Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE 2008

MARKING SCHEME

BIOLOGY

HIGHER LEVEL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE 2008

MARKING SCHEME

BIOLOGY

HIGHER LEVEL

Introduction

The marking scheme is a guide to awarding marks to candidates' answers. It is a concise and summarised guide and is constructed in a way to minimise its word content.

Assistant Examiners must conform to this scheme and may not allow marks for answering outside this scheme.

The scheme contains key words or phrases for which candidates may be awarded marks. This does not preclude synonyms or phrases which convey the same meaning as the answer in the marking scheme.

Although synonyms are generally acceptable, there may be instances where the scheme demands an exact scientific term and will not accept equivalent non-scientific or colloquial terms.

The scheme may include the words "any valid answer" and the Assistant Examiner will use his/her professional judgement to determine the validity of the answer. If in doubt, he/she should consult with his/her Advising Examiner before awarding marks.

Where it comes to the attention of the Assistant Examiner that a candidate has presented a valid answer and there is no provision in the scheme for accepting this answer, then he/she must first consult with his/her Advising Examiner before awarding marks.

A key word may be awarded marks, only if it is presented in the correct context.

e.g. Question: Briefly outline how water from the soil reaches the leaf.

Marking scheme - concentration gradient /root hair / osmosis / cell to cell / root pressure/ xylem / cohesion **or** explained / adhesion **or** capillarity **or** explained / Dixon and Joly / transpiration **or** evaporation [*accept water loss*] / tension *any six* **6(3)**

Answer " Water is drawn up the xylem by osmosis" Although the candidate has presented two key terms (xylem, osmosis), the statement is incorrect and the candidate can only be awarded 3 marks for referring to the movement of water through the xylem.

Cancelled Answers

The following is an extract from S63 *Instructions to Assistant Examiners*

"Where a candidate answers a question or part of a question **once only** and then cancels his/her answer,

you should ignore the cancelling and should treat the answer as if it had been left uncancelled."

e.g.

Question: What is pollination?

Marking Scheme: transfer of pollen/ from anther/ to stigma **3(3) marks**

Sample Answer: t~~ransfer of pollen/ from anther/ to stig~~ma

The candidate has cancelled the answer and has not made another attempt to answer the question and may be awarded 3(3) marks.

Sample Answer: tra~~nsfer of pollen/ by insect/ to stigma~~

The candidate has cancelled the answer and has not made another attempt to answer the question and may be awarded 2(3) marks.

Surplus Answers

In Section A a surplus wrong answer cancels the marks awarded for a correct answer.

e.g.

Question: The walls of xylem vessels are reinforced with ……

Marking Scheme: lignin **4 marks**

Sample answers:

chitin, lignin – there is a surplus answer, which is incorrect, therefore the candidate scores 4 – 4 marks = 0.

~~lignin~~ – the answer, which is correct, has been cancelled, but there is no additional **or** surplus answer, therefore the candidate may be awarded 4 marks.

lignin, ~~chitin~~ - there is a surplus answer, which is incorrect, but it has been cancelled and as the candidate has given more than one answer (i.e. the candidate is answering the question more than once only), the cancelling can be accepted and he/she may be awarded 4 marks.
Question: Name the **four** elements that are always present in protein
Marking Scheme; carbon/ hydrogen/ oxygen/ nitrogen **4(3)**
Sample answers:

- carbon/ hydrogen/ oxygen/ nitrogen/ calcium – there is a surplus answer, which is incorrect, and which cancels one of the correct answers, therefore the candidate is awarded **3(3)** marks.
- carbon/ hydrogen/ oxygen/ calcium – there is no surplus answer, there are three correct answers, therefore the candidate is awarded **3(3)** marks.
- carbon/ hydrogen/ oxygen/ calcium/ aluminium – there is a surplus answer, which is incorrect, and which cancels one of the three correct answers, therefore the candidate is awarded **2(3)** marks.
- carbon/ hydrogen/ oxygen/ calcium / ~~aluminium~~ – there is a surplus answer, which is incorrect, but as the candidate has given more than one answer (i.e. the candidate is answering the question more than once only), the cancelling can be accepted and there is no longer a surplus answer and he/she may be awarded **3(3)** marks.

In the other sections of the paper, there are occasions where a correct answer is nullified by the addition of an incorrect answer. This happens when the correct answer is a specific word **or** term and it is indicated on the scheme by an asterisk *.

