Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE 2010

MARKING SCHEME

BIOLOGY

ORDINARY 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.	(a)		A = respiration / B = photosynthesis / C = consumption (eating) / D = combustion (burning) [*allow 'decomposition', allow 'assimilation'*]	**2(7) + 2 + 4(1)**
	(b)		Fossil fuel(s) **or** named example(s) of fossil fuel(s)	
	(c)		Limited supply or words to that affect **or** reused	
	(d)		e.g. bacteria **or** fungi **or** microorganisms **or** earthworms **or** insects	
2.	(i)		False	**2(7) + 2 + 4(1)**
	(ii)		True	
	(iii)		False	
	(iv)		False	
	(v)		True	
	(vi)		False	
	(vii)		True	
3.	(a)		Plant cell	**2(7) + 2 + 4(1)**
		1./2.	e.g. cell wall/definite shape/chloroplasts/(large) vacuole **(Two points)**	
	(b)		A = (Large) vacuole; B = chloroplasts; C = (Cell) membrane	
	(c)		Water **or** sugar **or** sap **or** salt(s) **or** named gases **or** protein	
4.	(i)		Genotype	**2(7) + 3(2)**
	(ii)		Gamete	
	(iii)		Mutation	
	(iv)		Gene	
	(v)		Dominant	
5.	(i)		A = Semi-circular canals; B = Cochlea	**2(7) + 2 + 4(1)**
	(ii)		Hearing	
	(iii)		Throat **or** Pharynx [*allow 'back of mouth'*]	
	(iv)		To equalise pressure (on the eardrum) **or** air in **or** air out **or** protection	
	(v)		Disorder:	
			Corrective measure:	
6.	(i)		(Epi)dermal	**2(7) + 3(2)**
	(ii)		W is usually closer to the light	
	(iii)		Air **or** water (vapour) **or** O_2 **or** CO_2 **or** N_2 **or** chemicals - in and/or out	
	(iv)		To allow gas exchange **or** transpiration **or** temperature control	
	(v)		Guard cells	

			SECTION B Answer **two** questions	
7.	(a)	(i)	Nucleus **or** chloroplasts **or** mitochondria	**5+1**
		(ii)	Analysing or examining a person's DNA (to compare patterns with others) **or** getting or providing, patterns or bands	
	(b)	(i)	To increase surface area **or** to burst cells **or** to break cell walls	**2(6)+6(2)**
		(ii)	To break down cell membranes **or** to burst cells	
		(iii)	In a water bath	
		(iv)	To inactivate enzymes	
		(v)	It would be shredded	
		(vi)	To digest the protein (in the chromosomes) [*allow 'to unravel DNA'*]	
		(vii)	In the filtrate **or** liquid **or** solution **or** test tube	
		(viii)	Add freezer-cold ethanol or alcohol [*allow 'ice-cold ethanol or alcohol'*]	
8.	(a)	(i)	A (biological) catalyst **or** explained	**5+1**
		(ii)	(A measure of) how acidic or alkaline a solution is [*allow 'neutral or not'*]	
	(b)	(i)	Name of enzyme: amylase **or** pepsin **or** catalase	**2(6) + 4(2) +1**
		(ii)	1. Matching substrate	
			2. Matching product	
		(iii)	Diagram: [*minimum of test tube with substance in it*]	**2, 0**
			Label: [*one label*]	**1**
		(iv)	Add acid **or** add base **or** add (different) buffers	
		(v)	Temperature	
		(vi)	Water bath	
		(vii)	Graph – any line that is not parallel to *x* axis and that is not 'V' shaped	
9.	(a)	(i)	A group of tissues (working together)	**5+1**
		(ii)	Electron microscope	
	(b)	(i)	Any named dicot plant	**2(6)+6(2)**
		(ii)	Make section: cut/scalpel **or** (backed) blade/thinly/safety point **(Two points)** Prepare for examination: section into water/onto slide/ cover slip on/how/stain/how **(Two points)**	
		(iii)	Light source/low power objective first/ look through eyepiece /move to higher objective/coarse focus knob/fine focus knob **(Two points)**	
		(iv)	B	

