

Q1. (2018)

A)

18	(a)	(i)	mode = 0.26 (seconds) ✓	1	2.2	
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B)

		(ii)	(means are identical so) no difference between reaction time in each hand ✓ (mode shows) non-dominant hand most often faster reaction ✓	2	2 x 3.2b	ALLOW they are very similar to each other ALLOW left side quicker/better to catch ruler
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C)

	(b)		include the units ✓ record results in rank order ✓	2	2 x 3.3b	ALLOW put seconds in headings ALLOW sort the order
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D)

	(c)		use ten left (dominant) hand students / ten right (dominant) hand students ✓ opposite non-dominant hand tested for left/right handedness ✓ Any one from: similar sample sizes / similar aged groups ✓ compare means for each group ✓	3	3 x 3.3a	ALLOW add another table where student is left handed ALLOW same reaction room ALLOW compare reaction times for each group ALLOW set amount of left/right handed people
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E)

	(d)		sight ✓	1	2.2	ALLOW visual ALLOW to see when it's coming ALLOW light IGNORE eyes
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F)

	(e)		receptor ✓ motor neurone ✓	2	2 x 1.1	correct order needed
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Q2 (2018)

22	(a)		pupil has dilated (in diagram B) ✓ radial muscles contracted ✓ to allow more light into the eye ✓	3	2.1 1.1 1.1	ALLOW pupil is larger IGNORE eyes / iris dilated ALLOW reflex action has occurred
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Q3 (2019)

5			B	1	1.1	
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Q4. (2019)

6			D	1	1.1	
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Q5. (2019)

A)

18	(a)	(i)	Any one from: provides a fine/clean cut ✓ for more accurate/precise cutting measurement ✓	1	2.2	ALLOW scalpel is sharper ALLOW easier to cut with scalpel IGNORE more hygienic
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B)

18	(a)	(ii)	cut in a direction away from yourself / where possible cut using a cutting board ✓	1	2.2	ALLOW place cover over scalpel if not in use ALLOW idea of keep fingers away from cutting/sharp edge/blade IGNORE safety gloves
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C)

18	(a)	(iii)	No roots to take up minerals/water ✓ No shoots so no photosynthesis/sugars ✓	2	2 x 2.2	ALLOW (cells absorb) sugars for respiration/energy ALLOW to provide water/sugar/minerals/nutrients scores 1 mark if no other mark
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D)

18	(b)	(i)	warmth needed for (chemical) reactions / respiration / photosynthesis / growth ✓ light for photosynthesis / chlorophyll produced ✓	2	2 x 2.1	ALLOW warmth speeds up metabolism/enzymes/mitosis/reproduction IGNORE bacteria ALLOW light/sunlight so plant can make sugar IGNORE Sun
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E)

18	(b)	(ii)	temperature can be controlled / kept at optimum temperature ✓ idea that light can be provided 24 hours / continuous light source ✓	2	3.3a	ALLOW keeps constant temperature IGNORE keep heat constant ALLOW idea that air movement is constant ALLOW may go dark at night near window / avoids night-time conditions / avoids sunlight variability AW
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F)

18	(b)	(iii)	leaf cells / cells producing stems / chlorophyll being produced ✓	1	3.2a	ALLOW explants are making chloroplasts / able to photosynthesise
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G)

18	(c)		FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 86.7 (%) award 3 marks 13 ÷ 15 ✓ = 86.666666... (%) ✓ = 86.7 (%) (1 decimal place) ✓	3		
					2 x 2.2	ALLOW 86.6· (recurring) ALLOW ECF for % calculation if incorrect substitution of values from question
					1.2	ALLOW ECF for answer given to 1 decimal place

Q6. (2020)

15			C ✓	1	2.1	
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Q7 (2020)

A)

20	(a)	(i)	(sensory) receptor ✓	1	2.1	IGNORE neurone
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B)

		(ii)	brain ✓ motor ✓	2	1.1	ALLOW CNS IGNORE relay
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Q8. (2021)

2			D ✓	1	1.1	
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Q9. (2021)

7			D ✓	1	1.1	
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Q10. (2021)

8		A✓	1	2.1	
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Q11. (2021) – 20a, 20b, 20c, 20d

A)