Conventions

- Each word **or** phrase for which marks are allocated is separated by a solidus (/) from the next word **or** phrase.
- The mark awarded for an answer appears in bold next to the answer.
- Where there are several parts in the answer to a question, the mark awarded for each part appears in brackets e.g. **5 (4)** means that there are five parts to the answer, each part allocated 4 marks.
- The answers to subsections of a question may not necessarily be allocated a specific mark;
- e.g. there may be six parts to a question – (a), (b), (c), (d), (e), (f) and a total of 20 marks allocated to the question. The marking scheme might be as follows – **2 (4) + 4 (3).** This means that the first two correct answers are awarded 4 marks each and each subsequent correct answer is awarded 3 marks each.
- A word that appears in brackets is not a requirement of the answer, but is merely used to contextualise the answer.
- Square brackets are used where the Assistant Examiner's attention is being drawn to an instruction relating to the answer **or** to some qualification of the answer.

Section A Answer **five** questions

1.		**5(4) any FIVE points out of SEVEN**	
	(a)	Carbohydrate **or** sugar **or** saccharide	
	(b)	solvent / transport / support / reaction medium/reactant / turgidity / reference to changing concentration / movement of sperm / temperature function **or** example	
	(c)	Catabolic	
	(d)	(fats are) solid **or** oils are liquid	
	(e)	Biuret **or** (sodium) hydroxide and copper sulfate **or** correct formulas	
	(f)	Cellulose	

2.	(a)	Interphase	**2**
	(b)	uncoiling / transcription / replication **or** duplication	**2(2)**
	(c)	Prophase / metaphase / anaphase/ telophase correct order showing all four	**4(1)** **4**
	(d)	anaphase **or** 3rd stage	**2**
	(e)	Chromosomes in pairs (two sets of chromosomes)	**2**
	(f)	Cancer **or** named group of cancers **or** tumour	**2**

3.		**3(1) + 3(4) + 5**	
	(a)	hypothesis	
		experiments	
		data **or** information **or** findings **or** outcomes	
	(b)	for comparison **or** reference to (biological) variability	
	(c)	no herbicide **or** implied	
	(d)	repeat of experiment	
	(e)	(scientific) journal **or** named journal [*accept* Internet]	

4.	(a)	A = myelin sheath **or** Schwann cell B = myelin sheath **or** axon C = dendrite	**3(1)**
	(b)	A: (myelin sheath) insulates **or** protection **or** speeds up impulse **(message)**	
		A: (schwann cell) produces myelin (or sheath) **or** insulates **or** protection **or** speeds up impulse **(message)**	**3**
	(c)	arrow (right to left) **or** from dendrites towards cell body	**3**
	(d)	receives impulse **or** carries impulse **(message)** to cell body	**3**
	(e)	X on terminal dendrites on left	**3**
	(f)	receive or carry impulse (message) **and** to muscle or gland or effector or from CNS	**5, 0**

5.		**6(3) + 2**	
	(a)	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ (+ energy)	
	(b)	cytoplasm minus organelles (or structures or particles) **or** liquid part of cytoplasm	
	(c)	Small	
	(d)	anaerobic respiration **or** respiration that produces alcohol **or** respiration that produces lactic acid	
	(e)	Mitochondrion	
	(f)	Yes	
	(g)	lack of oxygen **or** exercise **or** restricted blood supply	

6.	(a)	A = ovary B = Fallopian tube (oviduct) C = uterus (womb)	**3(2)**
	(b)	locations of X, Y, Z	**3(2)**
	(c)	Ovary **or** A **or** follicle	**2**
	(d)	(transfer of) antibodies / balanced diet / bonding / contraception / correct temperature/ milk sterile / uterus recovers more quickly / reduced cancer risk / psychological wellbeing	**2(3)**

Section B. Answer **two** questions

7.	(a)	(i)	(place) where organism (or species) lives	**3**
		(ii)	organisms and their environment	**3**
	(b)	name of ecosystem:		**3**
		(i)	any three abiotic factors	**3(1)**
		(ii)	how investigated (what used **or** how)	**3(3)**
		(iii)	organism name matching ecosystem	**3**
			adaptation feature matching organism	**3**
		(iv)	benefit	**3**

8.	(a)	(i)	auxin **or** IAA **or** NAA **or** ethylene (ethene)	**3**
		(ii)	auxin **or** IAA **or** NAA **or** abscisic acid **or** ethylene (ethene)	**3**
	(b)	(i)	name of plant	**3**
		(ii)	investigative procedure: different concentrations / add regulator to / part of plant / how added / replicates described / control described / suitable time reference	**4(3)**
		(iii)	safety precaution	**3**
		(iv)	result of experiment and result of control or result of **<u>two</u>** different concentrations (or plant parts)	**6, 0**

