

CHERRY HILL TUITION OCR BIOLOGY A2 PAPER 21 MARK SCHEME

Question			Answer	Marks	Guidance
1	(a)		cell signalling ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
1	(b)	(i)	synaptic (cleft / space / gap) ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks ALLOW synapse DO NOT CREDIT synoptic / synopsis / synapsis

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1	(b)	(ii)	<p>1 (named) neurotransmitter / acetylcholine , released from pre-synaptic / first , cell / membrane ;</p> <p>2 diffuses across , gap / cleft / synaptic cleft <i>or</i> reaches second , neurone / cell / membrane , by <u>diffusion</u> ;</p> <p>3 attaches to , receptors / binding sites of sodium channels , on post-synaptic membrane / <u>membrane</u> of second cell ;</p> <p>4 neurotransmitter / acetylcholine , broken down (in cleft) ;</p>	2 max	<p>DO NOT CREDIT a mark point if stated that complete <i>vesicles</i> (even if containing neurotransmitter) are involved</p> <p>1 <i>release of neurotransmitter</i> must be clearly stated</p> <p>2 IGNORE synapse</p> <p>3 DO NOT CREDIT post-synaptic knob / bulb</p> <p><i>Note that a statement reading:</i> <i>'Diffuses across and attaches to receptors on the post-synaptic membrane'</i> = 2 marks (mps 2 & 3)</p> <p>4 CREDIT ref to action of cholinesterase</p>
		<p>QWC – technical terms used appropriately and spelt correctly ;</p>	1		<p>Use of three terms from: neurotransmitter, acetylcholine, pre-synaptic / presynaptic, diffuse / diffusion, synaptic cleft, receptor, post-synaptic / postsynaptic</p> <p>Please insert a QWC symbol next to the pencil icon, followed by a tick (✓) if QWC has been awarded or a cross (x) if QWC has not been awarded</p> <p>You should use the green dot to identify the QWC terms that you are crediting.</p>

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1	(b)	(iii)	<p>1 ensures movement of , impulse / action potential , in one direction (only) ;</p> <p>2 integration or one neurone can , connect to / receive impulses from / transmit impulses to , many neurones ;</p> <p>3 allows summation ;</p> <p>4 <i>idea</i> that filters out , 'background' / low level , stimuli or ensures that only stimulation that is strong enough will be passed on;</p> <p>5 AVP ;</p>	3 max	<p>IGNORE ref to 'signals' / 'messages' / coordination</p> <p>1 ACCEPT description eg ACh only released from presynaptic <u>and</u> receptors only on postsynaptic</p> <p>3 ACCEPT description eg enough action potentials arrive to trigger depolarisation in next neurone</p> <p>5 eg</p> <ul style="list-style-type: none"> • permits , memory / learning • acclimatisation (or described) • prevents continuous stimulation of neurones • synapses are of two types – excitatory <u>and</u> inhibitory
1	(c)	(i)	<p>endotherm(s) ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>CREDIT homoiothermic</p>

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1	(c)	(ii)	(vaso)dilation ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE 'arteriole' DO NOT CREDIT 'arterial dilation'</p>
1	(d)	(i)	thyroxine / adrenaline;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT adrenalin / thyroxin / epinephrin(e)</p>
1	(d)	(ii)	hypothalamus ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p>
Total				12	

