PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 7: ANIMAL COORDINATION, CONTROL AND HOMEOSTASIS (PACK 2)

SCORE	PERCENTAGE
/44	%

STEMUP

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Mark Scheme

Q1.

Question Number		Indicative Content	Mark
QWC	*	An explanation to include some of the following points • negative feedback Hydration • increased water/decreased salt in blood • detected by hypothalamus • acts on the pituitary gland • decreased release of ADH • decreased permeability of collecting duct/renal tubules/nephron • less re-absorption of water • Increased volume of urine Dehydration • decreased water/increase salt in blood • detected by hypothalamus • acts on the pituitary gland • increased release of ADH • increased permeability of collecting duct/renal tubules/nephron • more re-absorption of water • decreased volume of urine	**(6)**

Level	**0**	No rewardable content
1	**1 - 2**	• a limited explanation of increase in ADH **OR** decrease in ADH **OR** the role of the pituitary gland, hypothalamus or negative feedback in the release of ADH • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	**3 - 4**	• a simple explanation of both ADH increase **and** decrease **OR** a detailed explanation of either an increase or decrease • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	**5 - 6**	• a detailed explanation of both ADH increase **and** decrease including mention of permeability of the renal tubules and role of the hypothalamus or pituitary gland • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Q2.

Question Number		Indicative Content	Mark
QWC	*	An explanation to include some of the following points: lowering blood glucose concentrations • insulin is released • from the pancreas • into the bloodstream • causing glucose to be converted to glycogen • stored in the liver / muscle tissue • blood glucose concentrations are lowered raising blood glucose concentrations • glucagon is released • from the pancreas • into the bloodstream • causing glycogen to be converted to glucose • glucose released into the bloodstream • blood glucose concentrations are raised	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of either lowering or raising glucose concentrations in the blood • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation of both lowering and raising glucose concentrations in the blood or a detailed explanation of one of them • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation of both raising and lowering blood glucose concentrations including the role of the hormones and the role of glycogen. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Q3.

		Indicative Content	
	*	A explanation to include some of the following • homeostasis / regulation of the body's interna • controlled by the hypothalamus / thermoregul • hypothalamus / thermoregulatory centre moni temperature • negative feedback mechanism • sweat rate increases • sweat glands will release sweat on to skin surf • evaporation of this sweat / water will remove h	

		from skin • hairs on skin's surface lay flat • no trapping of insulating air layer so body lose • vasodilation occurs • widening of the arterioles / blood vessels eq, r delivers warm blood to skin surface • body loses heat by radiation	
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of at least one method of thermoregulation • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation including at least two methods of thermoregulation • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation of at least 3 methods of thermo regulation. Use of the term vasodilation or including information on the process of homeostasis • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Q4.

Question number	Answer	Additional guidance	Mark
	(32 600 000 ÷ 100) x 13.2 / 4 303 200 / 4.3 million (1) (100 – 98.8) = 1.2 (1) 51 638	accept 32.6 million x 0.132 accept any correct rounding up to 4.3 million accept 0.012 (1) accept a calculation of 98.8% accept 51 600 for 3 marks accept 51 638.4 for 2 marks award full marks for correct answer without working accept alternative methods of calculation	**(3)** AO2 1

Q5.

Question Number	Answer	Additional guidance	Mark
	substitution $124 \div 1.8^2$ (1) evaluation BMI = 38.27	award 2 marks for correct answer with no working accept 38 / 38.3 accept 68.9 / 68.89 for 1 mark accept answers correctly rounded to any number of decimal places	**(2)** **AO1 1**

Q6.

Question number	Answer	Additional guidance	Mark
(i)	correct data selected and subtracted (98 – 22) = 76 (1) rate calculated (76÷8) = 9.5 (^{0}C per minute)	accept full marks for correct answer on the answer line accept 10	**(2)** AO2 1

Question number	Answer	Additional guidance	Mark
(ii)	An answer comparing: • flask 1 and 2 decrease in temperature (1) • the temperature in flask 1 decreases faster than in flask 2 (1) OR • the temperature on flask 1 levels out after 7 minutes (1) • whereas the temperature in flask 2 keeps falling (1)	accept rate is slower for flask 2 /ORA	**(2)** AO3 2ab

Q7.

