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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education O Level

MARK SCHEME for the June 2004 question papers

5090 BIOLOGY

5090/01	**Paper 1 (Multiple Choice), maximum mark 40**
5090/02	**Paper 2 (Theory), maximum mark 80**
5090/03	**Paper 3 (Practical Test), maximum mark 40**
5090/06	**Paper 6 (Alternative to Practical), maximum mark 40**

These mark schemes are published as an aid to teachers and students, to indicate the requirements of the examination. They show the basis on which Examiners were initially instructed to award marks. They do 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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JUNE 2004

GCE O Level

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 5090/01

BIOLOGY
Paper 1 (Multiple Choice)

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Question Number	*Key*	*Question Number*	*Key*
1	**B**	21	**A**
2	**A**	22	**D**
3	**B**	23	**D**
4	**A**	24	**D**
5	**A**	25	**C**
6	**D**	26	**C**
7	**B**	27	**B**
8	**C**	28	**A**
9	**A**	29	**C**
10	**A**	30	**C**
11	**D**	31	**D**
12	**A**	32	**D**
13	**D**	33	**D**
14	**B**	34	**C**
15	**C**	35	**A**
16	**D**	36	**B**
17	**B**	37	**B**
18	**D**	38	**D**
19	**A**	39	**C**
20	**C**	40	**D**

TOTAL 40

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JUNE 2004

GCE O Level

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 5090/02

BIOLOGY
Paper 2 (Theory)

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Section A

1	**(a)**		scapula/shoulder blade (® shoulder bone)	;	**1**
	(b)		(Accept in either order) (Mark the first two)		
		(i)	B	;	
			F	;	
		(ii)	A	;	
			G	;	**4**
			(Ignore D)		
	(c)	**(i)**	hinge (or described e.g. move in one direction) (® elbow/antagonistic/any indication of more than one plane/bending)	;	
		(ii)	tendon (® if incorrectly named, but mark on if wrong)	;	
			transmits force/pulls AW	;	
			triceps/muscle (® biceps) + <u>contracts</u>	;	
			to straighten/extend (arm)	;	
			not elastic AW	;	**max. 5**
					Total [10]
2	**(a)**		<u>photosynthesis</u> (Ⓐ condensation reaction AW);	;	**1**
	(b)		nitrogen/water vapour/valid e.g.(® hydrogen, ignore symbols)	;	**1**
	(c)		contains all required/CO_2, H_2O and light + for P/S AW	;	**1**
			(Ⓐ yellow/brown/iodine colour, R white)		
	(d)		(L) blue/black centre + orange AW round outside	;	
			(M) orange (or colour e.c.f.) AW <u>all over</u>	;	
			↕ (Ⓐ blue/black centre <u>if ref. to plant not destrached</u>)		
			(N) orange (or colour e.c.f.) all over	;	**3**
			N.B. For all of (d), Ⓐ heading to leaf as label for whole leaf. Something must be written on/above leaf to score except if colours used. Colouring only = max 2.		
	(e)		(L) photosynthesis/CHO (or named) production	;	
			uses up CO_2	;	
			(M) respiration	;	
			CO_2 released AW	;	
			Absorbed (by substance)	;	
			(N) respiration/noP/S	;	
			CO_2 released AW	;	**max. 6**
					Total [12]

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3 (a) 5 parts correctly labelled (Ⓐ anywhere in cerebrum)

same label to 2 Different parts = 0,

2 labels to same part -mark the correct one. (Ⓐ pons/brain stem)

(line must not stop short)

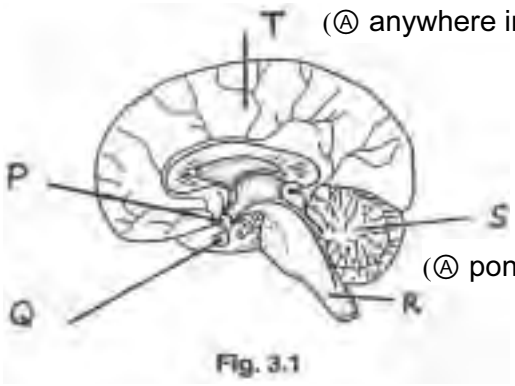

Fig. 3.1

;;;;; **5**

(b) (i) (carried by) blood/plasma ; **1**

(ii) early maturity AW ;

tall AW/rapid growth ;

early appearance of any 2 secondary sexual characteristics ;; **max. 3**

Total [9]

4 (a) alveoli/capillaries/air sacs ; (micro) villi ;

1 pulmonary vein ;

2 aorta (in any order) ; (H).P.V. ;

3 hepatic artery ;

respiration/oxidation of glucose ; 1/2 respiration ;