			SECTION C Answer **four** questions	
10.	(a)	(i)	Organisms/interacting/in their environment **(Any two points for full marks)**	**7+2(1)**
		(ii)	The place where an organism lives	
		(iii)	The (functional) role (of an organism) **or** 'occupation' (of an organism)	
	(b)	(i)	Name of ecosystem: **(One point)** Food chain: Must have at least three members and must match named ecosystem. **(Three points)** [*N.B.: if chain does not match ecosystem, disallow the point with the lowest mark*]	**3(5)+6(2)**
		(ii)	Feeding (level)	
		(iii)	A = producers; B = (primary) consumers **or** herbivores; C = secondary consumers **or** carnivores **or** predators	
		(iv)	(Their number would) increase	
	(c)	(i)	Pollution: Harmful addition to an ecosystem Conservation: Management of ecosystems **(Two points)**	**2(6)+6(2)**
		(ii)	Named pollutant Effect must match named pollutant **(Two points)**	
		(iii)	Outline of one conservation measure **(Two points)**	
		(iv)	One problem associated with waste disposal	
		(v)	To consume waste	
11.	(a)	(i)	e.g. eye colour	**7+2(1)**
		(ii)	e.g. ability to roller skate	
		(iii)	Chromosomes **or** genes **or** DNA	
	(b)	(i)	White	**3(5)+6(2)**
		(ii)	1. (Black parents): BB (White parents): bb 2. (Kittens): Bb **(Three points)**	
		(iii)	*Heterozygous	
		(iv)	One of each type of allele **or** 'Bb'	
		(v)	B and b [*both letters must be given for any marks to be awarded*] **(Two points)**	
		(vi)	Different forms of the same gene **or** B,b	
	(c)	(i)	1. Thymine **or** T 2. Cytosine **or** C	**2(6)+6(2)**
		(ii)	Nucleus	
		(iii)	Messenger **or** m (RNA)	
		(iv)	Ribosome	
		(v)	Amino acids	
		(vi)	It must fold (into its functional shape)	

12.	(a)	(i)	(The sum of all) the chemical reactions (in an organism) **or** catabolism + anabolism	**7+2(1)**
		(ii)	e.g. For movement/for heat/for making products/for internal transport **(Two points)**	
	(b)	(i)	Aerobic/respiration **(Two points)**	**3(5)+6(2)**
		(ii)	Stage 1. Cytoplasm Stage 2. Mitochondria	
		(iii)	Large	
		(iv)	(Glucose →) Ethanol [*allow 'alcohol'*]/ + CO_2 /+ energy **(Two points)**	
		(v)	e.g. Brewing **or** bread making	
		(vi)	Lactic acid	
	(c)	(i)	Diagram *[test tube + water + plant]* Labels [*three labels]*	**3,0** **3(1)**
		(ii)	Vary light: lamp at different distances from plant **OR** Vary CO_2 conc.: different concs of $NaHCO_3$ solution	**3(5)+3(1)**
		(iii)	(Counted number of) bubbles/per unit time **(Two points)**	
		(iv)	As either light intensity or CO_2 conc. increases, the rate of photosynthesis increases.	
		(v)	Extra CO_2/increase temperature/growth promotors/increase light/ add fertilizer **(Two points)**	
13.	(a)	(i)	(One which contains) all the food types/in correct **or** suitable **or** optimum proportions **(Two points)**	**7+2(1)**
		(ii)	Autotrophic nutrition: Food synthesised from simple molecules **or** produces own food **(Either point answered)** Heterotrohic nutrition: Already synthesised food consumed from other organisms **or** food from other sources	
	(b)	(i)	The breaking down of food	**3(5)+6(2)**
		(ii)	1. Cutting (food) 2. Chewing/grinding (food)	
		(iii)	(Muscular) contractions/in the walls of the alimentary canal/to move food **(Two points)**	
		(iv)	1. Churned 2. pH changes **or** broken down by acid **or** broken down by enzymes **or** proteins → peptides	
		(v)	0 − 3	
		(vi)	Duodenum **or** small intestine	
	(c)	(i)	1. Pancreas: Makes enzymes **or** makes neutralising secretion **or** makes $NaHCO_3$ 2. Gall bladder: Stores bile **or** releases bile	**2(6)+6(2)**
		(ii)	Small intestine **or** duodenum **or** jejunum **or** ileum	
		(iii)	(Hepatic) portal vein	
		(iv)	Heat generation/vitamin storage/iron storage/makes cholesterol/makes bile/deamination of amino acids/detoxification of poisons/makes plasma protein/breaks down blood cells **(Two points)**	
		(v)	Synthesise vitamins/out-compete pathogens **or** complement immune system /break down fibre **(Two points)**	

