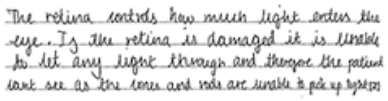
Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			(Huntington's) prevents/reduces the cerebrum/brain sending impulses (to move the legs) ✓ (MD) cannot contract muscles/effectors (to move the legs) ✓ (SMA) prevents/less impulses being carried by motor neurones✓	3 (3 x AO 2.1)	**AW** signals throughout **ALLOW** spinal cord can receive less impulses **ALLOW** brain sends impulses to spinal cord **ALLOW** muscles contract to move legs **ALLOW** prevents/less impulses reaching muscles/effectors **ALLOW** motor neurones send impulses to muscles/effectors **Examiner's Comments** This question challenged the candidates and demonstrated a knowledge gap whereby candidates could not apply their knowledge of the co-ordinated nervous responses to this question. The most common given mark candidates were awarded was identifying in MD cannot contract muscles. A lot of candidates rewrote the question that they can't move because muscle cannot be made. This was one of the lowest scoring questions on the paper. **Assessment for learning** This has been identified as a knowledge gap. Candidates did not use scientific language to describe nervous impulses, instead spoke about messages and communication. Many candidates described the part of the nervous system affected

					incorrectly or had the impulses passing the wrong direction. Revisiting key knowledge across the GCSE course is invaluable in ensuring candidates are used to using key scientific terms in the correct context.
			Total	**3**	
2			A ✓ B ✓	2 (2 x AO 1.1)	
			Total	**2**	
3	a		**Any 3 from**: **Similarities** Both humans and octopuses have nerves/neurones ✓ Both humans' and octopuses' central nervous systems/CNS have a brain ✓ Both humans and octopuses have eyes which contain receptors ✓ **Differences** Octopuses do not have a spinal cord / only humans have a spinal cord ✓ All nerves in octopuses connect to the brain / all impulses in octopuses go via the brain ✓	3 (3 x AO 2.1)	Answer must have a combination of similarities and differences for full marks **IGNORE** references to synapses **ALLOW** spine for spinal cord **Examiner's Comments** This question targeted AO2, requiring candidates to use their knowledge of the human nervous system to make comparisons with the novel system shown. The lack of a spinal cord in the octopus was highlighted by many and therefore so was the fact that the nerves entered the brain directly.
	b		(Octopus') lens stays the same/does not get thicker / human lens gets thicker ✓ (The octopus') eye changes shape (when looking at a near object) / human eye does not change shape ✓	2 (2 x AO 2.1)	**IGNORE** reference to suspensory ligaments or ciliary body **ALLOW** octopus eye gets narrower or wider **IGNORE** eye contracts/squeezes **ALLOW** retina moves closer to the lens **Examiner's Comments** There were some good responses seen to this question, with candidates

					appreciating that the octopus eye changes shape rather than the lens changing. However, some candidates did not realise that the two light rays shown on each diagram were starting from different points on the fish and not the same point. They therefore thought that in the octopus, light rays were not focused on the retina.
	c	i	**First check the answer on the answer line** **If answer = 1:10 award 2 marks** 200 ÷ 20 = 10 ✓ Ratio = 1:10 ✓	2 (2 x AO 1.2)	**ALLOW** 20 : 200 for one mark **Examiner's Comments** Most candidates could correctly calculate the ratio.
		ii	Idea that they have large eyes (compared to body mass) ✓ So more light can enter eye (to see in low light levels) ✓	1 (AO 2.1) 1 (AO 3.1b)	**ALLOW** large eye size to body mass ratio **DO NOT ALLOW** the eye to body mass ratio is small **ALLOW** they have larger pupils **ALLOW** they can take in more light **ALLOW** they can have more rods/receptors/larger retina to detect light **Examiner's Comments** The main issue for some candidates was the interpretation of the ratios. Some stated that the ratio in the octopus (1:10) was smaller than in the human (1:2667) rather than larger. Therefore, stating that this results in a larger eye did not make sense. However, these candidates could still access the second marking point by stating that a large eye means that more light could enter the eye.
			Total	**9**	
4			A	1 (AO 1.1)	**Examiner's Comments** Approximately half of the responses to this question were correct. Most candidates knew that sensory neurones possessed axons but a

					significant number thought they lacked a dendron and so incorrectly chose option B.
			Total	**1**	
5			D	1 (AO 2.1)	**Examiner's Comments** Many candidates seem to find the process of accommodation challenging, often thinking that the ciliary muscles need to contract to stretch the lens. However, about half answered this correctly.
			Total	**1**	
6			**Any two from:** Endocrine system uses chemical messengers/hormones but nervous system uses electrical messages/nerve impulses ✓ Endocrine is slow**er** acting ✓ Endocrine (responses) are long**er**-lived ✓ Endocrine system communicates via blood but nervous system uses neurones/nerves ✓ Idea that endocrine responses are more widespread throughout the body ✓	2 (2 xAO 1.1)	**ORA** **ORA** **Examiner's Comments** It was clear that some candidates had learned these differences and answered accurately and concisely. Some other responses involved vague references to homeostasis or specific actions.
			Total	**2**	
7			**C**	1 (AO 1.1)	
			Total	**1**	
8			**A**	1 (AO 2.1)	**Examiner's Comments** The majority of candidates answered this question correctly with only a minority being distracted by option C.
			Total	**1**	
9			**B**	1 (AO 2.1)	**Examiner's Comments** If candidates answered incorrectly, then it was nearly always because

					they confused long and short-sightedness and so choose option C.
			Total	**1**	
10			Thyroid releases thyroxine which regulates the body's metabolic rate ✓ Affects the amount of heat that will be generated/produced ✓	2 (1 × AO1.1) (1 × AO2.1)	**IGNORE** reference to respiration rate/heart rate/breathing rate **DO NOT ALLOW** reduces the production of energy **IGNORE** reduces the release of energy **ALLOW** idea that it stimulates exothermic reactions **Examiner's Comments** This was a higher demand question, requiring candidates to have knowledge of the function of thyroxine in the control of the metabolic rate. This then needed to be linked to heat generation. Only the most successful answers managed to include both of these aspects.
			Total	**2**	
11			Retina is light sensitive/is where the receptors are found/is where the image is formed ✓ If damaged it may not detect light/the image ✓	2 (1 × AO1.1) (1 × AO2.1)	**ALLOW** retina is where the light is focused **ALLOW** idea that information about the image would not be able to be sent to the brain **IGNORE** if damaged, the image will not form **Examiner's Comments** A significant number of candidates think that the retina is responsible for either refracting light in the eye or for restricting the intensity of light entering the eye. This is seen in this exemplar, which was not given any marks. Exemplar 2  The retina controls how much light enters the eye. If the retina is damaged it is unable to let any light through and therefore the patient cant see as the cones and rods are unable to pick up signals Exemplar 2 states that the retina controls how much light enters the

					eye, and they were not given any marks for this.
			Total	**2**	