Question		Answer	Marks	Guidance												
2	(a)	<p>L glomerulus ;</p> <p>M Bowman's / renal , capsule ;</p> <p>N proximal convoluted tubule ;</p>	3	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>L ACCEPT 'capillary knot' IGNORE 'capillary unqualified'</p> <p>N IGNORE 'first' IGNORE PCT / pct (as Q asks for 'name')</p>												
2	(b)	<table border="1"> <thead> <tr> <th>statement</th> <th>part(s) of the nephron</th> </tr> </thead> <tbody> <tr> <td>walls are impermeable to water</td> <td>ascending (limb of loop of Henle) ;</td> </tr> <tr> <td>glucose is reabsorbed into the blood</td> <td>proximal convoluted tubule / N ;</td> </tr> <tr> <td>ADH acts on the walls</td> <td>collecting duct / distal convoluted tubule ;</td> </tr> <tr> <td>contains podocytes</td> <td>Bowman's capsule / renal capsule / M ;</td> </tr> <tr> <td>most of the water is reabsorbed into the blood</td> <td>proximal convoluted tubule / N ;</td> </tr> </tbody> </table>	statement	part(s) of the nephron	walls are impermeable to water	ascending (limb of loop of Henle) ;	glucose is reabsorbed into the blood	proximal convoluted tubule / N ;	ADH acts on the walls	collecting duct / distal convoluted tubule ;	contains podocytes	Bowman's capsule / renal capsule / M ;	most of the water is reabsorbed into the blood	proximal convoluted tubule / N ;	5	<p>Mark the first answer in each box. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT rising limb</p> <p>ACCEPT pct / first convoluted tubule</p> <p>ACCEPT DCT / dct / second convoluted tubule</p> <p>ACCEPT pct / first convoluted tubule</p>
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2	(c)	<p>1 <i>role of loop of Henle is to</i> cause a decrease in water potential in / establish water potential gradient going down , medulla ;</p> <p>2 (as) in ascending limb active transport outwards of , solutes / (sodium and chloride) ions ;</p> <p>3 (walls of) descending limb permeable to water ;</p> <p>4 water removed from descending limb ;</p> <p>5 water potential of tissues surrounding collecting duct is low(er) than fluid inside it ;</p> <p>6 water removed from , filtrate / urine (in collecting duct) ;</p> <p>7 AVP ;</p>	4 max	<p>1 Do not award for a simple statement that ‘there is a lower water potential in the medulla’</p> <p>2 ACCEPT ‘pumped’ for active transport</p> <p>3 IGNORE ref to permeability to ions</p> <p>5 ACCEPT ‘contents of collecting duct’</p> <p>7 eg <ul style="list-style-type: none"> • acts as a countercurrent , system / multiplier • the drier the habitat the longer the loop • <i>idea that</i> urea contributes to low water potential in medulla • (facilitated) diffusion of ions out of the loop at the bottom </p>
		<p>QWC – technical terms used appropriately and spelt correctly ;</p>		1
Total			13	

Question		Answer	Marks	Guidance
3	(a)			Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
		crista(e) / inner mitochondrial membrane ;	1	ACCEPT thylakoid membrane / lamella(e) (of chloroplast)
3	(b)	(i)		All 3 seeds must be mentioned Staining ref. could relate to area or intensity of stain. DO NOT CREDIT implication that C has any staining
		A has more stain than B and C has none ;	1	ACCEPT 'shading' instead of 'staining' IGNORE ref to presence or absence of TTC (as it is present in all regions of all seedlings and it is the <i>staining</i> that is important)
3	(b)	(ii)		1 ACCEPT a description of the respiring area(s) eg the outer regions of the seed are respiring
		1 <i>idea that</i> shaded areas in A are respiring ;		
		2 <i>idea that</i> 22°C is suitable temperature for respiration ;		
		3 reduced , NAD / FAD / coenzymes , produced in , glycolysis / link reaction / Krebs cycle ;		3 ACCEPT NADH / NADH ⁺ / NADH + H ⁺ / NADH ₂ / FADH / FADH ⁺ / FADH + H ⁺ / FADH ₂
		4 lots of / more , electron transfer (to TTC) / (oxidative) phosphorylation / chemiosmosis ;	2 max	