	Answer	Acceptable answers	Mark
(i)	Calculation (1.7 × 1.7) = 2.89 (1) 78 / 2.89 = 27 (1)	Two marks for correct bald answer Ecf for incorrect numbers but correct calculation 26.98 / 26.9 Accept continued decimal places	**(2)**
(ii)	**C** ☒ overweight		**(1)**

Q8.

	Answer	Acceptable answers	Mark
(i)	2.7	Allow -2.7 (°C)	**(1)**
(ii)	a comparison to include the following linked points (Rebecca's) brain temperature fluctuated / stayed similar / did not change very much (1) (whereas) finger temperature decreased (1)	Ignore references to brain temperature going up	**(2)**
(iii)	an explanation to include three of the following points heat lost to the environment /from finger (1) **less**blood delivered to the skin's surface/finger (1) narrowing of the arterioles near the skin's surface (1) vasoconstriction (1) **less**heat loss by radiation(1)	accept ref to temperature gradient accept more blood flow to vital organs accept blood vessels for arterioles	**(3)**

Q9.

	Answer	Acceptable answers	Mark
	An explanation linking: • Uterus lining maintained/ thickened (more) (1) With one of: • Because progesterone levels maintained / progesterone is still produced • So that the embryo can embed on it / So that the uterus lining can supply the embryo with nutrients	Reject: repairs	**(2)**

Q10.

Question Number	Answer	Additional Guidance	Mark
	An answer including **four** from: • {TSH / thyroxine} levels are higher than normal (1) • TSH stimulates the thyroid gland / TSH stimulates the release of thyroxine (1) • **increases** metabolic rate (1) • {red blood cells / glucose} are within the normal range (1) • suggesting oxygen is carried as normal (1) • the symptoms are not due to diabetes (1)	accept the hormones levels are high / above average accept digests / breaks down food faster accept hyperthyroidism / overactive thyroid accept RBC / glucose are not high accept is not anaemic	**(4)** **AO3** **1a, 1b, 2a, 2b**

Q11.

Question Number	Answer	Additional guidance	Mark
(i)	the size/mass of the biscuits is not known	accept: biscuits come in various sizes and weights	**(1)**

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): • type 2 diabetics are not able to regulate the glucose levels in their body (1) • and this variety has less sugar (1)	accept: 0.4g compared to 16.1g	(2)

Q12.

	Answer	Acceptable answers	Mark
(i)	A description including the following points: • as mean mass increases so does the percentage of population with type 2 diabetes (1) • correct readings from the graph to illustrate the comparative point (1)	**accept**positive correlation ORA	**(2)**
(ii)	A suggestion linking **two**of the following: • increasing body mass leads to over weight / obesity		**(2)**

	• don't respond to insulin / reference to insulin resistance		

Q13.

Question Number	Answer	Additional guidance	Mark
(i)	A description including: • blood glucose concentration increased from {0 – 8 hours / from 100 to 139 / by 39 mg/dL} (1) • then blood glucose concentration decreased [at 12 hours / to 90 mg/dL / by 49 mg/dL) (1) • blood glucose concentration increased {at 20 hours / after 12 hours / to 134 mg/dL / by 44 mg/dL} (1)	accept blood glucose concentration increased {at 24 hours / to 137 mg/dL / by 47 mg/dL} accept other calculated increases between 12 and 24 hours	**(3)** **AO3 1 a + b**

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation linking: • the pancreas produced insulin (1) • but the cells in the {liver / muscles} were resistant to insulin (1) • so glucose was not taken up by the {liver / muscles / cells} (1)	accept but there is insulin resistance accept so the glucose is not converted to glycogen in the {liver / muscles}	**(3)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
(iii)	An explanation linking: • the blood glucose concentration decreased (at 12 hours) (1) • because the patient has used up the glucose in his blood (1) • due to increased respiration (during exercise) (1)	 accept glucose used by {muscles / cells}	**(3)** **AO3 2ab**

Q14.