		(ii)	Hormones ✓ Travel through the blood(stream)✓	2	2 x 1.1	ALLOW chemical messengers ALLOW hormones bind to specific receptors on cells
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B)

		(b)		2	2 x 1.1	All 3 correct = 2 marks 1 or 2 correct = 1 mark DO NOT ALLOW more than 1 line from each letter
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C)

		* (c)	(i)	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Identifies the retina as the part of the eye that contains light sensitive cells. AND Provides an explanation of the colours the colour blind person has trouble identifying. AND Provides an explanation how glasses treat colour blindness.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Identifies the retina as the part of the eye that contains light sensitive cells. AND Provides an explanation of the colours the colour blind person has trouble identifying. OR Identifies the retina as the part of the eye that contains light sensitive cells. AND Provides an explanation how glasses treat colour blindness. OR Provides an explanation of the colours the colour blind person has trouble identifying. AND Provides an explanation how glasses treat colour</p>	6	2 x 1.1 2 x 2.1 2 x 3.1b	<p>AO1.1 Demonstrate knowledge and understanding of parts of the eye</p> <ul style="list-style-type: none"> light sensitive cells are in the retina found in the fovea <p>AO2.1 Apply knowledge and understanding of the mechanisms involved in colour blindness</p> <ul style="list-style-type: none"> idea that in the colour-blind person the cells that detect red and green have similar sensitivities the similar sensitivities are at wavelengths 560-640 nm therefore the brain cannot easily distinguish red or green colours / colours in range 560-640nm <p>AO3.1b Analyse information and ideas to evaluate the effect of colour blindness glasses</p> <ul style="list-style-type: none"> glasses remove (wavelengths) in the region where the red and green overlap idea that brain is now able to identify/distinguish red and green colours
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		blindness. <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i> Level 1 (1–2 marks) Identifies the retina as the part of the eye that contains light sensitive cells. OR Provides an explanation of the colours the colour blind person has trouble identifying. OR Provides an explanation how glasses treat colour blindness. <i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i> 0 marks No response or no response worthy of credit.			
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D)

	(d)	Cerebrum ✓	1	1.1	
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Q12. (2021)

A)

17	(a)	Breathing rate ✓	1	2.2	
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B)

	(b)	The gender/sex of the person exercising ✓ Time doing the exercise ✓	2	2 x 3.2a	
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C)

	(c)	To be able to compare effect of exercise to no exercise ✓ OR Measure change/increase in (breathing rate) ✓	1	3.1a	ALLOW provides a baseline measurement ALLOW two students may have different breathing rates at rest
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Q13. (2021) – 18d

	(d)	Any two from: Controlling germination ✓ Fruit ripening ✓ Flower opening ✓ Shedding of leaves ✓	2	2 x 1.1	ALLOW abscission/leaf fall ALLOW reference to tropisms
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Q14. (2021) – 19c

A)

	(c)	(i)	Blood will have higher concentration /more (sugar) in it ✓ So will lower the water potential ✓	2	2 x 2.1	IGNORE reference to viscosity of blood
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B)

		(ii)	Any 2 from: Water will move from (body) cells into the blood ✓ By osmosis ✓ Cells crenate ✓	2	2 x 2.1	ALLOW water diffuses out of body cells ALLOW water moves from high to low water potential/concentration ALLOW body cells become dehydrated / shrivel
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C)

(d)	Change caused to the kidney	Part of tubule affected	3	3 x 3.2a	
	Glomerulus filters too much glucose from the blood.	A✓			
	Proximal convoluted tubule only reabsorbs some of the glucose back into the blood.	E✓			
	Collecting duct sends urine with glucose present to the bladder.	C✓			

Q15. (2022)

A)

20	(a)	(i)	(Person is) short sighted ✓ And any one from: Eye (ball) is too long / Lens is too powerful / Light/ray refracts too much / Light/rays not focused at the retina / Light/rays focussed in front of the retina ✓	2	2 x 2.1	Incorrect defect identified then no marks ALLOW has myopia ALLOW image not focused at the retina ALLOW image focussed in front of the retina
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B)

		(ii)	(glasses/contacts with) concave/diverging lenses / laser eye surgery ✓	1	1 x 2.1	ALLOW ecf for incorrect defect identified in Q20(a)(i)
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C)

