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**BIOLOGY**

**5090/21**

Paper 2 Theory

**October/November 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

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Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives
()	contents of brackets are not required but should be implied
<b>R</b>	reject
<b>A</b>	accept (for answers correctly cued by the question, or guidance for examiners)
<b>Ig</b>	ignore (for incorrect but irrelevant responses)
<b>AW</b>	alternative wording (where responses vary more than usual)
<b>AVP</b>	alternative valid point (where a greater than usual variety of responses is expected)
<b>ORA</b>	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)	<p><b>B</b> ; <u>incisor</u> ; biting / cutting / tearing / gripping ;</p> <p><b>C</b> ; <u>molar</u> ; chewing / crushing / grinding ;</p>	<b>6</b>	<b>R</b> pre-molar
1(b)(i)	<p>sugar ; bacteria ; respiration ; acid ; plaque ;</p>	<b>2</b>	<b>A</b> named sugar, <b>lg</b> sweets
1(b)(ii)	<p>reference to brushing ; flossing ; fluoride ; reference to dental check-ups ;</p>	<b>2</b>	<b>A</b> fluorine

Question	Answer	Marks	Guidance
2(a)(i)	<b>P</b> renal artery ; <b>Q</b> renal vein ;	2	
2(a)(ii)	<u>urine</u> ;  <u>ureter</u> ; <u>bladder</u> ; <u>urethra</u> ;	4	<b>R</b> urea
2(b)(i)	reference to artery + vein ;	1	
2(b)(ii)	lower pressure ; less / no urea ; reference to increase / decrease + concentration of ions <b>AW</b> ;	1	
2(c)	<i>(artificial membrane)</i> partially permeable <b>AW</b> ; 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 <b>OR</b> removes urea ; reference to concentration gradient ; same glucose concentration + as normal blood ; same ion <b>AW</b> 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 <b>OR</b> 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) <b>OR</b> songbird(s) decay(s) ;	3	
3(c)	more food produced ;  comparative data manipulation ;  fewer levels in food chain <b>AW</b> ; 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) <b>ORA</b> ;	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 <b>AW</b> ;	<b>2</b>	
4(b)	tiredness / fatigue / weak / dizzy / faint ; inability to exercise / exert / inactive ; breathing problems ; reduced oxygen transport ; reduced respiration ; reduced energy (release) ; irregular menstruation <b>AW</b> ;	<b>4</b>	
4(c)	low <u>water</u> potential / concentration inside cell ; water enters ; by osmosis / diffusion ; cell expands ; cell bursts ; reference to no cell wall ;	<b>3</b>	

Question	Answer	Marks	Guidance
5	<p>(fruit A) hooks / spikes <b>AW</b> ; on animal / fur ; falls off / rubbed off / leaves animal <b>AW</b> ;</p> <p>(fruit B) edible / eaten / food ; colour / taste / juicy / sweet ; thrown away / discarded / faeces / egested <b>AW</b> ;</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 <b>AW</b> ;	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><b>(W)</b> fungus / microorganism / bacteria / nutrient / yeast / water ;</p> <p><b>(X)</b> <u>carbon dioxide</u> ;</p> <p><b>(Y)</b> <u>oxygen</u> ;</p> <p><b>(Z)</b> antibiotic / named antibiotic ;</p>	<b>4</b>	
7(a)(ii)	<p>respiration ; aerobic ; reference to increased yield ; sparger / bubbles / more surface area ; growth ;</p>	<b>2</b>	
7(b)	<p>detect changes ; enzymes ; denature ; reduce rate of reaction / product formed ; kill microorganisms or named ; maintain optimum / best conditions ;</p>	<b>3</b>	
7(c)	<p>heat production / temperature ; ease of maintenance ; prevents water damage to motor ; doesn't take up space (in fermentation vessel) <b>AW</b> ;</p>	<b>1</b>	

Question	Answer	Marks	Guidance
8(a)	<p>active + more energy ; reference to carbohydrates / fats ;</p> <p>child <b>AW</b> + growth ; reference to protein / calcium / vitamin D ;</p> <p>(post-pubertal <b>AW</b>) female + iron ; reference to menstrual loss of blood ;</p> <p>old person + less growth / less active / no menstruation ; reference to reduced need for correct named nutrient ;</p>	4	marks are linked in pairs
8(b)	<p>muscle + wall ; contracts / churn / mechanical digestion ; acid ; optimum <b>AW</b> pH ; enzyme ; protease / pepsin ; protein(s) ; to amino acids / (poly)peptides ;</p>	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 <b>AW</b> ; 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 ;	<b>6</b>	<p><b>A</b> 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 ;	<b>4</b>	<p>increased heart rate = 2 marks (named target organ + effect)</p>