Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE 2010

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.

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 descriptions, methods and definitions in the scheme are not exhaustive and alternative valid answers are acceptable. If it comes to the attention of the 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. In general, if in doubt about any answer, examiners should consult their 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 Examiners 2010* (section 7.3, p.22)

"Where a candidate answers a question or part of a question once only and then cancels the answer, you should ignore the cancelling and should treat the answer as if the candidate had not cancelled it."

e.g.

Question: What is pollination?

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

Sample Answer: ~~transfer of pollen/ from anther/ to stigma~~

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: ~~transfer 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 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 SIX**	
	(a)	Small amount (needed) **or** indication of e.g. < 0.01%	
	(b)	e.g. Fe, Cu, Zn **or** other correct	
	(c)	Oil is liquid (at room temperature) **or** fat is solid **or** oils are unsaturated or explained	
	(d)	Fat-soluble Water-soluble	**(4, 2, 0)**
	(e)	Fat (or lipid or oil) unit (or molecule) **or** glycerol and three fatty acids **or** ester	
	(f)	Respiration **or** fermentation **or** glycolysis [*allow digestion*]	

2.		**4(5)**	
	(a)	100%	
	(b)	50%	
	(c)	75%	
	(d)	50%	

3.	(a)	A = pseudopods (false feet); B = contractile vacuole; C = food vacuoles	**3, 2, 1, 0**
	(b)	Protista **or** Protoctista	**3**
	(c)	Eukaryotic	**3**
	(d)	Membrane-bound organelles **or** named membrane-bound organelle [*allow nucleus*]	**3**
	(e)	Feeding (or explained) **or** movement	**3**
	(f)	1. Osmoregulation or explained [*allow excretion or homeostasis*] 2. Freshwater more hypotonic **or** more H_2O intake **or** reference to concentration difference	**3** **2**

4.		**6 (3) + 2**	
	(a)	Cells with common function (or with common structure)	
	(b)	Dermal **or** ground **or** vascular (or xylem or phloem) **or** meristematic	
	(c)	Function relevant to tissue named in (b)	
	(d)	Epithelial **or** Muscular **or** Connective **or** Nervous **or** named example	
	(e)	Function relevant to tissue named in (d)	
	(f)	Cells grown on (or in) medium **or** cells grown outside organism	
	(g)	Appropriate application	

5.		**6 (3) + 2**	
	(a)	Part(s) of earth that supports life	
	(b)	Organisms and their (interactions with) environment	
	(c)	(Place) where a species (or an organism) lives	
	(d)	Relationship between (different) species in which at least one benefits	
	(e)	Living (organism's influence on another organism)	
	(f)	Interconnected food chains **or** more than one species at each trophic level	
	(g)	Animals	

6.	(a)	A = protein; B = Nucleic acid or DNA or RNA	**3** **3**
	(b)	Attachment / (viral) nucleic acid into (host) cell / uses host structures (or described) / part(s) replicated / virus assembly / release (or lysis) ***Any three***	**3(3)**
	(c)	(Older people) previous exposure / antibodies (or active immunity or memory cells)	**3 + 2**

Section B. Answer **two** questions **2(30)**

7.	(a)	(i)	Thoracic **or** chest	**3**
		(ii)	Doesn't tire [*allow involuntary*]	**3**
	(b)	(i)	Identify front (or back or left or right) / how identified / named cutting instrument / location of first cut / second cut described / locate (find or flag label) named structure / safety precaution described (*any of the above points can be got from labelled diagrams*)	**4(3)**
		(ii)	Cut open aorta **or** cut open pulmonary artery	**3**
		(iii)	Diagram of dissection	**3, 0**
			Labels: Right atrium, tricuspid valve, right ventricle	**3(2)**

8.	(a)	(i)	Educated guess **or** (possible) explanation	**3**
		(ii)	Comparison (with experiment)	**3**
	(b)	(i)	As a stain **or** to see more clearly	**3**
		(ii)	To see (or measure) gas (or bubbles) [*negative for terrestrial plants*]	**3**
		(iii)	1. (Detergent) breaks down membranes	**3**
			2. To separate (or see) the DNA	**3**
		(iv)	1. To prevent contamination **or** described	**3**
			2. Attach leaves (or leaf parts)	**3**
		(v)	1. Test for (soluble) protein	**3**
			2. Test for fat (or lipid or oil)	**3**

9.	(a)	(i)	Growth of a plant in response to a stimulus	**3**
		(ii)	Controls the growth (of a plant)	**3**
	(b)	(i)	Named plant tissue (or part)	**3**
		(ii)	Tissue or part(s) placed in apparatus / different concentrations / how IAA used / leave for time (*min 2 days*) / then measure (or observe) tissue or part(s) / replicates	**4(3)**
		(iii)	Water **or** no IAA	**3**
		(iv)	Test results described / control results described	**2(3)**