14.			**Any two parts from (a), (b), (c)**	**30, 30**
	(a)	(i)	A = prostate; B = urethra; C = testis; D = vas deferens **or** sperm duct	**2(6)+6(2)**
		(ii)	To carry sperm [*allow 'to carry semen'*]	
		(iii)	Testosterone	
		(iv)	Deep voice/enlarged testes/enlarged penis/facial hair/chest hair/underarm hair/pubic hair/extra sebum/distinctive musculature/increase sex drive **(Two points)**	
		(v)	Diagram *[must have head and tail for 3 marks]* Labels *[three labels]*	**3, 0** **3(1)**
	(b)	(i)	Mother's and child's **(Single point)**	**3(6)+6(2)**
		(ii)	To allow nutrients/O_2/antibodies to pass to child/to allow CO_2 out/to allow waste to pass to mother/to synthesise progesterone/ to prevent mixing of mother's and child's blood/to protect foetus from mother's blood pressure **(Two points)**	
		(iii)	Oxytocin increases/progesterone decreases/uterus contracts/waters break/cervix dilates/baby out/usually head first/cord cut /placenta out **(Three points)**	
		(iv)	Ideal nutrient **or** antibodies **or** mother-baby bond **or** reduced infection	
		(v)	Condom/pill/IUD/cap/diaphragm/spermicide/ mucus monitoring/sympto-thermal/vasectomy/tubectomy/ surgical/chemical/mechanical/natural/rythym/implants **(Two points)**	
	(c)	(i)	Fusion of gametes **or** formation of zygote	**2(6) +2(3) + 6(2)**
		(ii)	1. Embryo sac **or** ovule **or** ovary **or** carpel 2. Carpel **or** ovary **or** receptacle	
		(iii)	Embryo: (part of seed that) becomes the new plant Dispersal: spreading of seeds.	
		(iv)	Blackberries: Animals Sycamore fruit: Wind	
		(v)	Germination	
		(vi)	Suitable temperature/moisture/O_2 [*Allow 'pH' and allow 'light' if light is linked to 'some seeds' or specifically named seed*] **(Two points)**	

15.			**Any two parts from (a), (b), (c)**	**30, 30**
	(a)	(i)	Root hairs	**2(6) +6(2)**
		(ii)	Osmosis	
		(iii)	Xylem [*allow dermal **or** ground **or** vascular **or** phloem*]	
		(iv)	Diagram: *[any two valid structures for three marks]* Labels: vessel **or** tracheid/pits **or** rings **or** spirals/lignin/hollow **or** dead [*allow valid labels for other given tissue*] [*three labels*]	**3, 0** **3(1)**
		(v)	Root pressure **or** cohesion **or** adhesion **or** capillarity **or** transpiration	
		(vi)	Amount of water moving through the plant: decreases **(One point)** Reason: photosynthesis stops **or** stomata close in darkness **or** night-time is cooler **(One point)**	
		(vii)	Thorns/stings/bad taste/poison/mimicry/cuticle/heat shock proteins **(Two points)**	
	(b)	(i)	A = Shoulder blade; B = Humerus; C = Ulna	**3(6) + 6(2)**
		(ii)	Tendons	
		(iii)	Biceps	
		(iv)	(Two) muscles that work in opposition to each other	
		(v)	Hinge **or** synovial **or** moveable	
		(vi)	Protection **or** body support **or** shape **or** blood cell production **or** muscle attachment	
		(vii)	To be light **or** to allow flight	
	(c)	(i)	Diagram: [*hypha and sporangiophore as minimum*] Labels: hypha/sporangium/sporangiophore	**5, 3, 0** **3(1)**
		(ii)	Secretes enzymes/onto bread/digests/absorbs products **(Two points)**	**2(6) + 5(2)**
		(iii)	Saprophytic	
		(iv)	It breaks down dead organisms **or** recycling of nutrients **or** reusing	
		(v)	Fungi	
		(vi)	Name or effect: Rhizopus **or** mildew **or** rusts **or** smuts **or** blight **or** dry rot (fungus) **or** athlete's foot (fungus)	
		(vii)	Some could be poisonous [*allow 'would make you sick'*]	