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Question			Answer	Marks	Guidance
3	(b)	(iii)	<p>(named stage of) respiration uses , enzymes / proteins in ETC / electron carriers ;</p> <p><i>group B</i> not enough <u>kinetic</u> energy for , ESC formation / substrates and enzymes to collide (successfully) ;</p> <p><i>group C</i> enzymes / proteins in ETC / electron carriers , <u>denatured</u> by , high temperature / (almost) boiling water ;</p>	2 max	<p>IGNORE coenzymes</p> <p><i>Note that a statement reading:</i> 'the respiratory enzymes are denatured by 90°C in C' = 2 marks (mps 1 and 3)</p>
3	(c)	(i)	ethanal ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT acetaldehyde IGNORE formulae (as name asked for in Q)</p>
3	(c)	(ii)	ethanal ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT acetaldehyde IGNORE formulae (as name asked for in Q)</p>

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Question			Answer	Marks	Guidance
3	(c)	(iii)	ethanol and carbon dioxide ;	1	<p>Mark the first 2 answers. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT formulae IGNORE alcohol unless specified as 'ethyl alcohol' IGNORE (oxidised) NAD DO NOT CREDIT NADP / reduced NAD / ATP</p>
3	(c)	(iv)	<p>1 releases NAD , to accept more H / to be reduced again / so glycolysis can continue</p> <p>or</p> <p>allows (some) ATP to be generated (in glycolysis) ;</p> <p>2 (some ATP available) for named cellular process ;</p> <p>3 AVP ;</p>	2 max	<p>1 the idea that cells can still respire is not quite enough</p> <p>2 eg</p> <ul style="list-style-type: none"> • active transport • endocytosis / exocytosis / pinocytosis • mitosis / meiosis • protein synthesis • DNA replication • Calvin cycle / light-independent stage of photosynthesis <p>3 eg</p> <ul style="list-style-type: none"> • stated situation where oxygen is in short supply (e.g. waterlogging / compacted soil / roots situated very deep in soil) <p>IGNORE can respire in low oxygen conditions (as stated in Q)</p>
Total				11	

Question			Answer	Marks	Guidance
4	(a)		<p><i>oxygen</i></p> <p>1 oxygen only produced in one (named) stage of photosynthesis ;</p> <p>2 oxygen produced might be used for respiration ;</p> <p><i>carbon dioxide</i></p> <p>3 CO₂ only used in one (named) stage of photosynthesis ;</p> <p>4 CO₂ produced during respiration might be used for , photosynthesis / light independent reaction / Calvin cycle ;</p> <p>5 O₂ / CO₂ / both , could be an underestimate or represents net production (O₂) or represents net use (CO₂) ;</p>	2 max	<p>1 CREDIT for O₂ 'only measures the rate of the light dependent stage / photolysis'</p> <p>3 CREDIT for CO₂ 'only measures the rate of the Calvin cycle'</p> <p>5 ACCEPT a description e.g. 'measurement is less than expected because not all the oxygen produced can be measured' (but not if expressed in terms of terms of experimental error – e.g. dissolves in the water) IGNORE refs to reliability / accuracy</p>
4	(b)	(i)	light <u>intensity</u> ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks

Question			Answer	Marks	Guidance
4	(b)	(ii)	<p>carbon dioxide <u>concentration</u> / partial pressure of CO₂ / temperature ;</p> <p>AVP ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>DO NOT CREDIT 'high' or 'low', as these indicate situations rather than factors</p> <p>eg</p> <ul style="list-style-type: none"> • stomatal density • stomatal size • chlorophyll concentration • number of chloroplasts • enzyme turnover rate <p>IGNORE (temporary) changes in stomatal , opening / closing</p> <p>IGNORE ref to water availability</p>
	(b)	(iii)	<p>(aerobic / anaerobic) respiration ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT Krebs cycle / link reaction / decarboxylation</p> <p>DO NOT CREDIT photorespiration (as light intensity stated as being low)</p>

