Coimisiún na Scrúduithe Stáit
State Examinations Commission

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Bitheolaíocht	**Gnáthleibhéal**

Marking Scheme	Leaving Certificate Examination, 2007
Biology	**Ordinary Level**

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LEAVING CERTIFICATE EXAMINATION 2007

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.
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: : t~~ransfer 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 <u>no surplus answer</u>, 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 / alu~~minium~~ – 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.

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. any five questions 5(20)

1. any four **4(5)**

(a) oxygen
(b) B or C
(c) iodine or potassium iodide
(d) water [allow cytoplasm or cytosol or plasmosol]
(e) glycerol

2. **4 (5)**

Column A	Column B
biosphere	All parts of the earth and its atmosphere where life exists
ecosystem	A community of organisms and their environment
niche	The role of an organism in an ecosystem
habitat	Place where an organism lives

3. **5(4)**

(a) F
(b) T
(c) T
(d) T
(e) T

4. **5(4)**

(a) inheritance or heredity or chromosomes or genes or DNA
(b) XY
(c) 23
(d) RNA
(e) mutation [*allow* genetic engineering]

5. **6 (3) + 2**

(a) **B** = flower or named part of flower [allow leaf] **C** = shoot or stem **E** = fruit or tomato
(b) A – photosynthesis or transpiration or gas exchange [allow storage of food or release of waste products]
D – anchorage or support or absorption of water or absorption of minerals or storage or reproduction
(c) reproduction or seed dispersal [allow attract animals or food for animals]
(d) xylem or vascular tissue[allow phloem]

6. **5(4)**

(a) ligament [allow capsule]
(b) holds bones together [allow retains fluid]
(c) cartilage
(d) synovial
(e) lubrication or shock absorption or protection

Section B any two questions 2(30)

7.	(a)	(i)	protein	**3**
		(ii)	ribosome	**3**
	(b)	(i)	name of enzyme	**6**
		(ii)	name of substrate [must match enzyme]	**3**
		(iii)	water bath or ice or thermostat	**3**
		(iv)	buffer	**3**
		(v)	time / change (colour, height of foam, etc.) **OR** **s**ensor / data logger	**2(3)**
		(vi)	activity increases or enzyme has an optimum or graph showing increase	**3**
8.	(a)	(i)	growth or maintenance or repair or enzymes or antibodies or hormones [allow energy]	**3**
		(ii)	nitrogen	**3**
	(b)	(i)	names of foods [allow any two substances containing protein]	**2(3)**
		(ii)	biuret (NaOH or KOH and copper sulphate) or other correct test [allow 3 marks for one chemical]	**6**
		(iii)	no	**3**
		(iv)	blue	**3**
		(v)	purple or violet	**3**
		(vi)	no	**3**
9.	(a)	(i)	quantity or number or amount or frequency or percentage	**3**
		(ii)	a square or (unit) area [allow diagram]	**3**
	(b)	(i)	random location or explained (e.g. throwing implies randomness) counted or observed presence or absence or measured cover	**6** **3**
		(ii)	more accurate or reduce error	**3**
		(iii)	key or diagrams or photos or reference to characteristic such as colour or shape	**3**
		(iv)	map or table or chart or report	**3**
		(v)	Yes or No Yes if animal is sessile or slow moving No if animal moves too fast or is too big [if answer is No, accept alternative method for quantitative study of animals]	**3**

Section C any **four** questions **4 (60)**

10. (a) (i) sun [allow light] **6**
(ii) photosynthesis **3**

(b) (i) seaweed or plant plankton **3**
(ii) plant plankton **3**
(iii) mussels or fish **3**
(iv) eat plants or are herbivores **3**
(v) seaweed – periwinkles – crabs – fish or birds **4(3)**
plant plankton – animal plankton – mussels - birds
plant plankton – animal plankton – fish – seals or birds
[allow 6 marks for a correct food chain from another ecosystem]

(c) (i) name of ecosystem **3**
(ii) name of animal **3**
matching method (e.g. traps, nets, by hand, etc.) **3**
(iii) description of adaptation of **named** organism (structural or behavioural) **3**
(iv) environmental or non-living **3**
(v) two abiotic factors **2(3)**
(vi) how each measured **2(3)**

11. (a) (i) cells which have the same function or specialised cells **3**
(ii) names of **two** tissues **2(3)**

(b) (i) growing cells or tissue (in a laboratory or in sterile conditions) **6**
(ii) oxygen or air **3**
(iii) 37 ^{0}C (plus or minus 2 degrees) or body temperature **6**
(iv) to prevent bacterial growth or contamination **3**
(v) mitosis **3**
(vi) plant breeding or micropropagation or cancer research or antibodies **3**
[allow stem cells or cloning]

(c) (i) unit or particle of heredity or code for protein or section of DNA **3**
(ii) on a chromosome **3**
(iii) allele – a form of a gene or example (e.g. B and b) **3**
dominant – masks recessive allele or expressed in heterozygous condition or explained **3**
(iv) Punnet square with all gametes **3**