9.	(a)	(i)	(pH at which enzyme) works best	**3**
		(ii)	Loss of (enzyme) function (or activity)	**3**
	(b)	(i)	name of enzyme	**3**
		(ii)	name of substrate (must match if enzyme named)	**3**
		(iii)	how activity measured (must match enzyme or match substrate)	**3**
			other procedures: how heated / how long / addition (of **or** to substrate) / control <u>described</u> / suitable condition **or** example (for both experiment and control)	**3(3)**
		(iv)	Result of experiment <u>and</u> result of control	**6, 0**

Section C. Answer any **four** questions

10.	(a)	(i)	struggle between organisms (animals or plants) for resource **or** for named resource (in short supply)	**3**
		(ii)	(contest) – one organism loses the resource and (scramble) – each organism gets some of resource	**6**
	(b)	(i)	B smaller numbers **or** B peak occurs after A peak	**3** **3**
		(ii)	predator-prey (relationship) **or** predation	**3**
		(iii)	reduced competition / predator eliminated **or** reduced / food available / development of resistance (to pesticide) / immigration	**2(3)**
		(iv)	biological control **or** genetically modified (GM) plant **or** example **or** crop rotation **or** example	**3**
		(v)	Pyramid: strawberry plants at base cyclamen mites and carnivorous mites in correct order and shape	 **3** **3**
		(vi)	disease **or** parasitism **or** food availability **or** pollution **or** other valid named factor	**3**
	(c)	(i)	disease / pollution / toxins / smell / unsightly / other valid named problem	**3(3)**
		(ii)	waste described **or** named matched management described	**3** **3**
		(iii)	reduce consumption / reduce packaging / recycle / reuse	**2(3)**
		(iv)	landfill sites / sewage treatment plants / digesters / compost heaps	**3**

11.	(a)		homozygous**:** identical alleles [*accept* identical genes] recessive: allele whose expression is masked by dominant allele phenotype: physical appearance **or** expression of genotype **or** result of genotype + environment	 **3** **3** **3**
	(b)	(i)	* GgLl / Ggll / ggLl / ggll grey, long / grey, vestigial / ebony, long /ebony, vestigial	**4(3)** **4(3)**
		(ii)	they assort independently **or** greater variation	**3**
	(c)	(i)	located on sex- chromosome **or** on X- chromosome **or** on Y-chromosome	**4**
		(ii)	* X^NX^n / X^nX^n / X^NY / X^nY normal (carrier) female/haemophilic female/ normal male/haemophilic male	**4(3)** **4(2)**

12.	(a)	(i)	mechanical: physical **or** grinding **or** cutting **or** churning **or** chewing **or** emulsifying chemical: enzyme **or** acidic action **or** molecular breakdown	**3** **3**
		(ii)	tongue **or** oesophagus **or** stomach **or** small intestine **or** named part of small intestine	**3**
	(b)	(i)	A = oesophagus B = stomach C = small intestine **or** ileum D = rectum E = appendix F = large intestine **or** colon	**6(2)**
		(ii)	emulsification **or** explained neutralisation **or** raises pH **or** makes alkaline	**3** **3**
		(iii)	1. pancreas [*allow* duodenum] 2. duodenum **or** small intestine **or** ileum 3. 7 – 9 inclusive	**3** **3** **3**
	(c)	(i)	(bacteria that) live in (or on) another organism involving benefit	**6**
		(ii)	digestion / production of vitamins / benefit immune system / compete with other micro-organisms [*allow* one reference to harmful activity]	**2(3)**
		(iii)	1. ileum **or** villi [*allow* duodenum **or** small intestine] 2. Colon [*allow a*ny named part from stomach onwards]	**3** **3**
		(iv)	diffusion **or** passive transport	**3**
		(v)	large surface area (folding) **or** good blood supply **or** lymph supply **or** (lining) one cell thick **or** long **or** villi **or** microvilli	**3**

