AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.2.4

Control of body temperature (biology only)

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**30**
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.

4.5.2.4 Control of body temperature (biology only)

Answer 01 · 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

4.5.2.4 Control of body temperature (biology only)

Answer 01 · Mark scheme

January 2008 | BLY1F | Original Q3 | Legacy

BLY1F

4.5.2.4 Control of body temperature (biology only)

Answer 02 · 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

4.5.2.4 Control of body temperature (biology only)

Answer 02 · Mark scheme January 2008 | BLY2F | Original Q2 | Legacy

BLY2F

Answer 03 · Mark scheme June 2008 | BLY1AP | Original Q2 | Legacy

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

Answer 04 · 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**

4.5.2.4 Control of body temperature (biology only)

Answer 05 · 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**

4.5.2.4 Control of body temperature (biology only)

Answer 05 · Mark scheme

June 2008 | BLY1F | Original Q2 | Legacy

COMPONENT NUMBER: BLY1F

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: June 2008

4.5.2.4 Control of body temperature (biology only)

Answer 06 · 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**

4.5.2.4 Control of body temperature (biology only)

Answer 06 · Mark scheme June 2008 | BLY2F | Original Q4 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

4.5.2.4 Control of body temperature (biology only)

Answer 07 · Mark scheme

June 2008 | BLY3F | Original Q2 | Legacy

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**

4.5.2.4 Control of body temperature (biology only)

Answer 07 · Mark scheme June 2008 | BLY3F | Original Q2 | Legacy

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

Answer 08 · 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**

Answer 09 · 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 10 · 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 11 · Mark scheme June 2009 | BLY1AP | Original Q3 | Legacy

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

4.5.2.4 Control of body temperature (biology only)

Answer 12 · Mark scheme

November 2009 | BLY1AP | Original Q2 | Legacy

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

Answer 13 · Mark scheme

November 2009 | BLY1BP | Original Q7 | Legacy

Seven	**4**	**4**	**2**	**2**

4.5.2.4 Control of body temperature (biology only)

Answer 14 · Mark scheme

Question 1

question	answers	extra information	mark
1(a)	**Body part** / **Substance** kidneys → urine lungs → breath skin → sweat faeces	**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**

4.5.2.4 Control of body temperature (biology only)

Answer 14 · Mark scheme

January 2010 | BLY2F | Original Q1 | Legacy

BLY2F

Answer 15 · Mark scheme

March 2010 | BLY1AP | Original Q5 | Legacy

Five	**A** energy		**2**
	B enzymes		**3**
	C mass		**4**
	D sweat		**1**

	A	**B**	**C**	**D**

Answer 16 · Mark scheme

November 2010 | BLY1BP | Original Q5 | Legacy

Five	**A** the wind blows sand around		**3**
	B very cold nights		**4**
	C soft ground		**2**
	D dry conditions		**1**

	A	**B**	**C**	**D**

4.5.2.4 Control of body temperature (biology only)

Answer 17 · Mark scheme January 2011 | BLY2F | Original Q2 | Legacy

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**

4.5.2.4 Control of body temperature (biology only)

Answer 17 · Mark scheme

January 2011 | BLY2F | Original Q2 | Legacy

BLY2F

Answer 18 · 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 19 · Mark scheme

