

Coordination and Response

Mark Scheme 4

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Coordination and Response
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 4

Time Allowed: 63 minutes

Score: /52

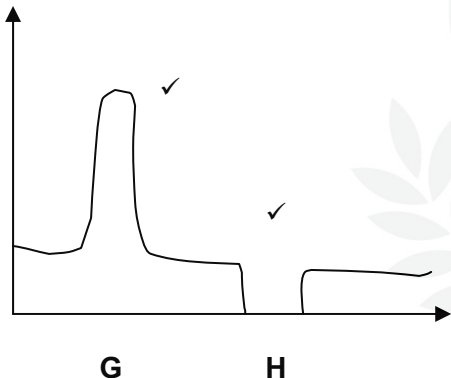
Percentage: /100

Question	E	Answers	Marks	Additional Guidance
1	(a)	whole / part of, organism changes in position / changes in place ;	[1]	ignore locomotion A (moves) from place to place / one place to another
	(b)	(i) <u>antagonistic</u> ;	[1]	A antagonism
		(ii) <i>idea of</i> muscle pull (don't push) ; biceps contracts ; triceps relaxes ; flexion / described as movement of (fore)arm ; during relaxation muscle is, stretched / passive ; both contract to maintain position / holding an object ;	[max 3]	<i>assume answer is about flexion – credit ora for extension – mark through if both given</i> if answer does not mention the names of the muscles but has the right idea for one contracts and the other relaxes, then allow one mark for MP2+3 contraction and relaxation of the pair must be linked to the correct movement of the arm. If not, no marks R hand A named correct bone – radius and/or ulna A lengthens
	(c)	(i) <i>transmits impulses</i> from, receptor / nerve endings / sensory endings / skin / sensory organ ; to, CNS / spinal cord / connector neurone / relay neurone ;	[2]	ignore sensory neurone as question says 'describe' ignore 'messages' / 'signals' / 'senses the stimulus' R 'fingers' / 'hand' A interneurone R 'brain' / 'brain and spinal cord'
		(ii) <i>idea that impulses</i> stimulate muscle to, contract / move hand ; (only) biceps contracts (to raise the forearm) ; ref. to impulse does not cross synapse to H ;	[2 max]	<i>assume answer is about neurone G, but accept about H</i>
	(d)	1 many / different, stimuli ; 2 brain, decides / controls / coordinates ; 3 <u>impulses</u> in <u>motor</u> , neurones / nerves ; 4 to, (many) muscles / effectors (involved) ;	[max 2]	R if one muscle
			[Total: 11]	

Question			Answers	Marks	Additional Guidance
2	(a)	(i)	pupil, decreases in size / gets smaller / AW ; circular / iris, muscle contracts ;	[2]	A 'is constricted' A iris widens R if radial and ciliary muscles
		(ii)	reduces light entering the eye ; protects, retina / rods / cones (against damage) ; destruction of pigment ;	[max 2]	accept 'too much light damages the retina' ora = 2 marks R 'damage' unqualified
		(iii)	rods detect light of low intensity ; no colour / black and white ; cones detect high light intensity ; different colours / give colour vision ;	[2] (1	maximum 1 mark per cell type
	(b)		arrows on each neurone in the correct direction ; <i>from retina to muscle in iris</i>	[1]	R if any one arrow is incorrect
	(c)		muscles, oppose each other / have the opposite actions ; when one contracts the other relaxes ; radial muscle contracts to make pupil, larger / dilate ; circular muscle contracts to make pupil, smaller / constrict ;	[max 3]	

2	(d)	(i)	<p>1 dangerous situation / or suitable example ;</p> <p>2 may have to run away / flight ;</p> <p>3 display aggression / anger / fight / AW ;</p> <p>4 predator move to catch prey ;</p> <p>5 voluntary action ; e.g. sporting events</p> <p>6 AVP ;</p>	[max 3]	<p>'fight and flight' = 2 marks</p> <p>e.g. qualified emotional scenar</p>
		(ii)	<p>hormone travels around the (whole) body ;</p> <p>no need to transmit impulses to specific places ;</p> <p>need to stimulate many / simultaneous responses ;</p> <p>less energy needed ;</p> <p>(effect/s) last longer ;</p>	[max 1]	
				[Total: 14]	