13.	(a)	(i)	elimination of waste products of metabolism **or** explained	**3**
		(ii)	Urea: protein **or** amino acid carbon dioxide: carbohydrate **or** named example **or** fat **or** named example of fat **or** fatty acids	**3** **3**
	(b)	(i)	A = arteriole B = Bowman's capsule C = proximal tubule D = Loop of Henle E = collecting duct F = distal tubule **or** Loop of Henle	**6(1)**
		(ii)	renal artery **or** renal arteriole	**3**
		(iii)	*cortex	**3**
		(iv)	1. Bowman's capsule **or** glomerulus **or** B 2. proximal tubule **or** C	**3** **3**
		(v)	large surface area / porous capillary walls/ (lining) one cell thick / efferent arteriole narrower than afferent arteriole **or** arterioles in arteriole out **or** arteriole to capillary network NB not more than one arteriole point.	**2(3)**
		(vi)	proteins **or** named group of proteins	**3**
	(c)	(i)	infection / hot conditions **or** perspiration **or** exercise / high salt intake / low water intake / diuretic(s)	**2(3)**
		(ii)	*ADH (vasopressin) *pituitary	**3** **3**
		(iii)	distal tubule **or** collecting duct in the blood	**3** **3**
		(iv)	(makes walls) <u>more</u> permeable (resulting in) <u>more</u> absorption of water	**6**

14.	Any **two** of (a), (b), (c)			**(30, 30)**
	(a)	(i)	Stomata light **or** CO_2 **or** potassium ions (K^+) **or** wind **or** turgidity of guard cells **or** water availability **or** high temperature	**3** **3**
		(ii)	1. water 2. light (dependent) stage 3. respiration 3. (diffuses) to atmosphere	**3** **3** **3** **3**
		(iii)	1. provides **or** stores energy / reduction of CO_2 **or** glucose formation **or** for dark stage 2. accepts electrons / hydrogen carrier / for the dark stage **or** glucose formation **or** for dark stage	**2(3)** **2(3)**
	(b)	(i)	Diagram labels: deoxyribose **or** ribose, phosphate, base **or** named base	**3** **3(2)**
		(ii)	Base **or** named base	**3**
		(iii)	three bases (triplet **or** codon) / in sequence / (codes for) one amino acid /(base or triplet or codon) sequence / codes for protein	**3(3)**
		(iv)	does not code for a protein **or** for RNA [*allow* not part of the genetic code **or** explained]	**3**
		(v)	(DNA) contains thymine **or** RNA contains uracil	**3**
		(vi)	Mitochondrion **or** chloroplast	**3**
	(c)	(i)	Diagram Labels: dermal tissue, ground tissue, vascular tissue [*accept* xylem **or** phloem for vascular]	**3, 0** **3(2)**
		(ii)	lower water concentration **or** higher solute concentration	**3**
		(iii)	movement of water (solvent) / along concentration gradient / through a selectively permeable membrane	**2(3)**
		(iv)	membrane **or** plant tissue / 2 solutions indicated / different concentrations / result	**3(3)**
		(v)	diffusion **or** passive transport	**3**

15.	Any **two** of (a), (b), (c)			**(30, 30)**
	(a)	(i)	support / movement / protection / anchorage for muscle / gives shape / blood production	**3(3)**
		(ii)	vertebral column and skull (and rib cage)	**3**
		(iii)	1. formation of blood cells 2. protection (absorbs shock) **or** reduces friction **or** allows bone elongation 3. joins muscle to bone	**3** **3** **3**
		(iv)	pair of muscles that have opposite effects **or** explained biceps and triceps **or** other example	**3** **3**
		(v)	treatment of named disorder	**3**
	(b)	(i)	no immunity in population / suitable vectors (e.g. fleas) / rapid spread **or** high population	**2(3)**
		(ii)	natural immunity **or** Natural Selection **or** virus mutated	**3**
		(iii)	advantage**:** environmentally friendly **or** specific **or** (may be) inexpensive disadvantage**:** upsets balance of nature (or described e.g. predator population will fall when prey becomes scarce allowing prey to increase again **or** introduced species may become a pest **or** predator may change to a different prey) **or** (may be) expensive. [Note: *allow* only one cost point]	**3** **3**
		(iv)	Yes + plausible answer **or** No + plausible answer	**6**
		(v)	attaches to (host) cell / introduces nucleic acid (DNA **or** RNA) / (host) DNA inactivated / viral DNA **or** RNA replicated / using resources of host cell / protein coat formed / assembly (of virus)	**3(3)**
	(c)	(i)	A = population (size) of **or** number (of bacteria) B = time	**3** **3**
		(ii)	X = lag (phase) adapting to environment **or** low reproductive rate	**3** **3**
		(iii)	log **or** exponential (phase) reproducing rapidly	**3** **3**
		(iv)	curve showing flattening **or** falling reproduction slows **or** some limiting factor mentioned **or** toxin builds up **or** space limitations	**3** **3**
		(v)	(batch) fixed amount of nutrients added at beginning **or** (bioreactor) emptied at end of production and (continuous) nutrients continuously fed into bioreactor **or** product removed continuously	**6**