June 2011 | BLY1BP | Original Q6 | Legacy

Six	**1**	**2**	**3**	**2**

4.5.2.4 Control of body temperature (biology only)

Answer 20 · 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**

4.5.2.4 Control of body temperature (biology only)

Answer 20 · Mark scheme

June 2011 | BLY2F | Original Q6 | Legacy

BLY2F

4.5.2.4 Control of body temperature (biology only)

Answer 21 · Mark scheme

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

4.5.2.4 Control of body temperature (biology only)

Answer 21 · Mark scheme

January 2013 | BL1FP | Original Q2 | Legacy

BL1FP

4.5.2.4 Control of body temperature (biology only)

Answer 22 · 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**

4.5.2.4 Control of body temperature (biology only)

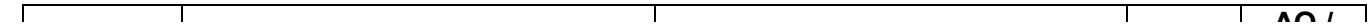
Answer 23 · Mark scheme

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	

4.5.2.4 Control of body temperature (biology only)

Answer 23 · Mark scheme

June 2014 | BL3FP | Original Q2 | Legacy



4.5.2.4 Control of body temperature (biology only)

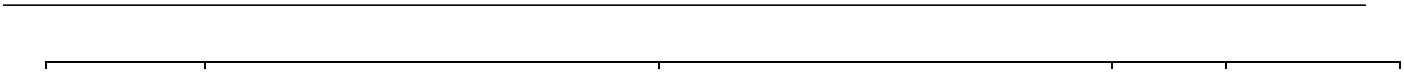
Answer 24 · Mark scheme June 2016 | BL3FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	The person started running a race.		1	AO2 3.3.2a
2(a)(ii)	2300		1	AO2 3.3.2a
2(a)(iii)	drinking (water / sports drink) **or** through eating		1	AO1 3.3.2a /3.1.1e
2(b)(i)	brain		1	AO1 3.3.2b
2(b)(ii)	receptors		1	AO1 332c
2(c)	cools us down	allow evaporates	1	AO1 3.3.2a
Total			**6**	

4.5.2.4 Control of body temperature (biology only)

Answer 24 · Mark scheme

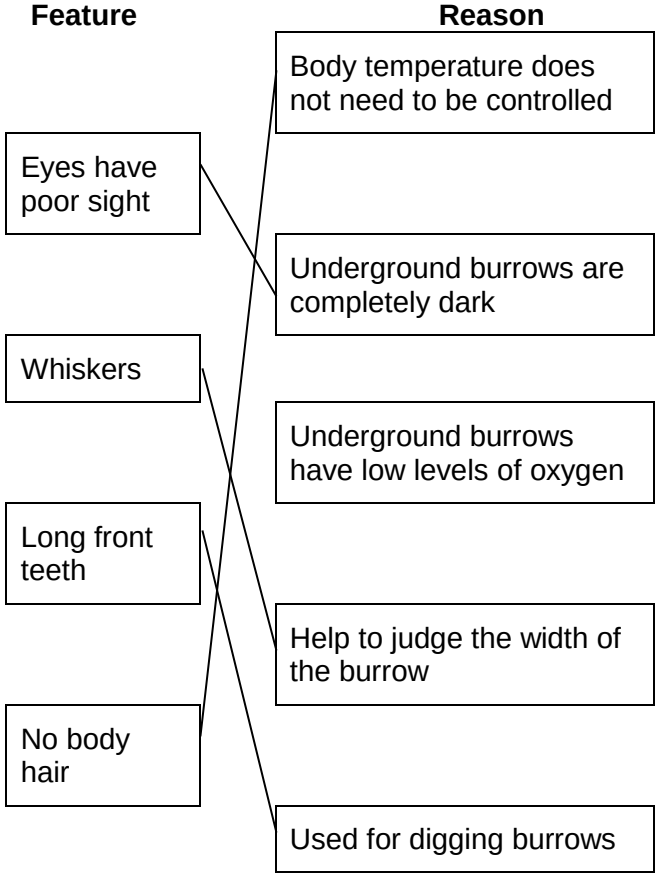
June 2016 | BL3FP | Original Q2 | Legacy



4.5.2.4 Control of body temperature (biology only)

Answer 25 · Mark scheme

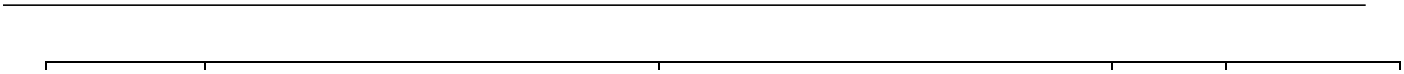
June 2017 | BL1FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1		one mark for the correct line from each feature if more than one line is drawn from a feature, do **not** award the mark for this feature	4	AO2 1.4.1f
Total			**4**	

