for more water lost on day 2	2
(c)(i)	respiration		1
(c)(ii)	cools / removes heat owtte	ignore 'maintains body temperature' unqualified	1
(c)(iii)	osmosis		1
total			7

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 03 · Mark scheme

January 2008 | BLY2F | Original Q2 | Legacy

BLY2F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 04 · Mark scheme January 2008 | BLY3F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
(a)(i)	bladder		1
(a)(ii)	glucose protein	extras – CANCEL	1 1
(b)(i)	any **two** from: • kidney functions all the time / not just 3 × 8 h sessions a week • can eat high-protein foods / high salt foods • cheaper • waste of time	allow direct quotation of correct points from the list allow can eat anything	2
(b)(ii)	have to take (immunosuppressant) drugs / consequence of this eg catch infections / may suffer brain damage / possible rejection of kidney **or** become ill more easily **or** risk of brain damage (due to anaesthetic)	allow direct quotation of correct points from the list	1
(c)(i)	urea		1
(c)(ii)	4.2		1
total			8

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 04 · Mark scheme January 2008 | BLY3F | Original Q6 | Legacy

BLY3F

Answer 05 · Mark scheme June 2008 | BLY1AP | Original Q2 | Legacy

Two	**A**	skin	**3**
	B	liver	**4**
	C	kidney	**1**
	D	gland	**2**

Answer 06 · Mark scheme June 2008 | BLY1AP | Original Q5 | Legacy

Five	**A**	540 cm^3	**3**
	B	1460 cm^3	**4**
	C	1500 cm^3	**1**
	D	2700 cm^3	**2**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 07 · Mark scheme

June 2008 | BLY1F | Original Q2 | Legacy

question	answers	extra information	mark
2(a)(i)	conserves water owtte		1
2(a)(ii)	prevents overheating / keeps cool	allow cooler at night allow safety from predators	1
2(a)(iii)	increases heat loss / cooling	allow prevents sinking into sand	1
2(b)	animal could overheat owtte		1
Total			**4**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 07 · Mark scheme

June 2008 | BLY1F | Original Q2 | Legacy

COMPONENT NUMBER: BLY1F

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: June 2008

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 08 · Mark scheme

June 2008 | BLY2F | Original Q4 | Legacy

question	answers	extra information	mark
4(a)(i)	1400	award **2** marks for correct answer if no working shown 2400 – (300 + 600 + 100) or equivalent for **1** mark	2
4(a)(ii)	$\frac{1}{3}$		1
4(b)	**A**: chemical reactions **B**: food **C**: drinking	all **three** required for **1** mark	1
4(c)	cools / reduces temperature	allow 'maintaining body temperature' owtte do **not** allow regulate unqualified ignore reference to urea numerical references to temperature should be correct	1
4(d)	more sweat produced less urine produced		1 1
Total			**7**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 08 · Mark scheme

June 2008 | BLY2F | Original Q4 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 09 · Mark scheme

June 2008 | BLY2F | Original Q6 | Legacy

question	answers	extra information	mark
6(a)	30	award **both** marks for correct answer, irrespective of working 100 – (33 + 27 + 10) or equivalent for **1** mark	2
6(b)	2 **or** 1.98	award **both** marks for correct answer, irrespective of working (33 / 100) × 6 or equivalent for **1** mark	2
6(c)	respiration		1
6(d)(i)	less / no heat loss / movement	do **not** accept 'energy' / warmth unqualified	1
6(d)(ii)	any reference to cruelty eg stress to calf / cramped conditions	ignore references to disease / hygiene	1
Total			**7**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 09 · Mark scheme

June 2008 | BLY2F | Original Q6 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 10 · Mark scheme

question	answers	extra information	mark
2(a)	glucose ✓ urea ✓ water ✓ sodium ions ✓ protein	all 3 correct = **2** marks 2 correct = **1** mark 0 or 1 correct = **0** marks	max 2
2(b)(i)	protein cannot pass through filter **or** protein (too) large **or** protein stays in the blood		1
2(b)(ii)	reabsorbed		1
2(c)(i)	less		1
2(c)(ii)	more		1
Total			**6**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 10 · Mark scheme June 2008 | BLY3F | Original Q2 | Legacy

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

Answer 11 · Mark scheme November 2008 | BLY1AP | Original Q3 | Legacy

Three	**A**	produces cholesterol	**2**
	B	produces sweat	**3**
	C	produces urine	**4**
	D	produces hormones	**1**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 12 · Mark scheme

question	answers	extra information	mark
4(a)	respiration	clear indication eg tick, underlining, others crossed out	1
4(b)	lungs		1
4(c)	liver		1
4(d)	amino acids		1
Total			**4**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 12 · Mark scheme January 2009 | BLY2F | Original Q4 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

Answer 13 · Mark scheme January 2009 | BLY3F | Original Q3 | Legacy

The full source mark scheme begins on page 78. Follow original question 3 in that document.

Answer 14 · Mark scheme March 2009 | BLY1AP | Original Q1 | Legacy

Question	Key		
One	**A**	the skin, which produces sweat	**1**
	B	a lung, which breathes out carbon dioxide	**3**
	C	the brain, which coordinates the other organs	**4**
	D	the kidney, which produces urine	**2**

Answer 15 · Mark scheme March 2009 | BLY1BP | Original Q2 | Legacy

Two	**A**	The camel's stomach can hold 200 litres of water.	**3**
	B	The camel produces little urine and does not sweat.	**1**
	C	Camels store fat in a hump.	**4**
	D	Camels can withstand an increase in body temperature of 9°C without harm.	**2**

Answer 16 · Mark scheme June 2009 | BLY1AP | Original Q3 | Legacy

Three	**A**	glands	**4**
	B	kidneys	**3**
	C	lungs	**1**
	D	skin	**2**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 17 · Mark scheme June 2009 | BLY2F | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)	$\frac{1}{5}$ / 20% / 1 in 5 / 1 : 4 / 0.2 /	any correct proportion ignore working do **not** allow 1 : 5	2
	$\frac{600}{3000}$ / 600 : 2400 / 600 in 3000	award **1** mark for selection of 3000 **and** 600	
3(b)(i)	sweat / sweating / perspiring	allow cooling / for cooling / to lose heat / to cool	1
3(b)(ii)	the volume of water in the urine decreases.		1
	the volume of water taken as food or drink increases.		1
3(c)(i)	liver	apply list principle	1
3(c)(ii)	kidney	apply list principle	1
3(c)(iii)	bladder	apply list principle	1
Total			**8**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 17 · Mark scheme

