

Q1. (2018) – 19b

A)

	(b)	(i)	Patient A = 2900 & Patient B = 2700 ✓	1	2.2	Mark answer line first but if nothing on answer line check table for correct answer
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B)

		(ii)	(Patient A) total output of patient A is 2900/exceeds total input / patient B input matches output ✓ patient A is losing too much water (from the kidneys) ✓	2	2.1 3.2a	No marks if Patient B identified ALLOW input output is imbalanced in patient A ALLOW patient A loses more water than normal
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Q2. (2019)

4			D	1	1.1	
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Q3. (2019)

7			A	1	1.1	
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Q4. (2019)

8			A	1	1.1	
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Q5. (2019)

9			A	1	2.1	
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Q6. (2019)

10			D	1	2.1	
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Q7. (2019)

11			C	1	1.1	
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Q8. (2019)

A)

19	(a)	(i)	flower opening ✓ germination ✓ shedding of leaves ✓	3	1.1	
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B)

19	(d)		Any three from: mitosis ✓ DNA replicates ✓ chromosomes separate ✓ cells divide into two new cells ✓ cells grow ✓	3	1.1	ALLOW chromosomes are copied ALLOW DNA duplicates/doubles ALLOW (identical) daughter cells produced each with own copy of chromosomes ALLOW cell splits into two
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Q9. (2019)

A)

21	(a)		blood travels through pump/heart twice ✓ on full circuit around body ✓	2	1.1	ALLOW idea that there are two pumps / idea that blood is pumped twice ALLOW idea that blood passes separately to lungs and body
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B)

21	(b)		bird ✓ bird has 4 chambered heart ✓ bird has double circulation ✓	3	2.1	If bird is not ticked or bird not selected in answer, then zero for question ALLOW bird has heart with 4 sections/compartments/named four chambers ALLOW description of double circulation
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C)

21	(c)	(i)	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 4 award 2 marks 25 000 ÷ 5800 = 4.3 ✓ = 4 (nearest whole number) ✓	2	2.2 1.2	ALLOW ECF mark for correct rounding if calculation is incorrect
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D)

21	(c)	(ii)	Any two from: muscles need more energy / more ATP / more respiration ✓ muscles need more oxygen / more carbon dioxide to be removed / more glucose / to avoid anaerobic respiration / to avoid lactic acid production ✓ other organs not needed (in exercise) ✓	2	3.2a	need to include only one comparative word e.g. more, to be able to score the first two marking points, e.g. muscles need more oxygen for energy = 2 marks ALLOW to remove more heat ALLOW other organs not prioritised / blood diverted from other organs
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Q10 (2020)

11			B ✓	1	2.1	
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Q11 (2020)

14			B ✓	1	1.1	
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Q12 (2020) – 20c

A)

	(c)	(i)	Any two from: idea it affects enzymes (action/structure) ✓ high temperature causes active site to change shape / active site denatures ✓ stops them working ✓	2	1.1	ALLOW enzymes are heat sensitive/denature ALLOW enzymes cannot bind to substrate molecules IGNORE cells denature ALLOW enzymes no longer catalyse reaction
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B)