4.5.2.4 Control of body temperature (biology only)

Answer 25 · Mark scheme

June 2017 | BL1FP | Original Q1 | Legacy



4.5.2.4 Control of body temperature (biology only)

Answer 26 · 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

4.5.2.4 Control of body temperature (biology only)

Answer 26 · Mark scheme

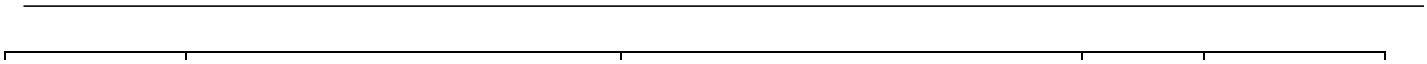
June 2019 | 8461/2F | Original Q6

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**	

4.5.2.4 Control of body temperature (biology only)

Answer 26 · Mark scheme

June 2019 | 8461/2F | Original Q6



4.5.2.4 Control of body temperature (biology only)

Answer 27 · 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

4.5.2.4 Control of body temperature (biology only)

Answer 27 · 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**

4.5.2.4 Control of body temperature (biology only)

Answer 27 · Mark scheme

November 2020 | 8461/2F | Original Q4

4.5.2.4 Control of body temperature (biology only)

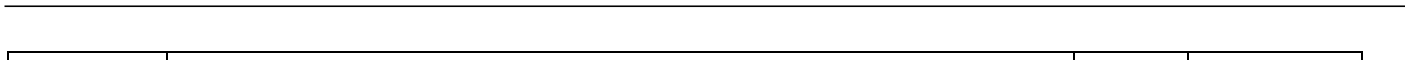
Answer 28 · Mark scheme November 2021 | 8461/2F | Original Q10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	any **one** from: • movement would release (extra) heat • movement would increase body temperature • movement would increase sweating		1	AO2 4.5.1 4.5.2.4
10.2	37.4 °C		1	AO2 4.5.1 4.5.2.4
10.3	<u>blood</u> is cooled at stomach / mouth (cooled) blood flows to the brain		1 1	AO2 4.5.1 4.5.2.4
10.4	via nerve(s) / neurones **or** via (nerve) impulse(s)	ignore type of neurone allow electrical signals allow via the nervous system	1	AO2 4.5.1 4.5.2.4
10.5	less sweating occurs so less heat is lost **or** less cooling	allow less sweat evaporates do **not** accept no sweating allow less heat used for evaporation of sweat / water	1 1	AO3 AO2 4.5.1 4.5.2.4
10.6	dilation of blood vessels in the skin		1	AO2 4.5.1 4.5.2.4
Total			**8**	

4.5.2.4 Control of body temperature (biology only)

Answer 28 · Mark scheme

November 2021 | 8461/2F | Original Q10



4.5.2.4 Control of body temperature (biology only)

Answer 29 · Mark scheme

June 2022 | 8461/2F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	(lowest) 1 (ºC) (highest) 34 (ºC)	both correct for **1** mark allow a tolerance of ± 0.2 (ºC) allow a tolerance of ± 0.2 (ºC)	1	AO2 4.5.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	5 / five		1	AO2 4.5.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	so stored food **or** glycogen does not run out **or** to replace stored food **or** glycogen	allow so stored fat does not run out **or** to replace stored fat **or** because stored food **or** glycogen / fat has run out ignore to provide energy	1	AO2 4.5.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	respiration		1	AO1 4.5.2.4 4.4.1.3 4.4.2.1

4.5.2.4 Control of body temperature (biology only)

Answer 29 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	any **one** from: • movement • muscle contraction • keeping warm • growth / repair • active transport	allow functioning of internal organs – eg heartbeat allow synthesis / described	1	AO1 4.5.2.4 4.1.3.3 4.4.2.1 4.4.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	3200 × 2.5 8000 (kJ)		1 1	AO2 4.5.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.7	$\frac{6000}{24\,000} \times 100$ 25 (%)	if no other mark awarded allow for **1** mark 0.25	1 1	AO2 4.5.2.4

4.5.2.4 Control of body temperature (biology only)

Answer 29 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.8	reduced	do **not** accept no sweating	1	AO2 4.5.2.4