June 2009 | BLY2F | Original Q3 | Legacy

BLY2F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 18 · Mark scheme June 2009 | BLY2F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	tick in box of FIRST pyramid		1
4(a)(ii)	any **one** from: • less energy / biomass lost / wasted • greatest biomass / energy for humans • shortest food chain **or** less stages **or** least number of different organisms **or** only one predator **or** only 2 boxes tall **or** least boxes	 ignore human box is bigger ignore 'food' for humans allow only one stage	1
4(b)(i)	any **two** from: • quicker / more growth **or** grow fatter • less urine **or** less faeces • less heat (lost) • less movement	assume for pigs indoors allow converse if clear for pigs outdoors do **not** allow no for less ignore less space	2
4(b)(ii)	any **one** from: • less cruelty **or** more ethical **or** better animal welfare • better flavour / quality (of meat) • less pollution / etc / less fossil fuel used for heating	assume for pigs outdoors allow converse if clear for pigs indoors ignore more natural ignore ideas referring to against God's will ignore pig health **or** free range / organic ignore quality of life	1
Total			**5**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 18 · Mark scheme

June 2009 | BLY2F | Original Q4 | Legacy

BLY2F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 19 · 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**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 19 · Mark scheme June 2009 | BLY3F | Original Q2 | Legacy

BLY3F

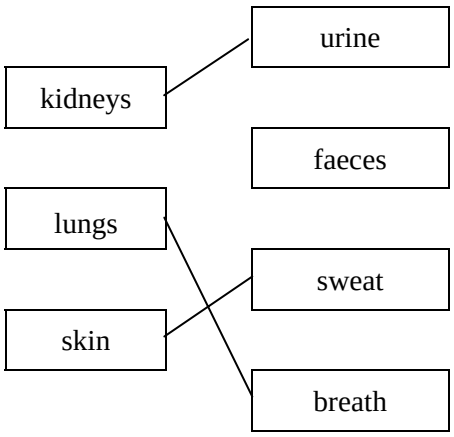
Answer 20 · Mark scheme November 2009 | BLY1AP | Original Q2 | Legacy

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

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 21 · Mark scheme

Question 1

question	answers	extra information	mark
1(a)		**1** mark per correct line extra line from a body part cancels the mark	3
1(b)(i)	1800 cm^3		1
1(b)(ii)	decreases		1
1(b)(iii)	any **one** from: • less / no sweat • less / no cooling *(*needed*)* • less / reduce / no heat loss / keep warm		1
1(c)	increases		1
Total			**7**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 21 · Mark scheme

January 2010 | BLY2F | Original Q1 | Legacy

BLY2F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 22 · Mark scheme

Question 5

question	answers	extra information	mark
5(a)(i)	E + F	either order	1
5(a)(ii)	D		1
5(b)(i)	any **2** from: • rises **or** a description • falls / levels off + **or** a description • further details		2
5(b)(ii)	maximum yield		1
Total			**5**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 22 · Mark scheme

January 2010 | BLY3F | Original Q5 | Legacy

BLY3F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 23 · Mark scheme

January 2010 | BLY3F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	water		1
6(a)(ii)	small		1
6(a)(iii)	3.15		1
6(b)(i)	21 000		1
6(b)(ii)	2 years		1
6(b)(iii)	prevent rejection		1
Total			**6**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 23 · Mark scheme January 2010 | BLY3F | Original Q6 | Legacy

BLY3F

Answer 24 · Mark scheme June 2010 | BLY1AP | Original Q6 | Legacy

Six	**2**	**3**	**4**	**2**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 25 · Mark scheme

June 2010 | BLY3F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	too large to pass through the filter		1
6(a)(ii)	passed through the filter, then reabsorbed into blood		1
6(a)(iii)	water is reabsorbed from the filtrate into the blood		1
6(a)(iv)	water, urea and sodium ions		1
6(b)(i)	less urine		1
6(b)(ii)	more concentrated		1
Total			**6**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 25 · Mark scheme

June 2010 | BLY3F | Original Q6 | Legacy

BLY 3F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 26 · Mark scheme

Question 2

question	answers	extra information	mark
2(a)(i)	lung		1
2(a)(ii)	kidney		1
2(a)(iii)	bladder		1
2(b)(i)	more the same less	allow synonyms	1 1 1
2(b)(ii)	cools / reduces temperature **or** prevent overheating	ignore reference to sweat	1
Total			**7**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 26 · Mark scheme January 2011 | BLY2F | Original Q2 | Legacy

BLY2F

Answer 27 · Mark scheme January 2011 | BLY3F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)(i)	capillary		1
2(a)(ii)	diffusion		1
2(b)(i)	Z	ignore any names	1
2(b)(ii)	large / increased surface / area / **or** to absorb more food **or** improved diffusion	allow all food absorbed	1
Total			4

Answer 27 · Mark scheme January 2011 | BLY3F | Original Q2 | Legacy

BLY3F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 28 · Mark scheme January 2011 | BLY3F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)	in table, in sequence: decrease increase	allow descriptions for increase / decrease	 1 1
5(b)	**No** older have lower % / less chance of rejection (than younger) older have higher % / more chance of still working (after 5 years than younger) **or** **Yes** older have lower % / less chance of surviving (at least 10 years than younger) (1)	 allow figures allow figures allow in older patients kidney works for longer allow max **1** mark if Yes allow older people are more likely to die	 1 1
Total			**4**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 28 · Mark scheme

January 2011 | BLY3F | Original Q5 | Legacy

BLY3F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 29 · Mark scheme

January 2011 | BLY3F | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)(i)	brain		1
7(a)(ii)	skin		1
7(a)(iii)	1/25 **or** 4% **or** 0.04 **or** 1 in 25 **or** 1:25 **or** 1 out of 25	allow $\frac{1000}{25000}$	1
7(b)	any **two** from: • increased / high heart rate / pulse rate • dilation / widening of <u>arteries / arterioles</u> (to skeletal muscles) **or** less blood flow to other organs • increased stroke volume / described	do **not** allow pumps more blood unqualified accept vasodilation unqualified do **not** accept reference to veins / capillaries	2
7(c)	<u>more</u> respiration / description **or** <u>more</u> energy required **or** to provide <u>more</u> energy	ignore references to breathing	1
	respiration / process described → CO_2	do **not** accept anaerobic respiration	1
	CO_2 <u>diffuses</u> into blood		1
Total			8

