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

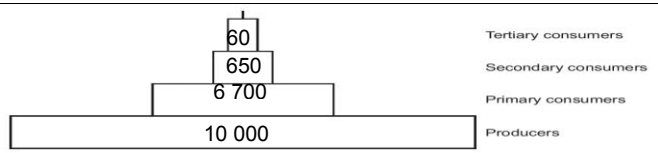
A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide 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 statement.

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)			Retina (1) A layer containing sensory cells sensitive to light (1) F (1) Lens (1)	4			4		
	(b)			Pupil <u>increases in diameter/ becomes larger/ widens</u> to allow more light in (1) Able to see objects (in the dark room)(1)	2			2		
				Question 1 total	**6**	**0**	**0**	**6**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		producers	1			1		
		(ii)		 All 4 correct = 2 marks 3 correct = 1 mark		2		2		
		(iii)		650/6700 x 100(1) 9.7%(1) **ecf** from (i)		2		2	2	
		(iv)		some lost in: respiration (1) waste (1)	2			2		
	(b)	(i)		Kestrels and snakes / shrews and spiders		1		1		
		(ii)		snakes		1		1		
		(iii)		Number of all species reduced **and** As all trophic levels depend on producers			1	1		
				Question 2 total	**3**	**6**	**1**	**10**	**2**	**0**

Question				Marking details	Marks available					
					AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
3	(a)	(i)		Soil animals are needed (for pollination / sexual reproduction)	1			1		
		(ii)		C (1) E(1)			2	2		
	(b)			Rapid spread /multiplication in the forest (1) Using less energy than flowering/ for sexual reproduction (1)		2		2		
				Question 3 total	**1**	**2**	**2**	**5**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	I	2500 – 1125 (1) = 1375(1)		2		2	2	
			II	Improved hygiene/improved living conditions/improved water quality		1		1		
		(ii)		Number of cases increases **and** While death rate falls			1	1		
		(iii)		Incidence fell and remained low 1960 onwards			1	1		
	(b)			Overuse / over-prescription /poor hygiene /cross-contamination among patients		1		1		
				Question 4 total	**0**	**4**	**2**	**6**	**2**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		19	1			1		
		(ii)		38	1			1		
	(b)	(i)		All **A** matched with **T** (1) All **C** matched with **G** (1) All shapes complementary (1)	3			3		
		(ii)		Nucleotide (anywhere) correctly indicated	1			1		
		(iii)	I	Species 2 (1) Fewest bases are different (1)			2	2		
			II	Compare the genetic profiles of species 1, 2 and 3 (1) The more closely related, the more similarities in banding (1)	2			2		
				Question 5 total	**8**	**0**	**2**	**10**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Oxygen (1) Glucose (1)	2			2		
		(ii)	I	Chloroplast	1			1		
			II	Chlorophyll absorbs light (1) Light needed for photosynthesis (1)	2			2		
	(b)	(i)	I	Rate increases, then plateaus and then decreases (1) Ref to highest rate at 25 °C-30 °C (1)		2		2		
			II	increase then plateau (1) Ref to plateau from 0.08% (1)		2		2		
		(ii)		Temp 24 °C , CO_2 0.04% (1) Highest rate of photosynthesis (1) Above this extra cost (electricity /resources) no extra yield (1)			3	3		
				Question 6 total	**5**	**4**	**3**	**12**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)		Chalk hill blue **and** 55% (1)		1		1	1	
		(ii)	I	256 x 2 = 512		1		1	1	
			II	$\frac{150}{0.75}$ (1) 200 (1)		2		2	2	
		(iii)		Become extinct [in the wild] (1) Biodiversity decreased (1) Numbers of different species / variety of species reduced (1)		2	1	3		
	(b)	(i)		Plant hedges/trees/set aside /encourage growth of wild flowers / environmental stewardship		1		1		
		(ii)		Reference to legislation to protect environment		1		1		
	(c)	(i)		Regular monitoring (1) Repeated counts (1)			2	2		2
		(ii)		Larger number of species			1	1		1
	(d)			Weed/flowers plants provide food (1) Insecticides kill [endangered] butterflies(1)		2		2		
				Question 7 total	**0**	**10**	**4**	**14**	**4**	**3**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)			2 x 2 x 2 (1) 8(cm^3) (1)		2		2	2	
	(b)			Correct scale 0-50 in 10 divisions (1) Correct plots (tolerance ½ small square) All 6 correct = 2 marks 5 correct = 1 mark Line and label (1)		4		4	4	4
	(c)	(i)		As pH rises the activity increases then decreases		1		1		1
		(ii)		7.0 – 8.0 and pH corresponding to greatest activity		1		1		1
		(iii)		No intermediate values		1		1		1
		(iv)		24 - 13 = 11 (1)		1		1	1	
		(v)		Increased temperature gives increased movement of molecules (1) Increased chance of collisions (1) **Alternative answer** The protease works faster at higher temperatures(1) Up to its optimum(1)		2		2		
	(d)			Confirms results are due to enzyme activity and not other factors	1			1		1
				Question 8 total	**1**	**12**	**0**	**13**	**7**	**8**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(a)			A = aerosol transmission / bacteria carried in droplets of mucus/ saliva and breathed in (1) use of tissues / washing hands after sneezing etc (1) B = insect bite transmitting bacteria while feeding (1) use of insect repellents / nets while sleeping / long sleeves (1) C = undercooked meat – temperature not high enough to kill bacteria OR food kept warm at temperatures that don't kill bacteria (1) cook meat thoroughly / check temperature using meat thermometer before eating / don't keep food warming at too low a temperature (1)	6			6		
	(b)			**Indicative content:** *Bacterium X* antibiotic A is the most effective (AO3) as it has the widest zone of killed bacteria (AO2) *Bacterium Z* both antibiotics A and C could be used (AO3) antibiotic C slightly better as larger zone of killed bacteria (AO2) *Bacterium Y* cannot be treated using the antibiotics tested (AO3) as no bacteria killed by any of the antibiotics (AO2) bacteria could be resistant (AO3)		3	3	6		6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(b)			**5-6 Marks** Correct identification of the most effective antibiotic against bacteria X and Z with correct reasons given. Identifies that Y cannot be treated using antibiotics A, B, C or D and supports answer with correct reason. Suggests that Y may be resistant to antibiotics. *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.* **3-4 Marks** Correctly identifies A as being most effective against both X and Z correctly and supports identification with correct reasons. Recognises that C is slightly more effective than A at killing Z and identifies that Y is not affected by any of the antibiotics. Does not recognise that Y may be resistant to antibiotics. *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** Identifies that X and Z are most affected by A and C respectively and that Y is not affected by any of the antibiotics but does not support answers with correct reasons. *There is a basic line of reasoning which is not coherent, largely irrelevant, 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*						