Total Question 6		**10**

4.5.2.4 Control of body temperature (biology only)

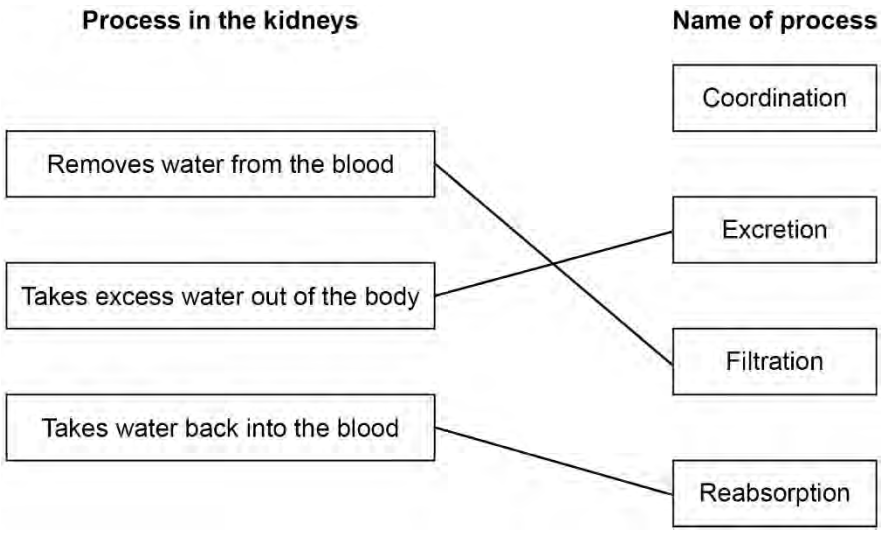
Answer 30 · Mark scheme

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

4.5.2.4 Control of body temperature (biology only)

Answer 30 · Mark scheme

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

4.5.2.4 Control of body temperature (biology only)

Answer 27 · 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 29 · Examiner comments — June 2022 | 8461/2F | Original Q6

Question 6

This question was about temperature variation in a primitive mammal, the echidna, and in a human.

06.1 Reading the highest and lowest values for the echidna's body temperature from the graph in **Figure 9** should have been very straightforward. Whereas some students misread the small divisions on the scale as representing 0.5 or 2°C (rather than 1°C), others misunderstood the question and gave the highest and lowest values of the peaks or of the troughs. Thus only three-quarters gained credit.

4.5.2.4 Control of body temperature (biology only)

Answer 29 · Examiner comments

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06.2 Almost 90 percent of students successfully counted the five peaks in the graph as representing the times when the echidna woke up from hibernation.

06.3 This question was particularly poorly answered, with fewer than one in twenty gaining credit. Very few students referred to food stores at all and of those who did, hardly any included the idea that waking up from hibernation to hunt for food resulted in replacement, or prevented the stores running out.

06.4 A liitle over one third of students selected the answer *respiration*, the other two options, 'diffusion' and 'excretion', being almost as common.

06.5 The most common correct answers for the use of energy in the echidna's body referred either to movement in one form or another (usually locomotion) or to keeping the echidna warm. A small proportion suggested growth or muscle contraction and a very small number gave 'active transport'. Just under half of the students were successful in this question.

Questions **06.6** to **06.8** related to temperature control in humans by sweating.

06.6 Most students (almost two-thirds) completed the calculation correctly to find the amount of energy the athlete used each day for evaporation of sweat. Of those who did not, the most common answer was 1280 kJ, achieved by dividing 3200 by 2.5, rather than multiplying the two values to give a correct value of 8000 kJ.

06.7 Just over half the students successfully calculated that the athlete used 25 percent of the daily energy intake to evaporate sweat, with just a few forgetting to multiply the fraction by 100, thus gaining just the one mark. As in question **06.6**, the most common error resulted from inverting the fraction and dividing 24000 by 6000, so arriving at 400%, there being no evidence of students questioning this answer and reconsidering their calculations.

06.8 Although almost two-thirds understood that resting would reduce the amount of sweat produced, a surprisingly high minority of students believed that resting, rather than running, would increase sweat production. Some of the latter showed they had misunderstood the question by stating that resting would allow the athlete to 'store up sweat' to be released when next exercising, thus increasing sweating then.

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.