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 29 · Mark scheme January 2011 | BLY3F | Original Q7 | Legacy

BLY3F

Answer 30 · Mark scheme March 2011 | BLY1AP | Original Q5 | Legacy

Five	**A**	liver	**4**		
	B	pituitary gland	**1**		
	C	kidney	**3**		
	D	skin	**2**		
	A		**B**	**C**	**D**

Answer 31 · Mark scheme June 2011 | BLY1AP | Original Q2 | Legacy

Two	**A**	12	2
	B	13	1
	C	22	4
	D	62	3

Answer 32 · Mark scheme June 2011 | BLY1AP | Original Q5 | Legacy

Five	**A**	kidney			4
	B	liver			1
	C	ovary			3
	D	pituitary gland			2
	A		**B**	**C**	**D**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 33 · Mark scheme

June 2011 | BLY2F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)	1800	allow – / minus 1800	1
6(b)	3200	award both marks for correct answer irrespective of working allow – / minus 3200 award **2** marks for 200 or –200 irrespective of working allow ecf from part (a) for both routes to 2 marks if no answer **or** incorrect answer then indication of addition of 1800 **or** their (a), 1000 and 400 gains **1** mark	2
6(c)	drink more / take in more from food & drink 200 (cm^3)	allow ecf from (b), ie if answer to (b) is less than 3000 then accept drink less if answer to (b) is exactly 3000 accept do nothing accept ecf from (b) answer should be difference between (b) and 3000 if answer to (b) is 3000 accept they are the same **NB** drink / take in 3200 (cm^3) of water = **1** mark drink / take in 200 (cm^3) of water = **2** marks ignore references to exercise / sweat	1 1
Total			**5**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 33 · Mark scheme

June 2011 | BLY2F | Original Q6 | Legacy

BLY2F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 34 · Mark scheme

June 2011 | BLY3F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)	(protein molecules too) big **or** larger than pore size	allow cannot fit through the pores / hole / gaps	1
6(b)(i)	diffusion		1
6(b)(ii)	high to low concentration **or** high concentration in blood, low concentration in dialysis fluid **or** down concentration gradient **or** correct use of numbers	ignore along gradient / across gradient allow there is none in dialysis fluid	1
6(c)	any value between 3.15 and 3.25 (inclusive)		1
6(d)(i)	any **two** from: • kidney works all the time **or** dialysis works for short time **or** dialysis needs regular trips to hospital / regular treatment / long term treatment • kidney maintains correct concentration all the time **or** no build-up as between dialysis sessions • no need to regulate diet **or** correct example – eg low salt / low protein / low fluid intake as with dialysis • cheaper in the long term	ignore enables an active life accept kidney transplant is one off treatment	2

Question 6 continues on the next page . . .

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 34 · Mark scheme

June 2011 | BLY3F | Original Q6 | Legacy

BLY3F

Question 6 continued . . .

question	answers	extra information	mark
6(d)(ii)	any **two** from: • rejection / described **or** need to use immunosuppressants **or** need to take drugs for life • susceptible to other infections • hazards of operation / anaesthetic • shortage of donors / match • high initial cost	allow may need later replacement	2
Total			**8**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 34 · Mark scheme

June 2011 | BLY3F | Original Q6 | Legacy

BLY3F

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 35 · Mark scheme

January 2013 | BL1FP | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)(i)	skin		1
2(a)(ii)	kidneys	accept kidney	1
2(a)(iii)	lungs	accept lung	1
2(b)(i)	multiply temperature by number of students at that temperature and add them up divide by number of students	allow (36.8×5) + (36.9×3) + (37.0×6) + (37.1×7) + (37.2×3) allow 888 allow divide by 24	1 1
2(b)(ii)	10 / ten		1
2(b)(iii)	so enzymes work (well)	ignore death / overheating / hypothermia allow body reactions work (well)	1
Total			7

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 35 · Mark scheme

January 2013 | BL1FP | Original Q2 | Legacy

BL1FP

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 36 · Mark scheme

June 2013 | BL3FP | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)(i)	kidney		1
3(a)(ii)	bladder		1
3(a)(iii)	liver		1
3(a)(iv)	lung(s)		1
3(a)(v)	skin		1
3(b)(i)	3000	allow 2970 to 3030 correct answer gains **2** marks with or without working if answer incorrect allow **1** mark for evidence of 1550 + 450 + 1000 (allow tolerance of + or – ½ square on each)	2
3(b)(ii)	1600	allow 1570 to 1630	1
3(b)(iii)	1400	allow (b)(i) – (b)(ii)	1
3(b)(iv)	correct plot from (b)(iii)	tolerance ½ square ignore width	1
3(b)(v)	cells swell / overhydrated / damaged	accept poisoned (by urea)	1
Total			**11**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

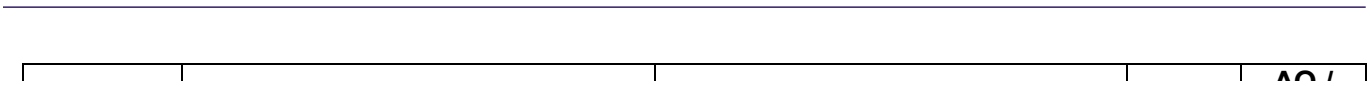
Answer 37 · Mark scheme

Question	Answers	Extra information	Mark	AO / spec ref.
2(a)	brain blood sweat	in correct order only	1 1 1	AO1 3.3.2a, b,c
2(b)(i)	A		1	AO3 3.1.1e
2(b)(ii)	to replace ions lost (in sweat)	accept salts allow named examples, eg. prevent cramps	1	AO1 3.1.1e
2(b)(iii)	any **one** from: • there is too much glucose / sugar in the sports drink • they shouldn't have too much glucose / blood sugar • it would cause their blood glucose / sugar to rise (too high)		1	AO2 3.1.1d, 3.3.3d
Total			6	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 37 · Mark scheme