Section C. Answer any **four** questions

10.	(a)	(i)	*Guanine	**3**
		(ii)	(DNA) opens (or unzips) / new strands (made)	**2(3)**
	(b)	(i)	*Transcription*: making of (m)RNA using DNA (template) *Translation*: making a protein using (m)RNA (code)	**3** **3**
		(ii)	*Ribosome(s)	**3**
		(iii)	*Three	**3**
		(iv)	Start; Adding an amino acid; Stop	**3** **3** **3**
		(v)	*Transfer	**3**
		(vi)	*An amino acid	**3**
	(c)	(i)	*Haploid:* (A nucleus having) one set of chromosomes (or one copy of each chromosome) *Diploid:* (A nucleus having) Two sets of chromosomes (or two copies of each chromosome)	**3** **3**
		(ii)	*Homozygous:* alleles the same *Heterozygous*: alleles different	**3** **3**
		(iii)	*Genotype*: genetic make-up **or** genes (alleles) present *Phenotype:* expression of genotype (and environment) **or** physical make up	**3** **3**
		(iv)	*Segregation*: only one (member) of a pair of alleles (or chromosomes) enters a gamete *Independent assortment:* Either member of a pair of alleles (or chromosomes) can combine (or transmit) with either member of another pair (in gamete formation)	**3** **3**

11.	(a)	(i)	Paralysis or Parkinson's . . .	**3**
		(ii)	1. Relevant cause 2. Relevant means of prevention or treatment	**3** **3**
	(b)	(i)	automatic / response to a stimulus / involuntary (or not controlled by brain) ***Any two***	**2(3)**
		(ii)	e.g. coughing, blinking, sneezing etc.	**3**
		(iii)	Protection **or** fast (response)	**3**
		(iv)	1. Diagram (*sensory neuron, motor neuron, spinal cord and correct position of cell bodies for 6 marks*) Labels: *receptor* (*or named*), *sensory neuron, inter neuron, motor neuron, cell body, effector* (*or named*) ***Any three*** 2. Arrow in (dorsal) + arrow out (ventral)	**6, 3, 0** **3(2)** **3**
	(c)	(i)	*Endocrine (or ductless)	**3**
		(ii)	1. Name of a hormone-producing gland 2. Location of named gland 3. Hormone secreted by named gland 4. Role of hormone 5. Description of deficiency symptom [*Accept named condition*]	**3** **3** **3** **3** **3**
		(iii)	e.g. 1. Treatment of diabetes 2. Contraception	**2(3)**

12.	(a)	(i)	Base **or** bottom	**3**
		(ii)	Pyramid showing any inversion (*at least two levels*) Any two named organisms in inverted relationship	**3** **3**
	(b)	(i)	Monera **or** Prokaryotae	**3**
Graph A		(ii)	Availability of organic effluent **or** sugar **or** more food	**3**
		(iii)	Decrease of organic effluent **or** sugar decreased **or** less food	**3**
		(iv)	(Oxygen demand) increases as bacteria increase (Oxygen demand) decreases as bacteria decrease [*allow 6 marks for relationship is directly proportional*]	**3** **3**
		(v)	More bacteria need more O_2 **or** fewer bacteria need less O_2	**3**
Graph B		(vi)	Fish need O_2 (for respiration)	**3**
		(vii)	Agitation (weirs, waterfalls) / photosynthesis / from atmosphere	**2(3)**
	(c)	(i)	True Energy lost at (or between) levels **or** described	**3** **3**
		(ii)	False Usually eaten by 2nd level consumers (or carnivores)	**3** **3**
		(iii)	True Use causes change **or** no abuse **or** no economic value **or** False Valid reason	**3** **3**
		(iv)	True Premature death of parents **or** poor living conditions **or** poor health care **(**or example) **or** poor education **or** an example of a cultural reason	**3** **3**