1/2. conversion from/to glycogen ; **max. 8**

(b) urea/uric acid (Ignore nitrogenous waste) ; **1**

(c) (i) H(hdrogen/C(arbon/O(xygen)q ;

(ii) N(itrogen) ; **2**

Total [11]

5 (a) (U) plumule ;

(V) cotyledon ;

(W) radicle ; **3**

(b) testa/coat ; **1**

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(c)	none at start	;	
	increases	;	
	(stored) starch	;	
	digested AW/ref. enzyme action	;	
	amylase/diastase	;	
	ref. transport/translocation/diffusion	;	**max. 4**
			Total [8]

Total for Section A = 50 marks

Section B

6 **(a)**	long/root to leaves or stem	;	
	narrow/thin/capillary-like	;	
	pipe-like/hollow/tubular/no end-walls/no cytoplasm/continuous	;	
	water carriage	;	
	mineral s(alts)/ions/nutrients	;	
	thickened/strengthened/lignin (® strong/hard/rigid)	;	
	significance of position in root/stem	;	
	support AW/prevents collapse of vessel	;	
	prevents tearing/spreads out + leaf	;	**max. 7**
(b)	sugar/sucrose/CHO* (® starch/glucose) ↕ (Ⓐ first two in a list) amino acids* (* or v.v. for saying not present in xylem)	;	
	for energy	;	
	and growth	;	
	phloem unthickened or softer AW/insects can penetrate wall	;	
	nearer the outside	;	**max. 3**
			Total [10]

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7	**(a)**	diaphragm	;	
		intercostal + muscles	;	
		contract + relax	;	
		change in volume/size of thorax/chest/rib cage + change in pressure OR in/exhalation correctly described	;	
		process repeated (so that supply is continuous)	;	
		hairs in nose filter/trap + air/dirt	;	
		mucus + adhesion trapping/catching	;	
		cilia + beating/sweeping action (® filtering/trapping)	;	
		carrying dirt/mucus + to throat/upwards	;	**max. 6**
	(b)	faster breathing rate	;	
		deep(er) breathing/big(ger) breaths (Ⓐ heavy/harder/gasping)	;	
		exercise/more energy needed/faster respiration	;	
		more/a lot of oxygen required/used	;	
		less oxygen (available)	;	
		more carbon dioxide/lactic acid (in blood)	;	**max. 4**
				Total [10]

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8E	**(a)**	breakdown/decay/decomposed AW	;	
		urea/<u>dead</u> animal	;	
		by bacterial/fungi/<u>named</u> decomposer (Ⓐ saprotroph etc.) (Ⓐ denitrifying bacteria)	;	
		(protein) to amino acids ↕ (Ⓐ fixation to salts by lightning/to amino acids by N_2-fixing bacteria)	;	
		(amino acids) to salts (or named) (Ⓐ ammonia)	;	
		absorbed by plants (® if NH_3, proteins, amino acids)	;	
		for protein manufacture/ref. protein in plants	;	
		eaten by animals	;	
		digestion + absorption	;	
		<u>assimilation</u> (® turned into protein)	;	**max. 7**
	(b)	bacteria/they + stated activity in N-cycle (e.g. fixation / decomposition / (de)nitrification)	;	
		respire	;	
		release carbon dioxide	;	
		(CO_2 + nitrates) – starting point for protein synthesis	;	**max. 3**
				Total [10]

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8O (a) (gene)
a section of DNA/chromosome ;

controls production of a protein/or a characteristic or e.g. ;
(Ⓐ feature/phenotype)

can be copied ;

passed on /(unit of) inheritance ; **max. 3** (for gene)

(allele)
(Ⓐ sort/type)
a form of a gene/ref. upper + lower case letters, or e.g./ pair of phenotypic examples ;

on homologous AW chromosomes/at same locus AW ;
(Ⓐ a pair of)

the idea of dominance/recessiveness/codominance/ can have different effects ; **max. 4** [for **(a)**]

(b) are inherited/ref. reproduction ;

ref. mutation/change in gene ;

producing variation/differences/changes in appearance or in behaviour or in phenotype ;

advantageous/useful/better adaptation ;

survival ;

change in environment ;

long period of time ;

change in phenotype ;

ref; competition ;

ref. natural selection ; **max. 6**

N.B. Accept and apply scheme as appropriate to specific examples.