June 2014 | BL3FP | Original Q2 | Legacy



4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

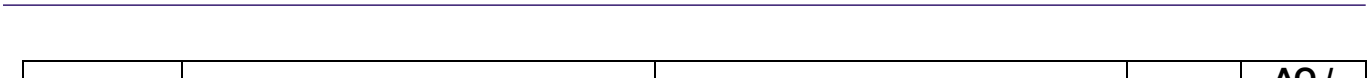
Answer 38 · Mark scheme June 2014 | BL3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.
5(a)(i)	(37C is the same as human) body temperature		1	AO2 3.3.1
5(a)(ii)	any **one** from: • urea • glucose • sodium	ignore water	1	AO2 3.3.1f
5(a)(iii)	(as they are) small enough to pass through (the membrane)	allow because there is a high concentration in the fake blood and a low concentration in the water (so will diffuse across)	1	AO2 3.3.1f
5(a)(iv)	glucose		1	AO1 3.3.1f
5(b)	any **two** from: • don't have to go to hospital **or** done at home rather than hospital • less effect on lifestyle / can be mobile • always filtering urea out • don't need a medical professional (to do it for you)	continuous is insufficient allow takes a shorter time allow does not have to be connected to blood vessels ignore 'less painful'	2	AO3 3.3
Total			6	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 38 · Mark scheme

June 2014 | BL3FP | Original Q5 | Legacy



4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 39 · Mark scheme

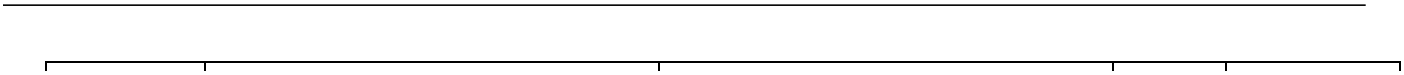
June 2015 | BL1FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	Taking cuttings from plants		1	AO1 1.7.2a/b
4(b)(i)	Adult cell cloning		1	AO2 1.7.2c
4(b)(ii)	an egg cell		1	AO2 1.7.2c
4(b)(iii)	nucleus		1	AO1 1.7.2c
4(b)(iv)	an electric shock		1	AO1 1.7.2c
4(b)(v)	uterus / womb	accept phonetic spelling	1	AO1 1.7.2c
4(c)	any **two** from: • unethical / immoral • cloned child would have to give up a kidney • possible operation complications	 allow 'rights' of the cloned child allow against religious teachings allow illegal allow parents may not want another child allow a long time to wait (for the kidney)	2	AO3 1.7
Total			**8**	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 39 · Mark scheme

June 2015 | BL1FP | Original Q4 | Legacy



4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

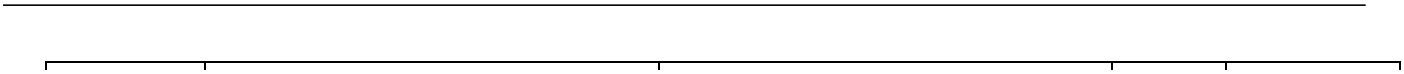
Answer 40 · Mark scheme June 2015 | BL3FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	Lung		1	AO1 331a
3(b)	Filtering the blood		1	AO1 331c
3(c)	They will take in water and burst		1	AO2 311f,331b
3(d)(i)	6		1	AO2 331c/d/e
3(d)(ii)	less than 28		1	AO2 331c/d/e
3(d)(iii)	urea not reabsorbed **or** dialysis (fluid) has removed urea		1	AO2 331c/d/e
3(e)(i)	antibodies		1	AO1 331g/h
3(e)(ii)	Tissue typing the donor kidney		1	AO1 311i
Total			**8**	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 40 · Mark scheme

June 2015 | BL3FP | Original Q3 | Legacy



4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 41 · Mark scheme June 2016 | BL1FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	2400 cm^3		1	AO2 1.2.2a
1(a)(ii)	1400 (cm^3)	allow **2** marks for ecf of correct answer to [answer given in (a)(i) – 1000] allow **1** mark for 2400 – (600 + 400) or equivalent with no or incorrect answer allow **1** mark for ecf of answer given in (a)(i) – 1000 or equivalent with no or incorrect answer	2	AO2 1.2.2a
1(b)(i)	sweat(ing)	allow evaporation allow perspiration	1	AO1 1.2.2a
1(b)(ii)	any **one** from: • for cooling • to maintain body temperature		1	AO1 1.2.2a
1(c)(i)	More water was lost through the skin.		1	AO2 1.2.2a
1(c)(ii)	decrease		1	AO2 1.2.2a
Total			**7**	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 41 · Mark scheme

June 2016 | BL1FP | Original Q1 | Legacy

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 42 · Mark scheme

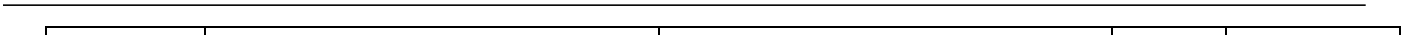
June 2017 | BL3FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	**A** = red **B** = white	 allow lymphocyte / phagocyte	1 1	AO2 3.2.2a/c/d
3(b)(i)	low number of platelets so blood doesn't clot	ignore abnormal unqualified	1 1	AO2/3 3.2.2e
3(b)(ii)	To prevent rejection of the new blood cells.		1	AO2 3.3.1i
3(c)	carbon dioxide small intestine kidneys	allow CO_2 in this order only	1 1 1	AO1 3.2.2b
Total			**8**	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 42 · Mark scheme

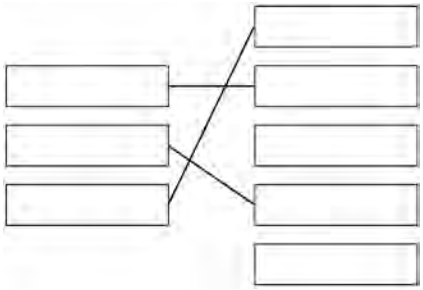
June 2017 | BL3FP | Original Q3 | Legacy



4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 43 · Mark scheme

June 2018 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1		additional line from a blood component negates the mark for that component	1 1 1	AO1 4.2.2.3
04.2	C		1	AO3 4.2.2.2
04.3	(vessel) B thick walls **or** thick muscle / elastic tissue **or** lumen is small / narrow	 do **not** accept ref to 'cell walls' allow description of 'lumen'	 1 1	AO1 4.2.2.2
04.4	95		1	AO2 4.2.2.2
04.5	(because coronary) arteries / they are narrower	allow (because the coronary) arteries are blocked / clogged (with fat)	1	AO2 4.2.2.4
04.6	 250 × 60 (= 15 000) **or** 15 000 15	an answer of 15 scores **2** marks allow 0.25 × 60 allow $\frac{\text{answer to marking point 1}}{1000}$ an incorrect conversion to dm^3 in calculation does not negate marking point 1	 1 1	AO2 4.2.2.2