13.	(a)	*Sepals*:	protect flower (or bud) **or** photosynthesis **or** attract insects	**3**
		Anthers:	produce pollen	**3**
		Stigma:	traps (or catches) pollen [*allow where pollen lands if qualified*]	**3**
	(b)	(i)	Meiosis / 4 (or tetrad) / haploid / micospores / (divides by) mitosis / tube and generative nucleus / pollen grain matures (or wall forms) ***Any four***	**4(3)**
		(ii)	Fusion of gametes **or** formation of zygote	**3**
		(iii)	Generative nucleus / mitosis / two male gametes (or nuclei) / one fuses with egg / to form zygote / other (male gamete or nucleus) fuses with (two) polar nuclei / to form endosperm ***Any four***	**4(3)**
	(c)	(i)	Period of reduced metabolism (or period of reduced activity) **or** period of no growth.	**3**
		(ii)	Survival **or** germination delayed until conditions suitable for growth **or** greater time for embryo development (or greater time for dispersal) **or** reduced competition	**3**
		(iii)	(Optimum) storage conditions **or (**optimum) sowing (or ploughing) time **or (**maximise) the growing season **or** seed treatment before sowing (or examples)	**3**
		(iv)	*Water*: for enzyme action (or example of enzyme action) **or** as a solvent **or** transport of materials **or** bursting the testa [*allow washing away inhibitors*]	**3**
			Suitable temperature: required for (optimum or increased) enzyme activity	**3**
			Oxygen: needed for (aerobic) respiration	**3**
		(v)	1. *Radicle	**3**
			2. *Plumule	**3**

14.	Any **two** of (a), (b), (c)			**(30, 30)**
14.	(a)	(i)	Chloroplast	**3**
		(ii)	*Light (stage)	**3**
		(iii)	1. Chlorophyll 2. *Pathway :* (Energised electrons) release energy / ATP formed / (electrons) return to chlorophyll ***Any two***	**3** **2(3)**
			Pathway : Electrons taken up by NADP / photolysis (or water splits) / NADPH (formed) /electrons from water to chlorophyll /ATP formed ***Any two***	 **2(3)**
		(iv)	1. *Carbohydrates 2. *Water (or H_2O)	**3** **3**
		(v)	*Adenosine Triphosphate (or ATP)	**3**

14.	(b)	(i)	Biological (or protein) catalyst **(**or explained)	**3**
		(ii)	(Enzyme) acts on only a particular substrate	**3**
		(iii)	Substrate / matching enzyme's active site / active site changes shape / (formation of) enzyme-substrate complex / product(s) formed ***Any three***	 **3(3)**
		(iv)	*1. Immobilisation:* attached to an inert substance (or example of inert substance) **or** fixed to each other *2. Bioreactor*: vessel in which products are made by cells (or organisms)	**3** **3**
		(v)	Enzyme Substrate (*must match enzyme*) Product (*must match enzyme or substrate*)	**3** **3** **3**

14.	(c)	(i)	Allowing some substances to pass through	**3**
		(ii)	Chloroplast / mitochondrion / nucleus / vacuole [*allow cell membrane*] ***Any two***	 **2(3)**
		(iii)	1. Movement of molecules (or substances) from area of high concentration to area of low concentration (or along a concentration gradient) 2. Named molecule and location	**3** **3** **6**
		(iv)	Bacteria / lose water / by osmosis / inactivity or death ***Any three***	 **3(3)**

15.	Any **two** of (a), (b), (c)			**(30, 30)**
15.	(a)	(i)	Sperm (cells) and (seminal) fluid	**3**
		(ii)	Diagram (*testis, sperm duct, urethra, penis*) Four parts <u>located</u> and named: 1. Testis 2. Epididymis 3. Sperm duct **or** prostate gland [*allow seminal vesicles*] 4. Urethra **or** sperm duct	**6, 3, 0** **3** **3** **3** **3**
		(iii)	Broken voice (or enlarged larynx) / body hair / more muscle / more bone enlargement of testes / enlargement of penis ***Any two***	**2(3)**
		(iv)	*Testosterone	**3**

15.	(b)	(i)	Diagram (liver, connection, gut) Labels (*liver, intestine and portal vein*)	**3, 0** **3(2)**
		(ii)	Named food **or** CO_2	**3**
		(iii)	*Hepatic artery	**3**
		(iv)	Above **or** to the right **or** behind	**3**
		(v)	*Gall bladder	**3**
		(vi)	Emulsify fats (or explained) **or** neutralise (or comment on pH)	**3**
		(vii)	Storage of (fat-soluble) vitamins (or glycogen or named mineral) / deamination / heat generation / detoxification / plasma protein production / cholesterol production ***Any two***	**2(3)**

15.	(c)	(i)	(Sucking or pumping) stimulates (pituitary) / production of hormone (or correctly named hormone) / promotes milk flow ***Any two***	**2(3)**
		(ii)	Common cold is a viral disease / antibiotics do not affect viruses / (overuse of antibiotics) may lead to antibiotic resistance in bacteria (in patients) ***Any two***	**2(3)**
		(iii)	Adds fibre / fibre absorbs water / peristalsis encouraged / faster digestive transit ***Any two***	**2(3)**
		(iv)	Water lost by exhaling (or by sweating) / less water in blood / ADH secreted / causes collecting ducts (or distal tubes or kidney) / to reabsorb water ***Any two***	**2(3)**
		(v)	Arterioles / constrict / less blood (in fingers) / heat loss minimised ***Any two***	**2(3)**