COMPONENT 1 - Concepts in Biology

FOUNDATION TIER

MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

Question				Marking details	Marks available					
					AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
1	(a)	(i)		Parents: XY XX (1) Sex cells: (X) Y X X (1) Children: (XX) XY (1) (accept YX)	3			3		
		(ii)		Female	1			1		
		(iii)		0.5		1		1	1	
	(b)	(i)		78		1		1		
		(ii)		Mitosis	1			1		
				Question 1 total	**5**	**2**	**0**	**7**	**1**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		$\frac{71}{500} = 0.142$		1		1		1
		(ii)		Chloroplast	1			1		
	(b)			$\frac{600}{17}$ (1) = 35.3 (1)		2		2	1	
				Question 2 total	**1**	**3**	**0**	**4**	**1**	**1**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			Glucose (1) Oxygen (1)	2			2		
	(b)	(i)		All 7 points plotted correctly **award 2 marks** 6 points plotted correctly **award 1 mark** Straight lines through centre of plots (1)		3		3	3	
		(ii)		Low in morning and evening (or specified hrs) (1) Peak around 14.00 (1) Lowering when less light available (1)			3	3		
	(c)			Carbon dioxide concentration Temperature pH	3			3		
	(d)			Measure light intensity (1) Take a reading at 20.00 / every hour / more frequently (1) Repeat on another day (1)			3	3		3
				Question 3 total	**5**	**3**	**6**	**14**	**3**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			A		1		1		
	(b)			D		1		1		
	(c)			C		1		1		
	(d)			A		1		1		
				Question 4 total	**0**	**4**	**0**	**4**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		Mutation	1			1		
		(ii)		Blocks / reduces uv light reaching skin (1) [excess] uv light increases chance of mutation (1)		2		2		
	(b)	(i)		121.5 + 2 862.7+ 2 797.0 (1) 5 781.2 (1)		2		2	2	
		(ii)		Most at risk/largest numbers (1) can reduce fertility/damage unborn baby (1)	1	1		2		
		(iii)		Survey all regions (1) over several years (1)			2	2		
				Question 5 total	**2**	**5**	**2**	**9**	**2**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			Any **two (×1)** from: 1 mark for each described adaptation (to a maximum of 2 marks) 1 mark for each adaptation in action (to a maximum of 2 marks) • large eyes/good eyesight; • to find/spot/hunt (prey); • large/strong/sharp beak; • to tear/rip meat/flesh/prey; • large/strong/sharp talons; • to catch/pounce/grip meat/flesh/prey;	2	2		4		
	(b)	(i)	I	24.0 + 9.0 + 5.0 + 18.0 + 7.0 + 2.0 (1) 100 – 65 = 35 (1)		2		2		
			II	Rats		1		1		
		(ii)		plants ➔ rabbits ➔ Red Kite 1 mark for correct names in correct sequence 1 mark for arrows (correct direction)		2		2		
	(c)	(i)		2 000 - 200 = 1 800 (1) $\left(\frac{1800}{200}\right) \times 100 = 900\%$ (1)		2		2	2	
		(ii)		Hunting reduced numbers to less than 100 (1) If not protected may become extinct in UK (1)			2	2		
	(d)			The numbers (of Red Kites) fell, so fewer rabbits eaten (1) so rabbit numbers grew / more survived / more reproduced (1)		1	1	2		
	(e)			Reduced biodiversity (1) Reduced habitat (1) Decreased food sources (1)			3	3		
				Question 6 total	**2**	**10**	**6**	**18**	**2**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			**Apparatus**: iodine and spotting tile (1) **Reason**: Iodine – because it is used to test for starch (1) Spotting tile – because the test is carried out in a test tube (biuret) / boiling tube (Benedict's) (1)	3			3		3
	(b)			**Indicative content:** **AO1 allocation** - Heat the water bath to a high temperature / 80 – 90 °C. Mix (equal volumes of) urine and Benedict's solution in a boiling tube and place in the water bath. If glucose present then you should observe a colour change from blue to brick red if there is a high concentration of glucose present or to green if there is a low concentration of glucose present. **AO2 allocation** - The test is qualitative / does not give numerical results / actual quantities / is not accurate. It relies on a colour change only which could be subjective. Testing urine may not give an actual measure of blood glucose levels. The concentration of glucose in the urine could be due to how badly the kidneys are damaged and not the blood glucose levels. **5 – 6 marks** : Gives a correct method for carrying out Benedict's test for glucose including the need to heat to a high temperature and the possible colour changes observed with high and low glucose levels in the urine. Explains that a diabetic needs to know accurate blood glucose levels to inject the correct amount of insulin. Explains that the test is qualitative and only shows presence or absence of glucose or at best a rough indication of glucose concentrations. Clear understanding of the subjective nature of the test and that the level of glucose in the urine may be affected by the health of the kidneys and not reflect actual blood glucose levels. *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The information included in the response is relevant to the argument.*	3	3		6		6