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

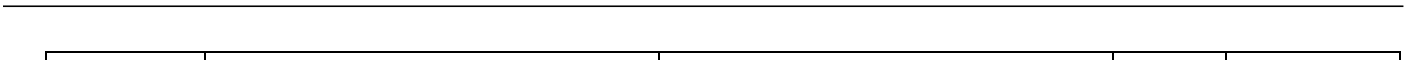
Answer 43 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	any **two** from: • no need to stay as long in hospital (after procedure) **or** can go home sooner / same day • not as / less invasive **or** no need for a major operation **or** no need for general anaesthetic • shorter recovery time **or** can get back to normal lifestyle quicker **or** less time needed off work • lower risk of a heart attack (during procedure)	allow only need to stay 2–3 hours in hospital (after procedure) allow less scarring allow less chance of infection allow only a small cut needed allow only 7 days recovery ignore reference to cost ignore idea that it takes less time overall	2	AO3 4.2.2.4
04.8	lower chance of failure (within one year) only need one operation to treat multiple blockages **or** can treat multiple blockages at one time	allow only a 5% chance of failure ignore ref to anaesthetic or CABG being a long-term treatment	1 1	AO3 4.2.2.4
Total			**14**	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 43 · Mark scheme

June 2018 | 8461/1F | Original Q4



4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 44 · Mark scheme June 2018 | 8461/2F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	pancreas		1	AO1 4.5.3.2
05.2	liver glycogen	in this order	1 1	AO1 4.5.3.2
05.3	would be digested / broken down (by enzymes / protease / pepsin / acid or to amino acids)	allow denatured (by acid)	1	AO2 4.2.2.1 4.5.3.2
05.4	use of 14.2 **and** 6.8 7.4	an answer of 7.4 scores **2** marks allow an answer of 7.2 or 7.3 (using 14.1 and / or 6.9) for **1** mark	1 1	AO2 4.5.3.2 AO3 4.5.3.2
05.5	any **one** from: • (person A's) results are higher • (A) increases for a longer time **or** peaks later • (A) takes longer to decrease **or** takes longer to return to normal	allow converse comparisons with person B as the subject ignore A peaks at a higher level than B allow other correct comparisons allow a description using pairs of figures from graph at a given time	1	AO2 4.5.3.2

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

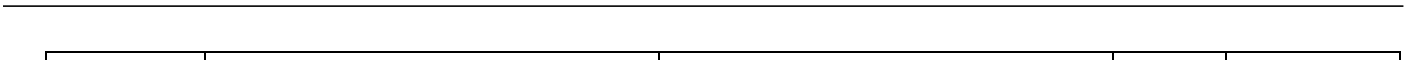
Answer 44 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	a negative correlation		1	AO2 4.5.3.2
05.7	less carbohydrate / sugar / fat in diet **or** lose weight **or** maintain a healthy weight (more) exercise	allow go on a diet allow eat less allow balanced / healthy diet ignore diet unqualified allow examples of exercise	1 1	AO1 4.5.3.2
Total			**10**	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 44 · Mark scheme

June 2018 | 8461/2F | Original Q5



4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 45 · Mark scheme June 2019 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	protein		1	AO1 4.4.2.3 4.5.3.3
06.2	urea is a waste (product)	allow toxic / poisonous **or** may damage cells **or** denatures proteins ignore harmful / dangerous	1	AO1 4.5 4.5.3.3
06.3	respiration breathing	in this order	1 1	4.4.2.1 4.4.2.2 4.7.4.3 AO1
06.4	least medium most	in this order 3 correct = **2** marks 1 or 2 correct = **1** mark	2	AO3 4.5.2.4 4.5.3.3
06.5	diffusion		1	AO1 4.1.3.1 4.5.3.3
06.6	protein (molecules too) large	this mark may only be awarded if mp1 is correct or not attempted allow pores in membrane are too small	1 1	AO3 4.5.3.3
06.7	3	allow three	1	AO3 4.5.3.3
06.8	increases	ignore numbers	1	AO3 4.5.3.3

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

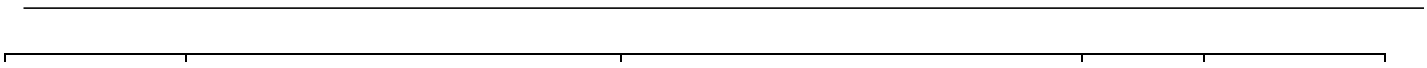
Answer 45 · Mark scheme June 2019 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.9	any **two** from: • has a low(er) concentration of urea • constant urea concentration / level • less time attached to machine **or** fewer hospital visits • no / less restriction on travel • not piercing skin repeatedly • less chance of infection / blood clots • cheaper in the long term • no restrictions on diet	allow converse points for person **A** / dialysis allow substance (if named must be correct) ignore cheaper unqualified	2	AO3 4.5.3.3
Total			**13**	

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 45 · Mark scheme

June 2019 | 8461/2F | Original Q6



4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 46 · Mark scheme

November 2020 | 8461/2F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	$\frac{1430}{2600} \times 100$ 55 (%)		1 1	AO2 4.5.1 4.5.3.3
04.2	(volume) increases	allow (volume) goes up	1	AO2 4.5.1 4.5.2.4 4.5.3.3
04.3	drink (a lot / more)		1	AO2 4.5.1 4.5.3.3
04.4	 filtration reabsorption excretion	this order only	 1 1 1	AO1 4.5.3.3

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 46 · Mark scheme

November 2020 | 8461/2F | Original Q4

Question	Answers	Mark	AO / Spec. Ref.
04.5	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3–4	AO3 4.5.3.3
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–2	
	No relevant content	0	
	Indicative content **Advantages of kidney transplant** • no need for regular / long hospital visits **or** is a long-term solution • flexible lifestyle, such as can go on holidays • may not live near a hospital **or** reference to transport costs • no risk of infection from frequent needles / treatment • less / no need to control diet • maintains correct concentration of substances in blood / body • cheaper long term for NHS / hospital **Disadvantages of kidney transplant** • may be rejected • have to keep taking anti-rejection drugs **or** immunosuppressants • (suitable) donor may not be available **or** need for tissue matching • risk from surgery (e.g. anaesthesia or infection) • recovery from surgery will take a long time • does not last forever (therefore further surgery needed) For Level **2**, answers must refer to both advantages **and** disadvantages		
Total			**11**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 46 · Mark scheme