Question number	Answer	Mark
	A description including: • (travels from the kidneys) through the ureters (1) • to the bladder (where it is stored) (1) • (from the bladder) through the urethra (and out of the body)	**(3)** AO1 1

Q15.

Question Number	Answer	Additional guidance	Mark
(i)	A description including **two** from: • blood is filtered (in a dialysis machine) (1) • urea moves {out of the blood / into dialysis solution} (1) • by diffusion (1)	 accept tube for blood	**(2)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
(ii)	Any **one** from: • patient B has {kidney failure / disease} which is less advanced than patient A (1) • patient B may have a {better diet / low protein diet} (1)	 accept patient B only just developed kidney disease	**(1)** **AO2 1**

Q16.

Question Number	Answer	Additional Guidance	Mark
	An answer including **three** from: • complete the same exercise (1) • in the same environmental conditions (1) • measure the change in mass for each T-shirt (1) • the {least / most} weight gain is the best for exercise (1) **OR** • wet each T-shirt (1) • with the same volume of water (1) • measure the change in mass for each T-shirt (1) • the {least / most} weight gain is the best for exercise (1)	accept the same time of day / weather / temperature	**(3)** **AO3 3a**

Q17.

Question Number	Answer	Acceptable answers	Mark
(i)	(5.2 + 2.8 + 4.9 + 3.5 =) 16.4 (1) (16.4/4 =) 4.1	two marks for correct answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
(ii)	**A suggestion including two of the following** variation in human population/different body sizes (1) hydration level (1) salt intake (1) drug influence (1)	 accept genetic variation accept fluid / food intake / level of exercise accept levels vary depending on the time of day (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
(iii)	**C** ☒ pituitary gland		**(1)**

Question Number	Answer	Acceptable answers	Mark
(iv)	dehydration / thirst / increased volume of urine	accept dilute urine/frequent urination/tiredness/dizzy/headache	**(1)**

Q18.

	Answer	**Acceptable answers**	**Mark**
(a)(i)	A description including the following points: • as mean mass increases so does the percentage of population with type 2 diabetes (1) • correct readings from the graph to illustrate the comparative point (1)	**accept**positive correlation ORA	**(2)**
(a)(ii)	A suggestion linking **two**of the following:		

	• increasing body mass leads to over weight / obesity • don't respond to insulin / reference to insulin resistance		**(2)**
(b)(i)	Calculation (1.7 × 1.7) = 2.89 (1) 78 / 2.89 = 27 (1)	Two marks for correct bald answer Ecf for incorrect numbers but correct calculation 26.98 / 26.9 Accept continued decimal places	**(2)**
(b)(ii)	**C** ☒ overweight		**(1)**
(c)	A description linking **three** of the following: • glucagon is released (1) • from the pancreas (1) • glycogen to glucose (1) • in the liver / muscle cells(1) • which acts to raise blood glucose levels (1)	correct spelling of glycogen and glucagon only No mark for glucagon is injected Ignore references to glucagon turning into glucose	**(3)**

Total for question = 10 marks

Q19.

Question Number	Answer	Additional Guidance	Mark
(i)	adrenal (glands)	ignore kidney / adrenalin glands	**(1)** **AO1**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation linking **three** from: • binds to **receptors** (on the liver) (1) • (triggers liver cells to) convert glycogen (1) • into glucose (1) • increasing the concentration (of glucose) in the blood / which is released into the blood (1)	ignore sugar accept blood sugar	**(3)** **AO2**

Q20.

Question number	Answer	Mark
(i)	As body temperature rises the oxygen consumption of the iguana is increased	**(1)** AO 3 1a

Question number	Answer	Mark
(ii)	An explanation linking the following: • {chemical/enzyme/metabolic} reactions are increased at higher temperatures (1) • (more) respiration occurs (1) • (more respiration) requires oxygen (1)	**(3)** AO 3 2a AO 3 2b

Question number	Answer	Mark
(iii)	An explanation linking the following: • (panting) causes water loss (1) • causing evaporation / removal of **latent** heat (so reduction in temperature) (1)	**(2)** AO 1 1