CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2013 series

5090 BIOLOGY

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

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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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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)
- **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

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Question	Mark Scheme	Mark	Clarification
1 (a) (i)	label line must touch the sweat gland;	[1]	**A** label on gland or duct **A (i) = gland**
(ii)	label line must touch some part of receptor under Malpighian layer;	[1]	**(ii)** = temp receptor
(b) (i)	(temperature / it) increases / rises;	[1]	**R** cooler / decreases OWTTE
(ii)	In either order: sweat; wider blood vessels / capillaries / more blood;	[2]	**R** veins
(c) (i)	arteriole; the upper horizontal blood vessel labelled;	[2]	**A** Artery (the word – ignore what is labelled) (ignore name given to it)
(ii)	less blood (flows); to capillaries (R capillaries constrict) to sweat glands; blood carries heat / less heat carried less heat lost by skin / radiation ; less sweat produced; ref to latent heat of vaporisation;	[max 4]	**A** less heat lost by blood
		[Total 11]	

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2 (a) (i)	antagonistic;	[1]	
(ii)	one muscle contracts; while the other relaxes; muscles can only contract / only pull / never push; one muscle causes a change, the other restores the position AW; e.g. so the action can be reversed.	[max 3]	**A** for max 1 muscles can contract + relax **A** oppose one another
(iii)	ciliary muscle / sphincter muscle or any named / heart / diaphragm;	[1]	
(b)	*In either order* : hinge + elbow / position described; ball and socket + shoulder / position described;	[2]	**A** any correct, the two listed are on the syllabus
(c)	ball + on scapula / shoulder blade; socket + on humerus normally the other way round / the reverse of normal;	[3]	
		[Total 10]	

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3 (a)	water + any part of the alimentary canal after the oesophagus; ions / minerals / named + ileum; vitamins / named + ileum / colon <u>glucose + ileum</u>	[max 2]	**A** small intestine for ileum
(b)	fibre / roughage / cellulose / fruits / seeds / tomato skins / maize pericarps;	[1]	**A** any suitable named plant part
(c)	products drawn in correct absorptive vessel – All correct = 2 marks 2 correct = 1 mark ;; all molecules totally digested ; 2 products correctly named ;	[max 4]	**I** any diagrams in the intestine **R** any products drawn in both capillaries and lacteals All bonds must be broken – a minimum of 3 products of each type required.
(d) (i)	amino acids; glucose/ other named monosaccharide; vitamins / named; ions / salts / minerals / named; water;	[max 3]	
(ii)	in solution; in blood / plasma; by (hepatic) <u>portal vein;</u>	[max 2]	
		[Total 12]	

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4	(a)	Carbon dioxide / CO_2; carbon monoxide / CO; soot / particulates / carbon;	[max 2]	
	(b)	water present in soil; absorbed by root; ref xylem; lost to atmosphere + from leaves / aerial parts or ref to evaporation / transpiration / diffusion ; released / produced from respiration (or described);	[max 3]	**A** ground, ref to water table **A** forms clouds AW + water vapour released
	(c)	*(the cow)* excretion; urea; ref to faeces ; decomposition ref to nitrification; (max.3) *(the factory)* oxides of nitrogen or named; dissolved (in rainwater) / ref to acid rain ;	[max 4]	**A** other named nitrogen excretory products. **I** urine **A** forms ammonia , nitrite, nitrate **I** names of bacteria **R** refs to denitrification and nitrogen fixation
			[Total 9]	

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5 (a) (i)	light / chlorophyll / water;	[1]	
(ii)	any temperature <u>with units</u> between 15°C and 29°C; any 2 from: ref. to enzymes; work slower at lower temps / below optimum ref to less kinetic energy / collisions AW; plant has slower (metabolic) rate AW;	[1] [max 2]	 **A** reduces the rate **A** slower rate of photosynthesis
(b)	light intensity AW; stomata open / allow CO_2 to enter; supplies light <u>energy</u> for photosynthesis; plants do not photosynthesise in the dark; increase in light increases photosynthesis (rate);	 [4]	
		[Total 8]	

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6	(a)	support / rigidity; lignin; conduct/transport of water; ions / minerals / salts; ref to narrow/hollow/continuous / lumen; from roots(hair) + ref to any aerial part of plant;	[max 3]	**R** transport of amino acids / sugars
	(b)	ref enzyme / named enzyme; action of enzyme ; named product of enzyme action; ref to solubility of product diffusion(from storage cells to phloem or vice –versa); to phloem; sucrose/amino acids (moved up phloem) ; ref translocation/transport up stem; no photosynthesis at night ; (energy) released during respiration; sugar provides energy for growth; amino acids make proteins; to make new cytoplasm / cells;	[max 7]	**A** amino acids / glucose / sugar **R** produced
			[Total 10]	

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7 (a)	*ref. to <u>against</u> concentration gradient; **A** a description *(plants) any 2 from*: minerals / ions / salts; from soil; via root hairs; *(humans) any 2 from*: glucose; from gut; via villi ;	[max 4]	*credit once only, under plants or humans,
(b) (i)	movement of <u>molecules / particles / ions;</u> high concentration to low;	[2]	
(ii)	ref. crossing a membrane ; thin; oxygen in (to cell) ; glucose in (to cell) ; carbon dioxide out (of cell) ;	[max 4]	**A** ref to entering named plant or animal cell Allow 1 mark for O_2 in + Co_2 out - if only refer to gases in the lungs.
		[Total 10]	

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8 (a)	cell division; ref. to chromosomes; diploid to haploid; gamete formation/ named gametes; all gametes genetically different; fertilisation restores chromosome number / AW; leads to variation in population;	[max 4]	**A** halving of chromosome number
(b)	name of fruit / seed (not linked to following marks); structural feature of fruit/seed that is a wind-dispersal adaptation; ref. large surface area / buoyancy; *wind removes fruit / seed from parent plant; *seed relatively light in mass; *to delay descent of seed AW; spread over large area / prevent overcrowding / competition ;	[max 6]	Accept * points for descriptions of pollen for max 3 e.g. floats for long time / increases air resistance
		[Total 10]	

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9	(a)	ref. to an ecosystem / food chain / web; total number v. total mass of organisms (at each trophic level); biomass pyramids usually pyramid-shaped; numbers pyramids variable in shape pyramid of numbers takes no account of size/mass of organism) AW;	[max 3]	**A** on a diagram with all trophic levels credibly named. **A** clear diagrams with correct shape **A** clear diagrams with non-pyramidal shape
	(b)	*(energy gained)* by photosynthesis in plants / producers; from (sun)<u>light</u>; correct ref. light energy + chemical energy; eaten by animals; named food molecule consumed AW; *(energy lost)* as heat; electrical / nerve impulses; growth / reproduction; movement / muscle contraction; excretion;	[max 7]	
			[Total 10]	

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