Question	Answers	Marks	Guidance
3 (a)	detect / sense / feel / AW, changes (in the environment) / stimuli ; make response(s) / react ;	[max 2]	'a response to a stimulus' = 1 mark IGNORE an example as a definition asked for IGNORE 'sensitive'
(b)	A cornea ; B iris ; C lens ; D suspensory ligaments ;	[4]	accept labels on Fig. 1.1 if not on answer lines D ACCEPT 'suspendary / suspensory' and other similar misspellings
(ii)	do not allow any ecf from (b)(i) <i>iris</i> controls / changes / adjusts, amount of light (entering the eye) ; controls / changes / adjusts, the size of the pupil ; protects, retina / light sensitive cells, from, bright / excess, light ; <i>ciliary muscle contracts to</i> change, focal length / thickness / shape, of lens ; (brings about) accommodation ; slacken the suspensory ligaments ;	[max 1] [max 1]	R 'pupil reflex' A circular muscles contract in bright light to protect the retina A radial muscles contract in dim light to help vision A stop retina from being bleached IGNORE size A change how light is refracted in the eye A contract and relax to focus the lens A relaxes to increase tension in suspensory ligaments
(c) (i)	<i>if these two responses are given the wrong way round award no marks, but look for ecf in (d)</i> G yellow spot / fovea ; H blind spot / optic disc ; A optic(al) nerve	[2]	

Question	Answers	Marks	Guidance
3 (ii)	1 detects light of low <u>intensity</u> ; A ora 2 converts light to (electrical) <u>impulses</u> ; 3 provides night vision / work at night / work in dim light / 'see in the dark' ; 4 high sensitivity (to light) ; 5 give peripheral vision / described ; 6 gives black and white vision / gives shades of grey ; A ora	[max 2]	2 R signals / messages / pulses 3 R 'rods capture light' 4 A very sensitive (to light) / more sensitive than cones 5 e.g. not looking directly at object 6 <i>ora</i> = 'cannot see colour' / AW
(d)	<p>allow ecf from (c)(i) if G is blind spot and H is fovea</p> <p>peak at G ; nothing at H ;</p>  <p style="text-align: center;">G H</p>	[2]	<p>look for these two points, ignore the rest of any line(s) drawn by the candidates mark independently 2 marks if only a peak at G</p> <p>ACCEPT lines that just go into H</p> <p>R one vertical line in G.</p>
		[Total: 14]	

Question	E Answers	Marks	Guidance
4 (a)	<i>sensitivity</i> (ability to) detect / sense, changes (in the environment) / stimuli ; make responses ; <i>involuntary action</i> a response that does not involve, decision / thought / AW ; A a response that is not under conscious control	[max 3]	A automatic qualified reflex or an example unqualified is not enough A 'a reflex because it is automatic'
(b) (i)	A spinal cord / grey matter ; B motor neurone / axon / efferent fibre ; C sensory cell / receptor / muscle spindle ; D quadriceps / muscle / effector ;	[4]	A responses on the diagram R references to 'nerves' and CNS A 'sense organ' in C but R sensory <u>neurone</u>
(ii)	movement of, <u>ions / molecules</u> + against a concentration gradient / AW ; using, energy (from respiration) / ATP ; R references to particles	[2]	A ref. to active transport slowed down by metabolic poison as alternative to energy / respiration / ATP NB be aware of contradictory statements re concentration and reject
(c)	sensory neurone still carries an impulse / can still feel the sharp blow ; no <u>impulses</u> in (motor) neurone / after the cut ; to, muscle / effector ; no, response / contraction ;	[max 3]	R signals and messages A action potential
(d)	to test if the nervous system is functioning properly / AW ;	[1]	A 'to see if the nerves are working properly'
[Total: 13]			