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Mark scheme

Coordination and response

Biology 0610 · Questions from Paper 3, Paper 4 and Paper 6

Total marks

89

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
3	7	8	9	7	10	10	11	11	13	**89**

Question 1 [3]

1	**(a)**	increases / dilates / AW; **[1]**	
	(b)	Low(er) intensity / less light (enters eye) / to get more light into the eye / AW; Circular muscles (of iris) relax / lengthen; Radial muscles contract / shorten; **MAX [2]**	**Accept** room is darker **Ignore** references to ciliary / longitudinal muscles **Ignore** descriptions of reactions to full light / photograph A
		[Total: 3]	

Question 2 [7]

2(a)	groups of receptor cells ; responding to specific stimuli ;	**2**	
2(b)	**C** ; **D** ; **E** ; **B** ;	**4**	
2(c)	a circle drawn in the iris that is smaller than the pupil in the dark room diagram ;	**1**	

Question 3 [8]

3(a)(i)	touch ;	**1**	**A** pain / pressure
3(a)(ii)	*any four from:* X is sensory (neurone), Y is motor (neurone), Z is relay (neurone) ; (pin is detected) by a receptor ; ref. to electrical impulse ; (impulse travels) from X to Z to Y ; ref. to synapse ; (impulse to,) effector ; effector / muscle (contracts), moves foot off the pin ;	**4**	
3(b)(i)	pupil drawn smaller than in Fig. 7.2 ;	**1**	
3(b)(ii)	iris ;	**1**	
3(b)(iii)	retina ;	**1**	

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Question 4 [9]

4(a)(i)	*any two from:* automatic / involuntary (response) /AW; fast / immediate / sudden (response); same response; integrates / co-ordinates, stimuli and responses;	**2**	**A** unconsciously / without thinking
4(a)(ii)	*idea* that responses are protective / needed for survival / keep safe / avoid getting hurt / AW;	**1**	
4(b)	receptors; sensory neurone; relay neurone; motor neurone; effectors;	**4**	All correct = 4 3 or 4 correct = 3 2 correct = 2 1 correct = 1
4(c)(i)	synapse;	**1**	
4(c)(ii)	spinal cord / CNS / brain;	**1**	
		Total: 9	

Question 5 [7]

5(a)	(the ability to) detect <u>stimuli</u> (in the internal / external environment) **;** to make (appropriate) responses **;**	**2**	
5(b)(i)	groups of receptor cells **;** responding to specific stimuli **;**	**2**	
5(b)(ii)	<table><tr><td>action</td><td>structure</td></tr><tr><td>relaxes</td><td>circular muscles (of the iris) **;**</td></tr><tr><td>contracts</td><td>radial muscles (of the iris) **;**</td></tr><tr><td>widens</td><td>pupil **;**</td></tr></table>	**3**	

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Question 6 [10]

6(a)	gravitropism ;	**1**	
6(b)	*idea of* negating the effect of gravitational pull / gravity, on one side of the plant (only) ; (used as a control) to compare with (the response of) plant **B** ;	**2**	
6(c)(i)	auxin ;	**1**	
6(c)(ii)	*any three from:* *(auxin / hormone produced in the tip)* moves / diffuses, away from tip / down the, stem *or* shoot *or* plant ; moves to / collects on, one / lower side (of stem / plant) ; stimulates cell elongation ; stem / plant, bends / grows / turns, upwards ; AVP ;	**3**	
6(d)	*any three from:* reach light for photosynthesis ; (reach air for) carbon dioxide for photosynthesis ; (reach air for) oxygen for respiration ; *idea that they* grow tall so that flowers are exposed for, (wind / insect) pollination ; AVPs e.g. roots grow downwards / towards (direction of) gravity ; to reach, water / ions *or* minerals ; to anchor plant in the soil ;	**3**	

Question 7 [10]

7 **(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** **10**	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 8 [11]

8	(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)	antagonistic ;	[1]	**A** antagonism
		(ii)	*idea of* 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]	*assume answer is about flexion – credit ora for extension – mark through if both given* 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)	*transmits impulses* 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)	*idea that* impulses stimulate muscle to, contract / move hand ; (only) biceps contracts (to raise the forearm) ; ref**.** to impulse does not cross synapse to **H** ;	[2 max]	*assume answer is about neurone G, but accept about H*
	(d)	**1** **2** **3** **4**	many / different, stimuli ; brain, decides / controls / coordinates ; impulses in motor, neurones / nerves ; to, (many) muscles / effectors (involved) ;	[max 2]	**R** if one muscle
				[Total: 11]	

Question 9 [11]

9(a)	*first gap:* central **and** *second gap:* peripheral ;	**1**	both needed for the mark
9(b)(i)	**T** **P** **S** **Q** **N** **M** **R** ;;	**2**	MP1 for **P** first and **M** at the end MP2 for **S**, **Q**, **N** in that order but in *any* position in relation to **P** and **M**
9(b)(ii)	*any two from:* touch ; temperature ; AVP ;	**2**	e.g. pressure / pain
9(b)(iii)	circular / radial, muscle ;	**1**	**A** iris
9(c)	*total of five from:* **1** only the first neurone releases neurotransmitters ; ***2*** only the second neurone has (complementary) receptors ; *max four from:* **3** *ref. to* neurotransmitter (molecules) ; **4** (neurotransmitter is released) from vesicles ; **5** into the synaptic gap ; **6** the junction between the neurones is the synapse ; **7** (neurotransmitter molecules) diffuse (across the gap) ; **8** *ref. to* receptors are complementary in shape (to neurotransmitter) ; **9** (neurotransmitter molecules) bind with receptors (on the next neurone) ; **10** impulse is then stimulated (in the next neurone) ;	**5**	

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Question 10 [13]

10(a)	**X –** vesicle (membrane) **;** **Y –** synapse / synaptic gap **;**	**2**	
10(b)	*any five from:* movement is, impaired / slower / non-existent **;** slower reflexes / AW **;** fewer vesicles **;** fewer neurotransmitters in, vesicles / **X ;** fewer neurotransmitters, released (when an impulse arrives) **;** fewer neurotransmitters diffuse across the, synapse / gap / cleft **;** fewer neurotransmitters bind to receptor proteins **;** fewer / no, impulses (in the, postsynaptic / second / next, neurone) **;** AVP **;**	**5**	
10(c)	*any two from:* more rapid **;** short-lived effect **;** localised / AW **;** transmission of (electrical) impulses **;** (transmission is through) neurones / nerve cells **;**	**2**	**A** ora for hormonal control throughout, i.e.: slower (some may have) long-lasting effect widespread / AW hormones are chemicals transmission through the, blood / circulatory, system
10(d)(i)	*any two from:* sequence of bases in, gene / DNA / mRNA, determines sequence of amino acids **;** sequence of amino acids determines shape of receptor proteins **;**	**2**	
10(d)(ii)	move / carry, (named) molecules / ions, across membrane(s) / into *or* out of cells **;** by active transport / using energy from respiration **;** movement against concentration gradient / from low to high concentration **;**	**2**	

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