Total [10]

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JUNE 2004

GCE O Level

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 5090/03

BIOLOGY
Paper 3 (Practical Test)

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Question 1

(a)	**(i)**	Table construction ;	**1**
		Finger tips warmest ; arm coolest ;	**2**
	(ii)	fingertips most sensitive ; more receptors/neurones ;	
		(receptors/endings) closer together ;	**up to 2**
	(iii)	Used water bath ; checked temp. with thermometer ;	
		ensured correct temp ; tested against skin ;	**up to 3**
(b)	**(i)**	Hot water = 48°C or below ;	
		range correct ;	**2**
	(ii)	(right finger) water felt hotter ;	
		(left finger) water felt cooler ;	**2**
	(iii)	new temp. compared with old ; AW	**1**
	(iv)	idea of <u>control</u> ;	
		to check that fingers had same reaction ; etc.	**up to 2**
(c)		Other part (e.g. toe) ; suitably tested ;	**2**
(d)		We are not good at estimating temp./the temp. we feel is influenced by prior experience AW ;	**1**
			Total [18]

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Question 2

(a) (i) fewer seeds ; more seeds ;
big seeds ; smaller seeds ;
linear arrangement ; circular etc ;
single cavity/loculus ; 2 cavities etc ;
seeds/fruits dry ; moist/succulent ;
shape – 'long' ; circular ; **three pairs - up to 6**

(ii) Drawing marks: **D.2**

1. Clear, clean, same size, at least 5 cm.

2. Hilum, clearly shown on both drawings.

Labels: Hilum/attachment scar/funicle ; testa/seed coat ; micropyle ; **up to 2**

(ii) Both measurements with units ;

Size of drawing over that of specimen ;

Mag. Correctly stated. **3**

(iv) Drawing marks: **D.2**

1. At least 5 cm. adequate quality.

2. Details of embryo.

Labels: Cotyledon ; plumule ; radicle **3 correct = 2, 2 correct = 1 2**

(b) (i) **S1** (blue) black - starch present ;

S2 brown/no change/no blue black - no starch ; **2**

(ii) Cut/grind material ;

add Biuret solution ;

mauve etc if protein present ; **3**

Total [22]

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JUNE 2004

GCE O Level

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 5090/06

BIOLOGY
(Alternative to Practical)

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1 (a) (i) Arrow pointing to left, part above/below capillary tube **1**

(ii) Up xylem ; R: vessel

through mesophyll ;

intercellular / air spaces ;

(out through) stoma(ta) ; **up to 3**

2 max if root/hair mentioned

(b) (i) Graph marks:

1. Grid well used – 12 (or 6) cm wide x 8 cm high (scale).
2. x axis linear & labelled 'time (of day)' & numbered.
3. y axis labelled 'distance…' mm.
4. plots correct (esp. 1500 h).
5. ruled dot connections / line of best fit. R: if mixed

Axes reversed/bars: points 2 & 3 only **5**

(ii) increases up to noon then descreases ;

R: description of line rather than uptake of water ; **1**

(iii) First 2 from: light ; humidity ; temperature ; wind ; **2**

(c) Fan at different speeds / still air / cf. breeze ;

other variables constant / acclimatization / control ;

measure / compare bubble movement ; **up to 3**

Total [15]

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2 (a) (i)

Drawing marks:

1 Clear, clean, realistic, at least 8 cm.

2 Artery 2 layered well shown, vein single layer.

3 (Thicker) crinkly artery wall. **3**

Labels:

Artery & vein both correct ;

Another valid label – muscle / elastic – connective tissue /

Lumen / ovp ; R: ref epithelium **2**

(ii) both measurements with correct units once (1 decimal if cm) ;

drawing divided by 13(etc) ; R: if words only

mag. accurately & acceptably stated ; R: if inverted

expression, more than 2 d.p., more than 0.2 rounding **3**

(iii)

artery	vein
thick wall ;	thin wall ; (thick v thin = 1)
more muscle ;	less muscle
narrow lumen / AW ;	wide lumen ;
rounder ;	triangular / irregular
wrinkled internally ;	smooth internal wall ;
two layers ;	one layer ;
part separated layers ;	wall intact ; **up to 6**

accept contrasting statements only for both marks per line.

allow c.e if totally transposed

Total [14]

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3 (a) (i)

Juice 1 = 0.1% ;

Juice 2 = a figure between 0.1 & 1.0%, or the range stated ;

Juice 3 = a figure between 0.0 & 0.10%, or the range stated ; **3**

(ii) Range of intermediate solutions of known concs. related to different colour range / weighed ppt ;

compared with fruit juice results ;

repeats / average results ;

glucometer / modified technique applied – weighing / clinistix etc ; **up to 2**

(iii) Add Benedict's (reagent) ;

Heat / warm etc ;

in water-bath / low flame other safety / hygiene feature ;

(rubber gloves / goggles) **3**

(iv) Less / no reducing sugar present / negative result –

no colour change to orange / yellow but to blue / green ;

insulin lowers blood sugar level ;

glucose converted to glycogen ;

less excreted / in urine / filtered out by kidney ;

up to 3

Total [11]

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