#### UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education O Level

### MARK SCHEME for the June 2005 question paper

#### **5090 BIOLOGY**

5090/02 Paper 2 (Theory), maximum mark 80

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

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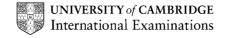
## GCE O Level

# MARK SCHEME

**MAXIMUM MARK: 80** 

**SYLLABUS/COMPONENT: 5090/02** 

BIOLOGY Paper 2 (Theory)



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## Section A

1	(a)	(i)	plants/plausible named plant (R anything obviously not a water plant also R sea weed)	;	
		(ii)	herbivore/consumer/2 <sup>nd</sup> (trophic level) (R named)	;	[2]
	(b)		fertiliser/nitrates/salts/ions/CO <sub>2</sub> /sewage/nutrients/manure (A minerals, ignore warm water, mark first in list) used for amino acids for P/S AW (if CO <sub>2</sub> or HCO <sub>3</sub> ) proteins rapid AW growth (R growth unqualified) greater reproductivity AW/population increases	;	[max: 4]
	(c)		bacteria + decomposition/feed on <u>dead</u> plants or animals bacterial population increases + <u>plant</u> population decreases	;	[2]
	(d)		B - C line must rise to begin with $C \rightarrow$ line must finish lower than it started and above arrow head (R line touching or crossing x axis)	; ; [To	[2] otal: 10]
2	(a)		F, I, J (mark first 3) G, H (mark first 2)	;	[2]
	(b)	(i)	<ul> <li>(H) stigma + to catch pollen/ovary + to hold ovule (A female gamete)/seed;</li> <li>(A carpel/gynoecium/pistil)</li> <li>(I) petal/corolla + to attract insect/landing platform</li> <li>(J) stamen + to produce AW pollen/male gametes</li> <li>(A pollen sac/anther + filament or androecium)</li> </ul>	· , , , , , , , , , , , , , , , , , , ,	[3]
		(ii)	large surface area/sticky/hairy/feathery maximum AW + collection of pollen	•	[2]
	(c)		line plus label L pointing to stigma on either F or H (R more than one line unless both correct, A line to J if identified as stigma in <b>(b)</b> )	;	[1]
	(d)		('It' = the pollen grain) haploid AW/diploid AW/different no. of chromosomes (correct ref. to) (ignore any stated numbers)	;	
			gamete/male contribution AW/ref. reproduction/meiosis or/not involved in reproduction/part of adult plant/mitosis	;	[2]
				[To	otal: 10]

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3	(a)	(i)	(palisade) 1 cell drawn, correct shape and position and labelled	•
		(ii)	(spongy) 1 cell drawn, correct shape and position and labelled	;
		(iii)	2 guard cells drawn in (lower) epidermis and labelled (R label to stoma)	;
		(iv)	(cuticle) shown as thin acellular layer and labelled (A cuticle on upper or lower epidermis, R if it crosses stoma) (max: 2 marks if no labels)	; <b>[4]</b>
	(b)		xylem correctly indicated on Fig. 3.1 <a href="mailto:xylem">xylem</a> - the name ( A even if incorrectly labelled)	; ; <b>[2]</b>
	(c)		greater concentration in the atmosphere water molecules loss of gradient AW slow(er)/less evaporation slow(er)/less diffusion	; ; ; ; [max:3]
	(d)		(Mark the first, but ignore waterproof) make cuticle protects photosynthesising or otherwise qualified cells transparent/light entry	; ; ; [max: 1]
				[Total: 10]
4	(a)		(O) WBC/phagocyte AW (R lymphocyte or other BI) (A polymorph/macrophage/cell membrane) (P) capillary	; ; [2]
	(b)		('It' = the blood vessel) any two from : walls + very thin/one cell thick microscopic/narrow/small bore/allow RBCs only in single file walls leaky/permeable AW/allow substances to pass through (or named, A phagocytes AW)	
			slow blood flow	; [max: 2]
	(c)	(i)	M - WBC/lymphocyte + antibodies clumping AW (of bacteria)	; ; <b>[2]</b>
		(ii)	N - engulfing/ingesting/phagocytosis (R digesting)	; [1]
	(d)		action of platelets fibrinogen to fibrin clotting trapping of RBCs stopping bleeding prevention of further bacterial entry reproduction/growth of skin cells AW	; ; ; ; ; ; [max. 4] [Total: 11]