November 2020 | 8461/2F | Original Q4

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

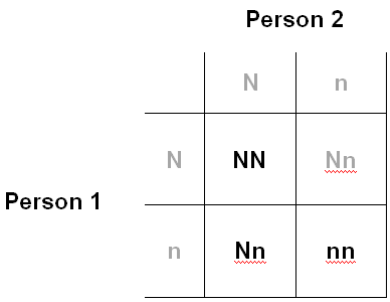
Answer 47 · Mark scheme

June 2022 | 8461/2F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	an allele expressed only if a person has two copies of the allele		1	AO1 4.6.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	male with MSUD	allow equivalent statements eg affected male **or** MSUD male **or** man with the disease	1	AO3 4.6.1.6 4.6.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3 *mark with 01.4, 01.5*		3 correct = **2** marks 2 or 1 correct = **1** mark	2	AO2 4.6.1.6 4.6.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4 *mark with 01.3, 01.5*	does not have MSUD	allow equivalent statements – eg normal **or** not affected **or** healthy ignore carrier	1	AO2 4.6.1.6 4.6.1.7

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 47 · Mark scheme

June 2022 | 8461/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5 *mark with 01.3, 01.4*	correct percentage from **Figure 2**	if no answer in question **01.3** allow 25%	1	AO3 4.6.1.6 4.6.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	dominant		1	AO2 4.6.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	DNA	allow deoxyribonucleic acid allow nucleotide(s)	1	AO1 4.6.1.4 4.6.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	proteins		1	AO2 4.6.1.4

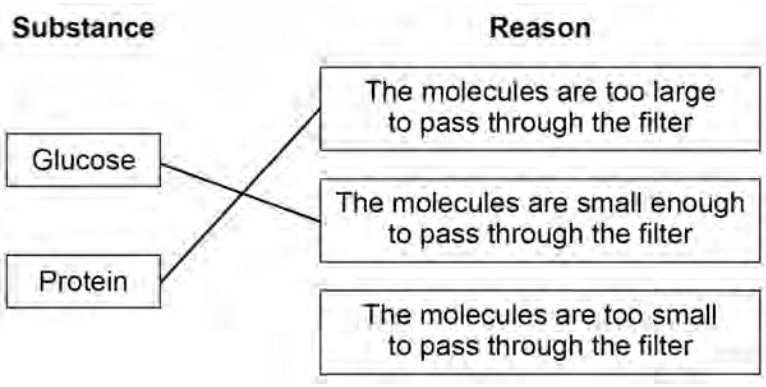
Total Question 1		**9**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 48 · Mark scheme

June 2023 | 8461/2F | Original Q6

Question 6

Question	Answers	Mark	AO / Spec Ref.
06.1	 do **not** accept more than one line from a box on the left	1 1	AO3 4.5.3.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.2	158.1 (dm^3)		1	AO2 4.5.3.3

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 48 · Mark scheme

June 2023 | 8461/2F | Original Q6

Question	Answers	Mark	AO / Spec Ref.
06.3	**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	AO2
	No relevant content	0	
	Indicative content **points for transplant:** • transplant is cheaper • numerical comparison, eg £18 000 cheaper in first year and £30 000 cheaper in subsequent years • less / no inconvenience, eg time **or** cost for hospital visits • less / no restriction on lifestyle • less / no restriction on diet or fluid intake • no danger of infection from eg puncturing skin or blood in contact with machine • less / no possibility of blood clots • no need to take anti-clotting drugs • transplanted kidney keeps water / urea / ions in blood at correct level at all times • feel well all the time **points against transplant:** • danger of rejection • need tissue match for transplant • donors in short supply • possibility of organ damage due to anaesthetic • possibility of infection in surgery • possibility of damage due to surgery • need to take immunosuppressant drugs • may suffer other infections due to suppressed immune system • may need repeat operation (after about 10 years) For **Level 3** students should refer to both points for and points against.		4.5.3.3

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 48 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.4	4 × 5 000 = 20 000		1	AO2 4.5.3.3
	20 000 + 17 000	allow 25 000 + 17 000	1	
	(£) 37 000	allow (25 000 + 17 000) = (£) 42 000	1	

Total Question 6	**12**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

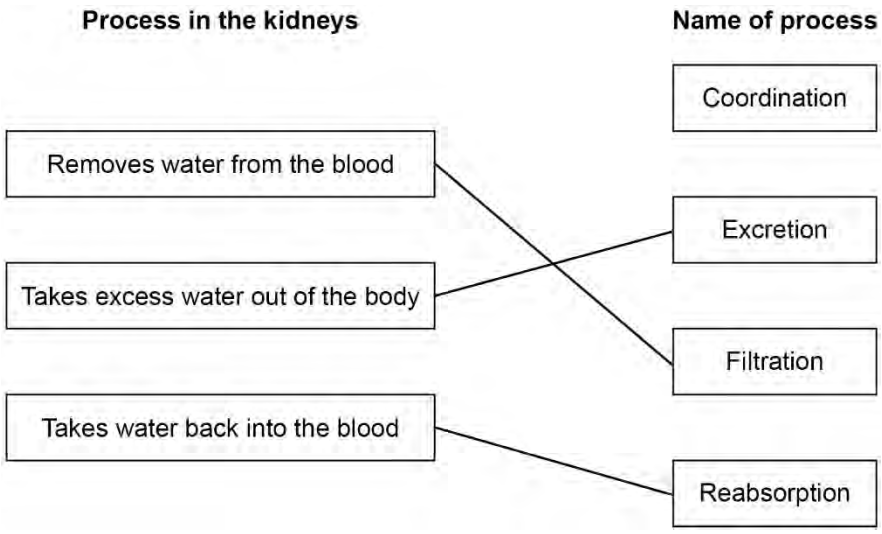
Answer 49 · Mark scheme

June 2025 | 8461/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	bars plotted at 420 **and** 340 bars correctly labelled	allow a tolerance of ± ½ a small square allow bars touching ignore width of bars ignore shading	1 1	AO2 4.5.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	increase		1	AO3 4.5.2.4

Question	Answers	Mark	AO / Spec. Ref.
04.3	 do **not** accept more than one line from a box on the left	1 1 1	AO1 4.5.3.3

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 49 · Mark scheme

June 2025 | 8461/2F | Original Q4

Question	Answers	Mark	AO / Spec. Ref.
04.4	**Level 2:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	3–4	AO3 4.5.3.3
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	Indicative content **in favour of a kidney transplant** • no need for regular / long hospital visits • could last for rest of lifetime • flexible lifestyle eg as can go on holidays • may not live near a hospital **or** reference to transport costs • no risk of infection from frequent piercing of skin **or** no risk of infection from blood exposed to equipment • no need for controlled diet • maintains correct concentration of substances in blood / body • cheaper in long term **against a kidney transplant** • may be rejected • need to keep taking anti-rejection drugs **or** immunosuppressants • (suitable) donor may not be available **or** donor may need tissue matching • risk from surgery (anaesthetic or infection) • recovery from surgery may take a long time • may need replacing eventually For **Level 2**, points for and against a kidney transplant must be given.		