	*	(ii)	Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. Level 3 (5–6 marks) Demonstrates knowledge of homeostasis. AND Applies knowledge of a skin mechanism for maintaining body temperature in different environments. AND Analyses information to comment on the effect of exposing skin.	6	2 x 1.1 2 x 2.1 2 x 3.1a	AO1.1 Demonstrate knowledge and understanding of skin and homeostasis <ul style="list-style-type: none"> need to keep constant internal temperature, despite the different external temperatures person A needs to lose heat to the environment / person B needs to reduce heat lost to the environment person A gains heat from the environment / person B loses heat to the environment person A will be in danger of overheating / person B will be in danger of becoming too cold.
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		<p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Demonstrates knowledge of homeostasis and applies knowledge of a skin mechanism for maintaining body temperature in different environments. OR Demonstrates knowledge of homeostasis and analyses information to comment on the effect of exposing the skin. OR Applies knowledge of a skin mechanism for maintaining body temperature in different environments and analyses information to comment on the effect of exposing skin.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) Demonstrates knowledge of homeostasis. OR Applies knowledge of a skin mechanism for maintaining body temperature in different environments. OR Analyses information to comment on the effect of exposing skin.</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks <i>No response or no response worthy of credit.</i></p>			<p>AO2.1 Apply knowledge and understanding of the mechanisms in skin for maintaining body temperature in different environments</p> <ul style="list-style-type: none"> cold environment reduces sweating /decreases blood flow to the skin (vasoconstriction) / shivering / body hairs rise warm environment increases sweating / increases blood flow to the skin (vasodilation) / body hairs on skin lie flat <p>AO3.1a Analyse information and ideas to interpret the effect of exposing / covering skin in different environments</p> <ul style="list-style-type: none"> person A body less covered/more exposed skin in warmer conditions increases heat loss/allows sweat to evaporate person B body covered/less exposed skin in colder conditions reduces heat loss/stops sweat evaporating
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Q13. (2021)

A)

17	(a)	Breathing rate ✓	1	2.2	
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B)

	(b)	The gender/sex of the person exercising ✓ Time doing the exercise ✓	2	2 x 3.2a	
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C)

	(c)	To be able to compare effect of exercise to no exercise ✓ OR Measure change/increase in (breathing rate) ✓	1	3.1a	ALLOW provides a baseline measurement ALLOW two students may have different breathing rates at rest
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Q14. (2021) – 18d

	(d)	Any two from: Controlling germination ✓ Fruit ripening ✓ Flower opening ✓ Shedding of leaves ✓	2	2 x 1.1	ALLOW abscission/leaf fall ALLOW reference to tropisms
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Q15. (2021) – 19c, 19d

A)

	(c)	(i) Blood will have higher concentration /more (sugar) in it ✓ So will lower the water potential ✓	2	2 x 2.1	IGNORE reference to viscosity of blood
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B)

		(ii)	Any 2 from: Water will move from (body) cells into the blood ✓ By osmosis ✓ Cells crenate ✓	2	2 x 2.1	ALLOW water diffuses out of body cells ALLOW water moves from high to low water potential/concentration ALLOW body cells become dehydrated / shrivel
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C)

	(d)		<table><tr><th>Change caused to the kidney</th><th>Part of tubule affected</th></tr><tr><td>Glomerulus filters too much glucose from the blood.</td><td>A✓</td></tr><tr><td>Proximal convoluted tubule only reabsorbs some of the glucose back into the blood.</td><td>E✓</td></tr><tr><td>Collecting duct sends urine with glucose present to the bladder.</td><td>C✓</td></tr></table>	Change caused to the kidney	Part of tubule affected	Glomerulus filters too much glucose from the blood.	A✓	Proximal convoluted tubule only reabsorbs some of the glucose back into the blood.	E✓	Collecting duct sends urine with glucose present to the bladder.	C✓	3	3 x 3.2a	
Change caused to the kidney	Part of tubule affected													
Glomerulus filters too much glucose from the blood.	A✓													
Proximal convoluted tubule only reabsorbs some of the glucose back into the blood.	E✓													
Collecting duct sends urine with glucose present to the bladder.	C✓													

Q16 (2022)

A)

19	(a)	(i)	First check answer on answer line. If answer = 35.0 award 2 marks $349.7 / 10 = 34.97$ ✓ OR 35 ✓ 35.0 ✓	2	2 x 2.2	ALLOW 34.9 for 1 mark ALLOW one mark for clear evidence of rounding incorrect answer correctly to 1.d.p
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B)

