Coordination and Response

Mark Scheme 3

Level

Subject Biology

Exam Board CIE

Topic Coordination and Response

Paper Type (Extended) Theory Paper

Booklet Mark Scheme 3

Time Allowed: 62 minutes

Score: /51

Percentage: /100

Question	E answers		Mark	Additional Guidance
1 (a (i)	stimulus receptor cells effector response	(blue) light / (change in) light intensity / dim to bright light; cones / rods; (circular) muscle, of / in, iris; pupil, gets smaller / constricts / AW;	[4]	ignore retina (as it is a tissue) R ciliary muscle R radial muscle R muscle / pupil, contracts ignore muscle contraction
(ii) 1 2 3 4 5	 reflexes, then mark to max 3 (nervous / electrical) impulses; sent by / initiated by, (named) receptors / sensory cells / retina; R if optic nerve, sends / initiates / AW, the impulse via / along / through, sensory neurone(s) / optic nerve to, brain / CNS / grey matter; ignore spinal cord 			MP1 – M5 ignore 'signals' / 'messages' / AW ignore relay / connector / inter-, neurone; ignore 'impulses to brain' after the response has happened

Question	E answers		Additional Guidance	
1 (b) 1 2 3 4 5	increase in, heart / pulse, rate; increase in, breathing rate / depth of breathing; more oxygen, taken in / absorbed; linked to MP2 for (increase rate of) aerobic respiration; more energy released; R energy produced		R 'lots of heart beats' unqualified / increases heart beat MP3 accept oxygen taken in faster MP4 ignore metabolic rate increases	
6 7 8	vasodilation in / arteries widen in / more blood to, muscle / brain; more oxygen to muscles; linked to MP1 or MP6 vasoconstriction in / less blood to, gut / skin;		MP6 accept faster blood supply to muscle MP7 accept faster supply of oxygen to muscle MP8 accept slower blood supply to gut / skin	
9 10 11 12	stimulates, breakdown / conversion, of glycogen to glucose in liver; increases glucose (concentration) in the blood; dilates pupils; lets more light into eye;		MP9 ignore glycogen to glucose in muscle MP10 does not have to be linked to MP9	
13 14	heightened sensitivity / increased mental awareness / AW; AVP; e.g. increased width of (named) airways, increase in blood pressure	[max 5]	MP13 R 'excited'	
(c) 1 2 3	assume answers are about involuntary unless told otherwise automatic / no conscious decision / does not involve thought / involves decision making; higher centres / AW, of brain not involved; faster / immediate;	LI	ignore voluntary / involuntary responses can / cannot be controlled unqualified	
4 5 6 7	response always the same; involves, one / small number of, muscle(s); may involve glands; they are protective / AW;	[max 2]		

2 (a)	A cell membrane ; B cytoplasm ; C nucleus	[3]	
(b) (i)	retina ;	[1]	
(ii)	fovea / yellow spot ; blind spot / optic disc / end of optic nerve ;	[2]	
(c) 1 2 3 4 5 6 7 8 9	light absorbed (by a pigment); rods detect low light (intensity); give 'black and white' vision / do not detect colour; provide night vision / AW; cones detect high light (intensity); cones detect colour; any detail, e.g. three different types of cone; convert light into (electrical) impulses; impulses sent to brain; via, neurones / sensory nerve / optic nerve;	[max 4]	
		[Total: 10]	

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Question	E Answers	Marks	Additional Guidance
3 (a)	A – pancreas ; B – insulin ;		A Islet(s) of Langerhans although not an organ
	C – glucagón;	[3]	
(b)	(i) liver;		
		[1]	
(ii)	glycogen less reactive than glucose;		
	idea that is not lost from cell by diffusion; not used up in respiration; decreases concentration of solute(s); idea that this prevents a decrease in water potential; so reducing excess uptake of water; by osmosis; prevents cell bursting (as a result of osmosis);	[max 2]	
(c)	negative feedback;	[1]	
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(d)	gene identified / location found;	KI	JILLINE
(i)	cut from, DNA / chromosome; inserted into, plasmid / vector;	TTIC	NT
	plasmid inserted into bacterium; AVP;	[max 3]	restriction enzymes / ligases

(ii)	advantages for max 2 increases, yield / production; increases profits; fewer animals need to be kept; less waste / less pollution; disadvantages to max 2 puts health of animals at risk; consumers may not buy 'genetically modified food'; ref to health scares with hormonally-treated animals; ref to health scares with use of GM products; AVP; e.g. ref to milk surpluses	[max 3]	e.g. mastit A GM

Ques	tion	E Answers	Marks	Additional Guidance
4	(a)	detect / sense / feel, changes / stimuli ; make response(s) / react / AW ;	2	ignore specific example of response
	(b)	F to skin receptor; G to sensory neurone; H to biceps;	3	Label line to actual part only. R lines to motor end plate or neurone
	(c)	automatic; no thought required / not a conscious action; stimulus always leads to the same response;	max 2	ignore refs to speed of response A no (higher centres in) brain involved A fixed response
	(d)	 1 rapid response; 2 protective / AW; 3 mechanical damage / injury; 4 e.g.; 5 already present immediately after birth; 	max 3	i.e. before learning can take pla
	(e)	 heart beats faster; increased rate of breathing; trachea / bronchi / bronchioles / airways, dilate / widen vasoconstriction / AW, in gut / skin; vasodilation / AW, in muscles; stimulates breakdown of glycogen in the liver; increases blood glucose concentration; dilate pupils; heightened sensitivity / increased mental awareness / AW; 	max 3	A more oxygen to muscles R 'adrenaline breaks down glycogen' A sharper senses / more alert / AW
		[Total: 13]		