				3 – 4 marks: Describes how to carry out a Benedict's test including the need to heat to a high temperature. The expected colour change is described but only for high glucose levels. Explains the need for accurate blood glucose levels to be measured by a diabetic and understands that the test is subjective and therefore cannot give quantitative results. Effort made to relate urine glucose levels to possible kidney damage or an understanding that urine glucose levels may not reflect blood glucose levels. *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. Mainly relevant information is included in the response but there may be some minor errors or the inclusion of some information not relevant to the argument.* **1 – 2 marks**: A method for carrying out a Benedict's test is described with some errors, e.g. does not describe the need to heat or includes an imprecise colour change. A limited understanding that a diabetic needs to know accurate blood glucose levels ; that the test is subjective or that glucose levels in urine do not reflect blood glucose levels. *There is a basic line of reasoning which is not coherent, supported by limited evidence and with very little structure*. *There may be significant errors or the inclusion of information not relevant to the argument.* **0 marks:** *No attempt made or no response worthy of credit.*						
	(c)	(i)		Difficult to see the colour change			1	1		1
		(ii)		Risk of infection		1		1		1
				Question 7 total	**6**	**4**	**1**	**11**	**0**	**11**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)			Larger lumen/diameter (1) Thinner walls (1) Less muscle (1)	3			3		
	(b)	(i)		Thin walls / pores or gaps between cells / one cell thick	1			1		
		(ii)		Always greater concentration in the blood (than tissue fluid) (1) To allow for diffusion to take place (1)	2			2		
	(c)	(i)		Any **two (×1)** from: • oxygen • named nutrient / glucose / amino acids • Hormone / named hormone	2			2		
		(ii)		Any **two (×1)** from: • carbon dioxide • urea • hormone/ named hormone • water	2			2		
				Question 8 total	**10**	**0**	**0**	**10**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(a)	(i)		1	1			1		
		(ii)		Xylem correctly labelled (area above phloem)	1			1		
		(iii)		Arrow tail starting in xylem passes through spongy mesophyll space and out through a stoma Allow arrow to show symplastic as well as apoplastic transport		1		1		
	(b)			Water molecules move faster (have more energy) (1) more rapid loss of water/higher transpiration rate (1)	2			2		
				Question 9 total	**4**	**1**	**0**	**5**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10	(a)			Withdrawal	1			1		
	(b)			Sensory neuron from receptor in skin (1) To coordinator / spinal cord / relay neuron (1) To motor neuron to the effector in the arm (1)		3		3		
	(c)	(i)		$\frac{(0.22+0.27+0.23+0.23+0.27+0.22+0.25+0.24)}{8} = 0.241$ [s]		1		1	1	
		(ii)		She is correct (marks are awarded for reasoning) Measurements were to 2 decimal places therefore mean should be to 2 decimal places (1) The first three readings gave a mean of 0.24 (1) Additional readings did not improve this value (1)			3	3	2	
				Question 10 total	**1**	**4**	**3**	**8**	**3**	**0**

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SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	5	2	0	7	1	0
2	1	3	0	4	1	1
3	5	3	6	14	3	3
4	0	4	0	4	0	0
5	2	5	2	9	2	0
6	2	10	6	18	2	0
7	6	4	1	11	0	11
8	10	0	0	10	0	0
9	4	1	0	5	0	0
10	1	4	3	8	3	0
TOTAL	36	36	18	90	12	15