	(b)		Change the shape of the lens / Accommodation / Focus the light (on retina) ✓	1	1 x 1.1	ALLOW makes clear fluid that fills the space between cornea and iris IGNORE contract/relax DO NOT ALLOW control pupil size
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Q16. (2022)

21	(a)		<p>Please refer to the marking instructions on page 5 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Provides a detailed description of a reflex arc with most components in the right order AND Identifies the structures involved in this specific reflex</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Provides a description of a reflex arc with some components in the correct order AND Identifies a structure involved in this specific reflex OR Provides a detailed description of a reflex arc with most components in the right order</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) Provides a basic description of some components of a reflex arc OR Identifies a structure involved in this specific reflex</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p>	6	3 x 1.1 3 x 2.1	<p>AO1 Demonstrate knowledge and understanding of scientific ideas of a reflex arc</p> <ul style="list-style-type: none"> Stimulus detected is by the receptor Electrical impulses Pass along sensory neurone to the relay neurone to the motor neurone to the effector/muscle Bypass the brain Fast/automatic <p>AO2 Apply knowledge and understanding of scientific ideas to the horse reflex.</p> <ul style="list-style-type: none"> Stimulus is the fly The receptors are in the skin The horse muscle/effector contracts Response is skin shivering <p>Maximum Level 1, 2 marks if reflex action goes to the brain</p>
			0 marks No response or no response worthy of credit.			

Q17. (2023)

8	D	1	2.1	
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Q18. (2023)

14	A	1	1.1	
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Q19. (2023) – 21b, 21c

A)

(b)	Person C ✓ Risk identified as dangers of following the diet ✓ Benefit identified that the diet helps overweight people reduce health issues ✓	3	3 x 3.1a	If answer is not person C then award 0 marks.
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B)

(c)	Any two from: Starch and sugar are both carbohydrates ✓ To test for starch, you need to use iodine test ✓ To test for sugar you need to use Benedict's test ✓	2	3.1b 2.2	AW potassium iodide If no other marks awarded allow sugar and starch test / iodine and benedict's test for one mark
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Q20. (2023)

A)

22	(a)	Correct comparison identified of the effectiveness/preventing pregnancies of a contraceptive method when used incorrectly ✓ Correct comparison identified of the effectiveness/preventing pregnancies of a contraceptive method when used correctly ✓ Correct comparison of the difference in effectiveness/preventing pregnancies of a contraceptive method when used incorrectly compared to correctly ✓ Correct use of data to describe one comparison ✓	4	2 x 3.1a 2 x 3.2a	ALLOW hormonal methods more effective than barrier methods when used incorrectly ORA ALLOW hormonal methods more effective than barrier methods when used correctly ORA If no marks awarded allow a correct comparison on the effectiveness (in preventing pregnancies) of the different contraceptive methods
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B)

(b)	Day 13 ✓ Ovulation has occurred/egg is released so fertilisation can happen ✓	2	3.1a 3.2a	ALLOW between day 12-15 ALLOW description of fertilisation
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C)

(c)	Uterus lining will not be maintained/will be shed/will not stay thick ✓	1	3.2a	ALLOW will not be able to support a pregnancy/ embryo will not be able to implant/will lose the baby/will miscarry/period happens
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Q21. (2024)

7	A	1	1.1	
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Q22. (2024)

15	A	1	1.1	
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Q23. (2024)

A)

19	(a)	From the top in a clockwise direction: Receptor ✓ Sensory (neurone) ✓ Relay (neurone) ✓ Motor (neurone) ✓ Effector ✓	5	5 x 2.1	DO NOT ALLOW more than 1 answer in each box
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B)

	(b)	Positive ✓ 1.0 ✓ Faster ✓	3	3 x 3.2b	DO NOT ALLOW more than one option chosen for each marking point ALLOW 1
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C)

	(c)	(i) Similarity: (They both) have a brain ✓ Difference: (Only the) human has a spinal cord OR Octopus does not have a spinal cord ✓	2	2 x 2.1	ALLOW eyes are close to the brain IGNORE spine alone
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D)

		(ii) Idea the nerve impulses do not have far to travel / takes less time for information to reach the brain/CNS ✓	1	2.1	ALLOW idea of response/reactions will be faster/quicker/take less time IGNORE reflexes IGNORE reference to speed of nerve impulses/electrical signals IGNORE send information from brain to eye
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