
BIOLOGY**5090/21**

Paper 2 Theory

October/November 2017

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives
()	contents of brackets are not required but should be implied
R	reject
A	accept (for answers correctly cued by the question, or guidance for examiners)
lg	ignore (for incorrect but irrelevant responses)
AW	alternative wording (where responses vary more than usual)
AVP	alternative valid point (where a greater than usual variety of responses is expected)
ORA	or reverse argument
<u>underline</u>	actual word underlined must be used by candidate
+	statements on both sides of the + are needed for that mark

Question	Answer	Marks	Guidance
1(a)	B ; <u>incisor</u> ; biting / cutting / tearing / gripping ; C ; <u>molar</u> ; chewing / crushing / grinding ;	6	R pre-molar
1(b)(i)	sugar ; bacteria ; respiration ; acid ; plaque ;	2	A named sugar, lg sweets
1(b)(ii)	reference to brushing ; flossing ; fluoride ; reference to dental check-ups ;	2	A fluorine

Question	Answer	Marks	Guidance
2(a)(i)	P renal artery ; Q renal vein ;	2	
2(a)(ii)	<u>urine</u> ; <u>ureter</u> ; <u>bladder</u> ; <u>urethra</u> ;	4	R urea
2(b)(i)	reference to artery + vein ;	1	
2(b)(ii)	lower pressure ; less / no urea ; reference to increase / decrease + concentration of ions AW ;	1	
2(c)	<i>(artificial membrane)</i> partially permeable AW ; small molecules or named + pass through (membrane) ; correct reference to diffusion / osmosis ; proteins do not pass through (membrane) ; <i>(dialysis fluid)</i> no / low urea OR removes urea ; reference to concentration gradient ; same glucose concentration + as normal blood ; same ion AW concentration + as normal blood ;	5	

Question	Answer	Marks	Guidance
3(a)(i)	food chain ;	1	
3(a)(ii)	<u>tree</u> ; songbird / hawk ;	2	A named tree
3(b)(i)	doesn't hit leaves / tree OR intercepted by other objects ; reflected (off leaves) ; not used in photosynthesis ;	2	
3(b)(ii)	movement / flight ; excretion ; egestion / faeces ; sound / singing ; heat / maintaining body temp / warm blooded ; respiration ; hawk doesn't eat / digest all of songbird(s) OR songbird(s) decay(s) ;	3	
3(c)	more food produced ; comparative data manipulation ; fewer levels in food chain AW ; correct reference to herbivore / carnivore + human ; correct reference to primary / secondary + consumer ; less energy lost / more efficient ; example of energy not lost (e.g. through movement) ORA ;	5	A quote from Fig. 3.2 (e.g. 12 000 loaves vs. 1200 portions of meat) A 25× more mass / 10× more food products (for wheat)

Question	Answer	Marks	Guidance
4(a)	red blood (cell) / erythrocyte ; oxygen + carriage / transport / absorption AW ;	2	
4(b)	tiredness / fatigue / weak / dizzy / faint ; inability to exercise / exert / inactive ; breathing problems ; reduced oxygen transport ; reduced respiration ; reduced energy (release) ; irregular menstruation AW ;	4	
4(c)	low <u>water</u> potential / concentration inside cell ; water enters ; by osmosis / diffusion ; cell expands ; cell bursts ; reference to no cell wall ;	3	

Question	Answer	Marks	Guidance
5	<p>(fruit A) hooks / spikes AW ; on animal / fur ; falls off / rubbed off / leaves animal AW ;</p> <p>(fruit B) edible / eaten / food ; colour / taste / juicy / sweet ; thrown away / discarded / faeces / egested AW ;</p> <p>(for A or B) new location / away from parent plant ;</p>	5	R feathers / hairs

Question	Answer	Marks	Guidance
6(a)(i)	<u>shaded</u> circle drawn in iris + <u>smaller</u> than in 6.1(a) ;	1	
6(a)(ii)	iris + muscle ; circular + contract ; radial + relax ; pupil ; constricts AW ;	5	
6(b)	<p>(type of action) reflex / involuntary ;</p> <p>(why the changes take place) protection / prevent damage ; reduces light (entering) ; retina / rods / cones / photoreceptors ;</p>	4	

Question	Answer	Marks	Guidance
7(a)(i)	<p>(W) fungus / microorganism / bacteria / nutrient / yeast / water ;</p> <p>(X) <u>carbon dioxide</u> ;</p> <p>(Y) <u>oxygen</u> ;</p> <p>(Z) antibiotic / named antibiotic ;</p>	4	
7(a)(ii)	<p>respiration ; aerobic ; reference to increased yield ; sparger / bubbles / more surface area ; growth ;</p>	2	
7(b)	<p>detect changes ; enzymes ; denature ; reduce rate of reaction / product formed ; kill microorganisms or named ; maintain optimum / best conditions ;</p>	3	
7(c)	<p>heat production / temperature ; ease of maintenance ; prevents water damage to motor ; doesn't take up space (in fermentation vessel) AW ;</p>	1	

Question	Answer	Marks	Guidance
8(a)	active + more energy ; reference to carbohydrates / fats ; child AW + growth ; reference to protein / calcium / vitamin D ; (post-pubertal AW) female + iron ; reference to menstrual loss of blood ; old person + less growth / less active / no menstruation ; reference to reduced need for correct named nutrient ;	4	marks are linked in pairs
8(b)	muscle + wall ; contracts / churn / mechanical digestion ; acid ; optimum AW pH ; enzyme ; protease / pepsin ; protein(s) ; to amino acids / (poly)peptides ;	6	answer must refer to the stomach and not other parts of the alimentary canal

Question	Answer	Marks	Guidance
9(a)	hypothalamus ; reference to detecting blood temperature ; receptors ; in skin ; detect temperature + of surroundings AW ; impulse ; sensory neurone ; to central nervous system / brain / spinal cord ; motor neurone ; <u>effector</u> ; named effector ; shiver / vasoconstriction or vasodilation / sweat increase or decrease ; reference to negative feedback ;	6	<p>A muscle or named effector / sweat gland</p>
9(b)	correct named situation ; target organ / named ; <i>(any two effects from)</i> glycogen to glucose / sugar ; increased (heart) rate ; pupils dilate ; dry mouth ; breathing rate change ; diversion of blood to muscle / from gut ;	4	<p>increased heart rate = 2 marks (named target organ + effect)</p>