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Cambridge Ordinary Level

MARK SCHEME for the May/June 2015 series

5090 BIOLOGY

5090/21 Paper 2 (Theory), maximum raw mark 80

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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)
Ig	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
underline	actual word underlined must be used by candidate (grammatical variants excepted)
max	indicates the maximum number of marks that can be given
+	statements on both sides of the + are needed for that mark

Question	Expected answers	Additional guidance	Marks
1 (a) (i)	sweat gland labelled ; capillary labelled ;	**R** sweat duct	[2]
(b)	warmer ;	must be a comparative statement	[1]
(c) (i)	sweat (present in **B / ORA**) ; capillaries carry more blood (in **B / ORA**) ; capillaries wider / dilated (in **B / ORA**) ;	 **Ig** constrict / shrink	[max 2]
(ii)	evaporation (of sweat) ; more blood near (surface of) skin ; increased heat loss / cooling ; allows regulation of temperature / prevents overheating ;		[max 3]
			[Total 8]
2 (a) (i)	(750/5800) *100 ; 12.9 / 13 (%) ;		[2]
(ii)	renal artery ;		[1]
(iii)	600 ;		[1]

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Question	Expected answers	Additional guidance	Marks
(b)			[max 4]
	heart ;		[1]
	skeletal muscle ;		[1]
	for above named parts ref. supply of more oxygen / glucose ; ref. increased (aerobic) respiration / prevent anaerobic respiration ; remove lactic acid (for skeletal muscle only) ; ref. contract harder / faster ; skin ; increased heat loss ;		[max 2]
(c)	less blood to digestive organs ; less digestion ; less / slower absorption of products of digestion ;	**A** ref. active transport in digestive system	[max 2]
			[Total 10]
3 (a)	amniotic ; prevents physical harm / damage to fetus ;		[2]
(b) (i)	placenta correctly labelled ;		[1]
(ii)	exchange / passage in correct direction of + nutrients / named ; + gases / named ; + excretory products / named ; + antibodies ; ref. prevent mixing of maternal and fetal blood ;		[max 2]

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Question	Expected answers	Additional guidance	Marks
(c)	male ; presence of Y (chromosome) ;	 **R** gene	[2]
(d) (i)	one extra chromosome / trisomy / three not two / 47 not 46 ; position / pair 21 ;		[2]
(ii)	Down's syndrome ;		[1]
			[Total 10]
4 (a)	externally administered ; substance ; modifies / affects chemical reactions in body ;		[max 2]
(b)	brain ; / depressant ; liver ; / ref. damage ;	**A** named parts of brain **A** named, e.g. cirrhosis / liver failure / fatty liver disease	[4]
(c) (i)	nicotine ; tar ; carbon monoxide ;		[max 2]
(ii)	reduced birth weight ;	**A** premature birth / breathing problems	[1]
			[Total 9]
5 (a) (i)	producer / 1st / 1 ; (primary) consumer / herbivore / 2nd / 2 ; nitrogen / N ;		[3]
(ii)	plant releases oxygen ; fish uses this (oxygen) for (aerobic) respiration ; lay eggs on weed / provides cover / nesting ; appropriate explanation for above point ;		[max 2]

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Question	Expected answers	Additional guidance	Marks
(b) (i)	(X) decomposition ; (Y) nitrification ;	**Ig** excretion **A** ammonification	[2]
(ii)	bacteria ;	**R** named bacteria	[1]
(iii)	active transport ; ref. use of energy (if active transport given) ; diffusion ; correct ref. concentration gradient ; ref. roots ;		[max 3]
(c)	eutrophication ; better growth of plants ; more food for fish ; increased decay (of plants / waste products of fish) ; increased numbers of bacteria ; more oxygen used / ref. (bacteria) respiration ; ref. death of fish / animals ;		[max 2]
			[Total 13]
6 (a)	villus / villi ; small intestine / ileum ;		[2]

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Question	Expected answers	Additional guidance	Marks
(b)	increased surface area ; many / good supply + capillaries / blood ; lacteal ; absorption ; *two marks for* two correctly named absorbed products ;; one cell thick / thin walls ; reduced distance / increased speed of molecular movement **AW** ; diffusion ; active transport ; goblet cells ; mucus + lubricate **AW** ; production / release + enzymes; ref digestion + named products ;		[max 8]
			[Total 10]
7 (a) (i)	in palisade ; spongy ; ref. more in palisade ; none in epidermis / xylem / phloem / vein / transparent epidermis ; near leaf surface / (sun)light / to absorb more or most sunlight ; rapid **AW** rate of photosynthesis ; guard cells ; controlling stomata ;	**A** exposed to **A** with ref. either distribution or number	[max 4]

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Question	Expected answers	Additional guidance	Marks
(ii)	CO_2 ; O_2 ; correct ref. to photosynthesis or respiration ; diffusion ; *(stomata):* allow water vapour out / transpiration ; *(mesophyll cells):* moist surface ; large surface area ;		[max 3]
(b)	xylem **+** phloem ; around edge of stem ; centre of root / description of arrangement ; many xylem (stem) + one xylem (root) ; phloem and xylem paired in stem / unpaired in root ;	**A** in vascular bundles in stem	[max 3]
			[Total 10]
8 (a)	example named ; large surface area ; related adaptation, e.g. wing, air bladder, etc. ; allows plant to colonise new areas ; reduces competition ;	 **A** feathery, hairy **A** transport away from parent plant	[5]

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Question	Expected answers	Additional guidance	Marks
(b)	water ; softening testa / seed coat ; activation of enzymes ; solvent ; oxygen ; ref. respiration* ; energy (for germination / growth)* ; suitable temperature ; ref. enzyme / named enzyme action ; break down food store ; ref. respiration* ; energy (for germination / growth)* ;	* award only once, either for oxygen or temperature	[max 5]
			[Total 10]
9 (a)	correct ref. diffusion in any section ; *temperature* rate increases ; increased evaporation (of water) ; from surface of mesophyll cells ; ref. (diffusion) gradient* ; ref. kinetic energy / molecules move faster ; *light intensity* rate increases ; more stomata open / stomata open wider ; increased surface area for water loss ; *humidity* rate decreases ; ref. (diffusion) gradient* ;	**R** guard cells open **Ig** water alone	[max 7]

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Question	Expected answers	Additional guidance	Marks
(b)	to bring water / salts ; from roots to leaves / up the stem ; for photosynthesis ; cool leaf / plant ;	**A** nutrients	[max 3]
			[Total 10]

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