F	Page	3	Mark Scheme	Syllabus	Pap	er
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5	(a)	(i)	insulin (if wrong hormone, allow ecf* for (ii) - 1 mark	only) ;		
		(ii)	pancreas labelled (line must touch or enter gland) [+*] (1 mark max. if more than one organ is nam and labelled so long as one is the pancrea		;	
			pancreas named (A even if incorrectly labelled) (A islets of L)	,	;	
		(iii)	any <u>two</u> (allowing ecf from either (i) or (ii) if applicab amylase, protease, lipase, alkali/salts, glucagons/CC (A enzymes, pancreatic juice, but not with			
			named enzyme or juice constituent)		;;	[5]
	(b)	(i)	bacterium/E.coli		;	[1]
		(ii)	gene/sequence AW of bases for insulin/hormone production		· ·	[2]
	(c)		enzyme or named e.g. endonuclease(s), lingase(s)/o	catalyst	;	[1]
					[To	tal: 9]
			[Maximum	mark for Se	ection A	<b>A</b> : 50]
			Section B			
6	(a)		(ref. to 'It' should be taken to refer to the first in each no energy required in diffusion/diffusion is passive energy required in active transport ref. down a concentration gradient AW in diffusion	pair)	· , , , , , ,	
			(R along) ref. against concentration gradient AW in active trans ref. respiration/ATP necessary in active transport/car cell/living membrane in active transport	•	; ; ; ; [m	ax: 3
	(b)		(excretion) removal via lungs/bladder/skin			

	ref. respiration/ATP necessary in active transport/carriers cell/living membrane in active transport	; ; [max: 3]
(b)	(excretion) removal via lungs/bladder/skin (A kidneys) any <u>two</u> from: toxins, nitrogenous waste, CO <sub>2</sub>	;
	(A urea/uric acid) metabolic AW + waste AW (egestion) removal from alimentary canal/rectum/anus/gut undigested/e.g. cellulose/lignin/fibre/roughage/faeces	; ; ; [max: 3]
(c)	(breathing) muscular to move air/ventilate (R O <sub>2</sub> , CO <sub>2</sub> ) into <u>and</u> out of lungs/inhale <u>and</u> exhale (respiration) in cells/metabolic AW *oxidation/ref. oxygen + of <u>glucose</u> *to release (or accepted alternatives) energy (*available on an equation - balanced if symbols used)	; ; ; ; ; [max: 4]
	( available on an equation balanced ii symbols deed)	[Total: 10]

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7		(A points on annotated genetic diagrams, and points, where relevant if they use the gene transfer idea in question <b>5</b> .)	
	(a)	sheep with better wool used for reproduction/are crossed/selective breeding gene passed to offspring offspring vary due to mutation different gene combinations 'artificial selection' process repeated over many generations use of back/test cross the find homozygotes AW	; ; ; ; [max: 6]
	(b)	ref. mutation/ref. change in gene of chromosome spontaneous/random/sudden/abrupt mutagen/named mutagen (A radiation/chemicals) meiosis (R spelling if a 't' appears) random mating/cross fertilisation/recombination ref. environment one environmental factor identified	; ; ; ; [max: 4]
8	EITHER		[Total: 10]
	(a)	protein alters/speeds up rate of (chemical) reactions in (living) <u>cells</u> /made by <u>cells</u> catalyst/not used up/small amounts needed	; ; ; ; [max: 3]
	(b)	(i) or (ii) (pH or temperature) ref. best/optimum/fastest *rate slower both sides of the optimum ref. active site AW change in shape (of active site) substrate no longer fits enzyme (or v.v.) inactive outside range/range specific AW for enzyme	· · · · · · · · · · · · · · · · · · ·
	(i)	(pH only) *symmetrical curve or described	;
	(ii)	(temperature only) destruction/denaturation only at high temperatures	; ; ; [max: 7] [Total: 10]

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#### 8 <u>OR</u>

(a) (i) (chlorophyll)

a green chemical/pigment/substance/molecule

contains magnesium

traps/harnesses/collects/harvests/absorbs/converts

light

; [max: 3]

(ii) (chloroplast)

structure/organelle

in plant/leaf + cells or named plant cell

contains chlorophyll

contains enzymes for photosynthesis

; [max: 3]

for part (a) [max: 4]

(b) (in (i) or (ii)) controlled by limiting factors or described

(i) (temperature)

\*rate increases with increased temperature

faster molecular movement

photosynthesis is enzyme-controlled

ezymes work faster with increased temperature

may cause water loss slowing P/S

guard cells lose turgidity AW/stomata close (for (b) (i) max 4);

(ii) (light intensity)

\*higher the light intensity the faster the rate of P/S

up to a maximum

more energy/light absorbed AW by chlorophyll/chloroplasts

; [max: 6]

(\*marks available on graphs with axes labelled)

[Total: 10]