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(c)			repeated experiment using more plates of each bacterium (1) investigated using different concentrations of antibiotics (1)			2	2		2
				Question 9 total	**6**	**3**	**5**	**14**	**0**	**8**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10	(a)			Cross the rose with large red flowers and thorns with the rose with small red flowers and few thorns (1) Grow seeds and select those with largest red flowers and fewest thorns and self-fertilise them (1) Grow seeds and select again those with largest red flowers and fewest thorns. Continue this process until all plants have large red flowers and few thorns.(1)		3		3		
	(b)	(i)		They have the same genotype/same genes/clones	1			1		
		(ii)		No potentially advantageous variation/resistance to disease (1) Could spread a harmful mutation (1)	2			2		
	(c)			Correct gametes Rr x Rr (1) Correct outcome: RR Rr Rr rr (1)		2		2		
				Question 10 total	**3**	**5**	**0**	**8**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
11	(a)			First row: Relaxes and fills with blood (1) Open (1) Closed (1) Second Row: Contracts to force blood through aorta (1) Closed (1) Open (1)	6			6		
	(b)			Ventricles have more muscle in walls (1) to force/pump blood a greater distance (1)	2			2		
				Question 11 total	**8**	**0**	**0**	**8**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
12	(a)	(i)		A: Muscle contracts (1) B: Hair becomes erect (1) Air movement over skin reduced to reduce heat loss (1)	3			3		
		(ii)	I	Vessels widen/increase diameter so more blood flow near skin surface (1) More heat radiated/loss (from surface) (1)	2			2		
			II	Less/ no evaporation of sweat possible (1) So less heat loss from skin (1)	2			2		
	(b)	(i)		Exercise linked to increased sweating in both (1) Increase is less in athletic/ trained people (1)			2	2		
		(ii)		(0.6-0.5)/0.5 x100 (1) 20% (1)		2		2	2	
		(iii)		Males reach higher body temperature / Return to normal temperature more quickly(than females)			1	1		1
		(iv)		Faster cooling in males is accompanied by higher rates of sweating during exercise			1	1		1
		(v)		Ensure all of same age/ take reading at same body part			1	1		1
				Question 12 total	**7**	**2**	**5**	**14**	**2**	**3**