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Question			Answer	Marks	Guidance
4	(b)	(iv)	<p>1 at 0 , respiration only / no photosynthesis ;</p> <p><i>between 0 and X</i></p> <p>2 <i>idea that</i> (rate of) respiration is greater than (rate of) photosynthesis ;</p> <p><i>at X</i></p> <p>3 <i>idea that</i> (rate of) respiration equals (rate of) photosynthesis / at compensation point ;</p> <p><i>after X</i></p> <p>4 <i>idea that</i> (rate of) photosynthesis is greater than (rate of) respiration ;</p>	3 max	<p>Assume that candidate is answering in the same order as the bullet points, unless otherwise indicated. IGNORE photorespiration throughout</p> <p>CREDIT 'Calvin cycle' for 'photosynthesis' throughout For mps 2, 3 & 4 must include clear ref. to both respiration and photosynthesis</p> <p>2 DO NOT CREDIT no photosynthesis</p>
4	(c)	(i)	<p>reduced NADP / NADPH / NADPH₂ / NADPH⁺ ; ATP ; oxygen ;</p>	3	<p>Mark the first 3 answers. IGNORE numbers of molecules</p> <p>ACCEPT O₂ (to be consistent with the other answers to this question)</p>

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4	(c)	(ii)	<p>1 prevents <u>photophosphorylation</u> ;</p> <p>2 cyclic and non-cyclic ;</p> <p>3 no / less , ATP / reduced NADP , for , light-independent stage / Calvin cycle / GP to TP ;</p> <p>4 no (named) substrate made for <u>respiration</u> ;</p>	2 max	<p>3 'no ATP for photosynthesis' is not quite enough DO NOT CREDIT (oxidised) NADP</p> <p>4 substrate eg glucose / starch / carbohydrate / sucrose / sugars IGNORE triose phosphate / food / nutrients</p>
			Total	13	

Question			Answer	Marks	Guidance
5	(a)	(i)	islet(s) of Langerhans ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE α and β cells</p>
5	(a)	(ii)	beta / β ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT b IGNORE islets (of Langerhans) DO NOT CREDIT B (confusion with immune system)</p>

Question			Answer	Marks	Guidance
5	(b)		<p><i>in gap order</i></p> <p>1 increases ;</p> <p>2 glycolytic / glycolysis ;</p> <p>3 depolarised ;</p> <p>4 calcium ;</p> <p>5 exocytosis ;</p>	5	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>1 CREDIT rises / gets higher ACCEPT 'is high'</p> <p>2 IGNORE metabolic / respiratory</p> <p>3 ACCEPT 'less negative / more positive , on the inside (than previously)' or 'less positive / more negative , on the outside (than previously)' IGNORE figures (as Q has asked for words) DO NOT CREDIT ionised / polarised</p> <p>4 IGNORE Ca or Ca²⁺ (as Q has asked for words) DO NOT CREDIT if incorrect symbols given (e.g. Ca⁺ , CA²⁺)</p>
5	(c)	(i)	<p>ribosome / <u>rough</u> endoplasmic reticulum / <u>RER</u> ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE rRNA (as this is not <i>where</i> proteins are made)</p>

Question			Answer	Marks	Guidance
5	(c)	(ii)	<p>1 transported to Golgi ;</p> <p>2 modified / processed , in Golgi ;</p> <p>3 packaged into / stored in , (Golgi) vesicle(s) ;</p> <p>4 vesicles transported towards , plasma / cell surface , membrane ;</p> <p>5 AVP ;</p>	3 max	<p>IGNORE ref. to mechanism of insulin secretion</p> <p>IGNORE ref. to negative feedback control of insulin secretion</p> <p>2 DO NOT CREDIT if ref. to carbohydrate</p> <p>4 IGNORE ‘fuses with membrane’</p> <p>5 eg • detail of modification (splitting / recombining, polypeptide)</p> <ul style="list-style-type: none"> • role of cytoskeleton • use of ATP (in context of, modification / movement)
			Total	11	