		(ii)	First check answer on answer line. If answer = 50% award 2 marks $5 / 10$ ✓ OR 0.5 ✓ $\times 100 = 50\%$ ✓	2	2 x 2.2	ALLOW half / $\frac{1}{2}$ ALLOW one mark for clear evidence of incorrect fraction of rescued people identified with a correctly calculated percentage
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C)

		(iii)	Shivering / vasoconstriction ✓ Maximum two from: (Shivering) increases metabolic rate/respiration ✓ (Shivering) generates more heat ✓ (Vasoconstriction) decreases blood flow to the skin surface ✓ (Vasoconstriction) reduces heat loss ✓	3	1 x 1.1 2 x 2.1	ALLOW blood vessels narrow ALLOW releases heat / increased thyroxine ALLOW redistribution of blood to organs IGNORE blood vessels move IGNORE go pale/blue/cold extremities If no credit worthy answer given allow goose bumps/hairs stand on end for one mark
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D)

		(iv)	Any one from: Blood sugar/glucose(level) ✓ Water balance/potential/concentration/levels (in the blood) ✓ pH/carbon dioxide level (of the blood) ✓ Urea level (of the blood) ✓	1	1 x 1.1	IGNORE heart rate/breathing rate/blood pressure
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E)

	(b)	(i)	Any two from: Scientists can replicate/reproduce/further develop the work ✓ To check/prove results ✓ To allow recognition for their work ✓	2	2 x 1.1	IGNORE scientists' review ALLOW comment/feedback on work / identify mistakes/misinformation ALLOW can see the value of the research
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F)

		(ii)	Idea body temperature is altered ✓ This would affect the mean ✓	2	2 x 3.1a	Assume answer refers to people with illnesses and infections if not stated. ALLOW invalidate results IGNORE inaccurate results
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G)

		(iii)	Any one from: Limits impact/identification of anomalies/outlier ✓ Representative of the population ✓	1	1 x 3.1a	
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Q17 (2022)

A)

22	(a)		1.75 (million)	1	1 x 2.2	ALLOW in range of 1.65 – 1.8 million
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B)

	(b)		First check answer on answer line. If answer = 9.75 million award 2 marks 11.5 million ✓ 11.5 million – 1.75 million = 9.75 million ✓	2	2 x 2.2	ALLOW ecf from Q22(a) for UK diabetes patient numbers ALLOW 1 st mark for correct figure for USA in range of 11-12 million ALLOW second mark for correctly calculated difference between stated USA and UK figures
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C)

	(c)		Any two from: Idea in both countries the number of individuals has increased over time ✓ The rate has increased over time/ ref to gradient in both countries ✓ USA fluctuates more than UK ✓ Quotes correct data increases for both UK and USA ✓	2	2 x 3.2b	Assume answer refers to both countries if not stated. DO NOT ALLOW only one countries rate has increased
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D)

	(d)		Not all diabetics may be diagnosed/recorded/identified/aware ✓	1	1 x 3.2a	IGNORE estimates/averages
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Q18 (2023)

6	B	1	2.1	
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Q19 (2023) – 17b

A)

(b)	(i)	Any two from: Idea that stem cells are undifferentiated / unspecialised ✓ Idea can divide into any type of cell in the body ✓ Which form tissues and organs ✓	2	2 x 1.1	ALLOW stem cells can specialise / can differentiate
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B)

	(ii)	First check the answer on answer line If answer = 16 award 3 marks Conversion: (2 days) = 48 (hours) ✓ (48 ÷ 12) = 4 (divisions) ✓ (4 divisions) = 16 (cells) ✓	3	3 x 2.2	ALLOW 12 x 4 = 48 = 2 days for two marks ALLOW diagram showing 4 divisions
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Q24. (2024)

6	C	1	1.1	
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Q25. (2024)

A)

(b)				2	2 x 2.1	DO NOT ALLOW more than two ticks, each additional tick will negate a marking point.

B)

(e)			1	2.1	DO NOT ALLOW more than one line drawn
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C)

(f)		Y ✓ Random ✓	2	2 x 2.2	
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