Total Question 4	10

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Version 1: 0109

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Mark Scheme

2009 examination – January series

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' 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.

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4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

MARK SCHEME

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 and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

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

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 lines 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.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates 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.

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

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

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate 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

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

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 are 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 e.c.f. 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.

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
1(a)(i)	artery		1
1(a)(ii)	capillary		1
1(b)	alveoli		1
	red blood cells		1
	nucleus		1
Total			**5**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
2(a)(i)	energy		1
2(a)(ii)	microorganisms		1
2(b)(i)	25°C		1
2(b)(ii)	pathogens		1
Total			**4**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

<table>
<tr><th>question</th><th>answers</th><th>extra information</th><th>mark</th></tr>
<tr><td>3(a)</td><td>178</td><td>ignore working or lack of working

correct working: 180 – 2 but no answer / wrong answer = 1 mark</td><td>2</td></tr>
<tr><td>3(b)</td><td><table><tr><th>Man A</th><th>Man B</th></tr><tr><td>higher</td><td>lower</td></tr><tr><td>lower</td><td>higher</td></tr><tr><td>lower</td><td>higher</td></tr></table></td><td>all 4 cells correct = 2 marks
2 or 3 cells correct = 1 mark
0 or 1 cells correct = 0 mark</td><td>2</td></tr>
<tr><td>Total</td><td></td><td></td><td>4</td></tr>
</table>

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
4(a)	yeast		1
4(b)(i)	**two** sensible suggestions, each linked to correct explanation:	max **4** marks	
	does not release CO		1
	gas is toxic / harms living organisms		1
		allow ethanol <u>only</u> releases CO_2 and H_2O for **1** mark	
	does not release NO_x / SO_2	do **not** allow more pollution / more gases released	1
	gas(es) cause acid rain / eq / harms organisms		1
	or		
	does not cause acid rain (1)		
	(acid rain) damages building / harms organisms (1)		
	made from crops / not a fossil fuel (1)		
	crops can re-grow / source is renewable / fossil fuels are non-renewable (1)		
4(b)(ii)	any **one** from • releases less energy (per litre) • need to burn more to cover same distance / travel shorter distance • land not being used for food crops / less food available • raises food prices		1
Total			**6**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
5(a)	40–60 hours		1
5(b)(i)	decrease 1st slowly then faster / appropriate detail from the graph eg from 7.8 to 0 / faster after 4-10 h		1 1
5(b)(ii)	oxygen after glucose oxygen less than glucose	extra box ticked cancels **1** mark	1 1
5(b)(iii)	aerobic respiration		1
Total			**6**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
6(a)(i)	kill / destroys (micro)organisms / bacteria / fungi / living things	do **not** allow get rid of microorganisms	1
6(a)(ii)	entered from environment / already in flask **or** insufficient heating to kill all microorganisms		1
6(b)	any **two** from: • heated more thoroughly / for longer / higher temperature • destroyed / killed all microorganisms • sealed better eg flask melted / sealed immediately after heating / no pouring through air • microorganisms unable to enter (from air) / can only enter when neck broken / open		2
6(c)	biogenesis		1
Total			**5**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
7(a)(i)	19 800	for correct answer ignore working or lack of working 165 × 120 but no answer / wrong answer = **1** mark (ignore extras)	2
7(a)(ii)	any **two** from: • for respiration • energy released • prevents anaerobic respiration • prevents build-up of lactic acid	 ignore oxygen debt allow energy produced	2
7(b)	any **two** from: • increased breathing rate • increased depth of breathing **or** deep breathing • dilation of arteries / vasodilation • blood diverted from elsewhere	 } more breathing is max **1** mark ignore increase in heart rate allow heavier breathing do **not** allow harder breathing allow blood vessels dilate do **not** allow veins / capillaries dilate ignore name of organ	2
Total			**6**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
8(a)	transpiration / evaporation / diffusion	ignore osmosis	1
8(b)(i)	D		1
8(b)(ii)	any **two** from: • more / faster diffusion **or** evaporation **or** transpiration • molecules move faster • maintains concentration gradient **or** keeps water concentration low in the air **or** brings in more dry air **or** removes damp air / water		2
Total			**4**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
9(a)	prevents denaturation / change / damage of proteins / enzymes **or** prevents bacteria being killed / destroyed	allow protein is 'destroyed' do **not** allow 'bacteria denatured' **or** 'protein killed'	1
9(b)(i)	any **two** from: • anaerobic respiration • lactic (production) • acid (produced)	do **not** allow 'bacteria are acidic' allow max **1** mark if incorrect named acid	2
9(b)(ii)	any **one** from: • thickens / clots / solidifies (milk) • kills other microorganisms **or** prevents other microbes growing • preserves yoghurt **or** prevents yoghurt going off **or** makes yoghurt last longer **or** keeps it fresh • reference to (improved) flavour	allow reference to germs	1
9(c)	reduce / prevent growth / reproduction of microorganisms **or** to prevent decay **or** to preserve it **or** to keep it fresh **or** to prevent it becoming <u>too</u> sour	allow reference to germs ignore curdling	1
Total			**5**

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 46 · Examiner comments

November 2020 | 8461/2F | Original Q4

Question 4 (low & standard demand)

This question was about water balance in the human body and the treatment of people with kidney failure. The most common error in calculating the percentage of water lost as urine was to simply subtract the volume of urine from the total volume. Some students went on to divide this total by 2600 or by 1430. Consequently, a significant proportion of students were not credited with any marks and half scored full marks.

In **04.2** some students appeared to misunderstand what they were being asked and rather than describing an 'increase' suggested that the water lost from the skin as sweat during a long-distance run 'evaporates', 'dries up' or 'decreases (due to evaporation)'. It was common for students to identify all three of the words required in **04.4**; however, a large proportion managed to get these words in the wrong order. Students appear to know what goes on in the kidney but could not associate the specific terms, 'filtration', 'reabsorption' and 'excretion', with the given descriptions.