	B	**b**
B	BB	Bb
b	Bb	bb

Genotypes: BB, Bb, bb **3(2)**
Phenotypes: brown and blue **4**
association of any one genotype with correct phenotype **2**

12. (a) (i) release of energy/ from food or basic equation **2(3)**
(carbohydrate or named + oxygen/ carbon dioxide + water + energy)

(ii) (aerobic respiration) needs oxygen or (anaerobic respiration) does not need oxygen **3**

(b) (i)

Type of respiration	Energy Source	End products	
Aerobic respiration	Glucose	**carbon dioxide/ water / ATP**	**2(3)**
Anaerobic respiration in muscle	Glucose	**lactic acid**	**3**
Anaerobic respiration by yeast	Glucose	**alcohol/ carbon dioxide/ATP**	**2(3)**

(ii) cytoplasm or cytosol **3**

(iii) mitochondrion **3**

(iv) stage 2 [allow aerobic] **3**

(c) (i) diagram (glass container, anaerobic method, solution) **6, 3, 0**
[one missing 3 marks, two missing 0 marks]
labels **3(2)**

(ii) to remove oxygen or air or to sterilise water or to prevent yeast death
or to prevent enzyme denaturation **3**

(iii) layer of oil or fermentation trap **3**

(iv) reagent/ condition (heat or acidification) / result **6 + 3**

13. (a) (i) capsule or slime layer or mucilage **3**
protection **3**

(ii) flagellum or plasmid **3**

(b) (i) autotrophic nutrition – makes own food **3**
heterotrophic – uses food already made (made by other organisms) **3**

(ii) feed on dead matter **3**

(iii) decompose dead organisms or recycle nutrients **3**

(iv) obtain energy (make food) from chemical reactions **3**

(v) host **3**

(vi) TB/ syphilis/ cholera/ tetanus/ sore throat/ names of bacteria/ etc. **2(3)**

(c) (i) diagram (stolon, rhizoid, sporangiophore) **6, 3, 0**
[one missing, 3 marks only]
labels **3(2)**

(ii) sporangiophores grow upwards/ sporangium formed/ haploid/ spores produced/ dries up/
splits/ spores released/lands on substrate/germinates to produce hypha **3(2)**

(iii) A = gametangium B = zygospore [allow zygote or cyst] **2(3)**

(iv) withstands unsuitable conditions or remains dormant or dispersal
or reproduction or survival or prevents dessication **3**

14. any **two** of (a), (b), (c). **2(30)**

(a) **3(6) + 6(2)**

(i) between dermal and vascular or in cortex or filling or packing (tissue)

(ii) stores food or carries out photosynthesis or stores waste or gives support or strength or allows movement of water or gas

(iii) region of mitosis or of cell division or of growth or dividing tissue

(iv) root tip or shoot tip or vascular bundle or bud or under bark

(v) root
shape of xylem/ root hairs/ single or central vascular bundle <u>any two</u>

(vi) X/ Y in correct positions

(b) **6 + 2(5) + 7(2)**

(i) getting rid of waste products

(ii) carbon dioxide/ urine (urea or uric acid or urate)/ water/ sweat/ bile/ salt <u>any two</u>

(iii) skin or lungs or liver

(iv) balancing salt or water concentration

(v) 1. cortex [allow Bowman's capsule]
2. medulla [allow cortex or Loop of Henle or convoluted tubule]
3. bladder
4. aorta

(vi) urine [allow water]

(c) **3(6) + 6(2)**

(i) D

(ii) pollination – transfer of pollen
fertilisation – fusion of gametes or of sex cells
[allow fusion of egg and sperm or of "pollen" and egg cell]

(iii) endosperm or cotyledon or seed leaf

(iv) growth / of embryo plant or of seed

(v) oxygen/ water/ suitable temperature or warmth [allow light]

15. any **two** of (a), (b), (c). **2(30)**

(a) **6 + 2(5) + 7(2)**

(i) sensory or receptor/ inter-or relay or connector/ motor or effector

(ii) A → B → C

(iii) synaptic cleft or synapse

(iv) to carry impulse/ across gap

(v) example of action
example of reaction

(vi) fast response or defence against injury

(b) **6, 3, 0 for diagram + 2(6) + 4(3)**

(i) diagram (epidermis or cuticle, rectangular cells, air spaces)
labels (stoma, guard cell)

(ii) controls stomatal size [allow controls passage of gas or water vapour]

(iii) carbon dioxide/ oxygen/ nitrogen/ water vapour <u>any two</u>
[allow maximum of 3 marks if air alone mentioned]

(iv) diffusion or passive transport

(c) **6 + 2(5) + 7(2)**

(i)

Stomach	an organ for churning of food to chime
Peristalsis	waves of contractions passing along the gut
Molar teeth	grind food into smaller pieces
Lipase	an enzyme that turns fats to fatty acids and glycerol
Bile salts	emulsify fats
Symbiotic bacteria	produce vitamins

(ii) absorption/ villi/ protein (or polypeptides or peptides or name protein or source of protein)/ carbohydrates (polysaccharides or disaccharides or sugar or named carbohydrate or source of carbohydrate)