For **04.5** references to the advantage of a kidney transplant as not needing frequent hospital visits and the disadvantages of possible rejection and long waiting lists were commonly described. However, many students got no further than these and only very rarely was there any suggestion regarding infection, dietary control, the need to take immunosuppressants or surgical risks. Some students gave a description without any attempt to identify whether these were advantages or disadvantages of transplants; whilst others just described advantages of both a transplant and dialysis.

Answer 47 · Examiner comments

June 2022 | 8461/2F | Original Q1

Question 1

This question was about the inheritance of a human genetic condition.

01.1 Just over half the students correctly selected the option that a recessive allele was one expressed only if a person has two copies of the allele.

01.2 Most students were able to identify the correct phenotype for the given symbol in terms of both sex and having the condition maple syrup urine disease (MSUD). A small proportion simply copied one of the other phenotypes from the key.

01.3 A large proportion of students completed the Punnett square correctly. Of those who didn't, it was common for them to give offspring genotypes as single alleles.

01.4 Identification of the phenotype for the heterozygous genotype was poorly done, with many students not referring to MSUD in their answers. Almost one in five made no attempt at all.

01.5 Those students who gave correct answers in question 01.4 were frequently able to give the correct answer to this question. However the number who gained all four marks across this

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 47 · Examiner comments June 2022 | 8461/2F | Original Q1

and the two previous questions was not high (fewer than one-fifth). Students seemed to be somewhat confused by MSUD being the recessive allele and often gave 75%, even when their Punnett square was correct.

01.6 Most students correctly selected *dominant* as the term that described the allele **N** for not having MSUD.

01.7 Although a quarter of students gave the correct answer, DNA (with a small number giving the full chemical name), a considerable number offered all manner of substances, organelles or whole organisms. It was evident that some students either ignored the word 'substance' in the question or lacked the understanding of what a substance is.

01.8 Just over half knew that proteins are made of amino acids.

Answer 48 · Examiner comments June 2023 | 8461/2F | Original Q6

Question 6

This question was about filtration in the kidney and the benefits of a kidney transplant compared with dialysis for the treatment of kidney disease.

06.1 The vast majority of students were able to link the boxes correctly to show that glucose molecules were small enough to pass through the kidney's filter and that protein molecules were too large, as shown in Figure 10.

06.2 This should have been a simple subtraction of the data in Table 4:

160.0 – 1.9 = 158.1

To show the volume of water reabsorbed by the kidneys in one day. However, only one-half of students did this correctly. Some added the figures, some multiplied and some divided them.

06.3 This was an extended response question to evaluate the claim that it is better to treat a person with kidney disease by using a kidney transplant rather than by dialysis. Students were instructed to make use of the 8 points of information given in Figure 11.
Students only had to assign information from Figure 11, or their own knowledge, as being in favour of or against kidney transplant. No further overall judgement was required.
The most common omission was for students to simply copy information from Figure 11, without identifying the ideas as being in favour of a transplant or against one.
Those students who gained marks commonly referred to the lower cost of transplant or that the transplant may only last for 10 years. Many others described the inconvenience of dialysis, as being in favour of a transplant.

4.5.3.3 Maintaining water and nitrogen balance in the body (biology only)

Answer 48 · Examiner comments June 2023 | 8461/2F | Original Q6

Most students appeared unaware that patients on dialysis must also take drugs, so simply referring to the inconvenience of drug taking was insufficient; the consequences of the different types of drug were required.
A few students referred to the danger of rejection or having to wait for a suitable donor; but such ideas were usually offered only by better students, as was the idea that transplant patients tend to feel well all the time.
In order to gain marks at the highest level, answers needed to include both advantages and disadvantages of a kidney transplant.

06.4 Given some information about the cost of a transplant operation and the subsequent annual cost of drugs, students had to calculate the overall cost for the first 5 years.
Many students arrived at the correct answer of £37 000, although a few added £5 000 to the first year as well, giving £42 000. If they did the latter, 2 marks out of 3 were still available. Weaker students added the first year's cost and the subsequent annual cost, then multiplied the whole by 5, and could not be awarded any credit. Around half of the students were completely successful.

Answer 49 · Examiner comments

June 2025 | 8461/2F | Original Q4

Question 4 (Low and Standard demand)

04.1
Students were given data showing how much water a person gained and lost by different methods and were asked to complete a bar chart. Generally, this question was answered very well, with 75% of students gaining both marks. Around 5% of students did not attempt the question. There was some mis-plotting seen, usually due to misreading the scale. A common error was not labelling the bars, so mark point 2 could not be awarded.

04.2
Over 70% of students knew that the volume of water lost by sweating on the day of a race would be greater.

04.3
In this question, the students were told to draw one line from each box on the left to the appropriate box on the right. Some students drew two lines from a box on the left and thus did not gain the mark for that process. A pleasing 66% of students gained full marks. A common error was to have 'Excretion' linked to 'Removes water from the blood' or 'Filtration' linked to 'Takes excess water out of the body'. Only just over 5% of students did not understand the processes in the kidney and scored no marks at all.

04.4
This was a levelled response question, in which students were given some facts about kidney transplants and dialysis, and asked to evaluate the two methods of treating kidney failure. They were also told to draw on their own knowledge in their answer. 10% of students did not attempt this question.
A significant proportion of students simply copied the information given in the question without any modification or comment and were among the 20% of students that scored no marks. There had to be some original content in the answer for it to be worthy of credit.
It was apparent that several students had little awareness of the processes involved with either type of treatment giving comments such as 'Transplants only take a couple of hours – you just need a donor'.

A pleasing number of students identified the improvement to lifestyle due to not needed to go for regular/long hospital visits, and similar numbers of students considered the issue of rejection. Over 40% of students that gave both an idea in favour and against kidney transplant were given credit in Level 2.

Many students gave a partial reason in their arguments which did not gain credit such as 'It is less expensive', 'You have to take drugs', 'It's risky'. The source of the donor organ was seldom referred to, and when it was, was generally assumed to be a living relative or a kind stranger. A large number thought that the cost of treatment was the responsibility of the patient and that might affect their choice of treatment. Giving a one-sided argument – that is - giving only points for or points against transplant, limited the student to one mark in Level 1.