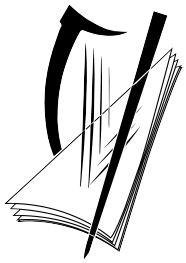

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2017

Marking Scheme

Biology

Ordinary Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.

INTRODUCTION

1. The marking scheme is a guide to awarding marks to candidates' answers. It is a concise and summarised guide and is constructed so as to minimise its word content.
2. Examiners must conform to the scheme, as qualified by the following points, and may not award marks for answering outside this scheme.
3. The scheme contains key words or phrases for which candidates may be awarded marks. This does not usually preclude synonyms or phrases which convey the same meaning as the answer in the marking scheme.
4. Although synonyms are generally acceptable, there may be instances where the scheme demands an exact scientific term and equivalent non-scientific or colloquial terms are not acceptable.
5. In relation to particular answers, the scheme may include the words "any valid answer" and examiners will use their professional judgement to determine the validity of the answer. If in doubt, examiners should consult with their advising examiner before awarding marks.
6. A key word or phrase may be awarded marks only if it is presented in the correct context.
7. Where it comes to the attention of an examiner that a candidate has presented a valid answer and there is no provision in the scheme for accepting this answer, then the examiner must first consult with his/ her advising examiner before awarding marks.

CANCELLED ANSWERS

The following is an extract from S.63 *Instructions to Examiners 2017, 7.3, p.25.*
"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/ 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:
(i) chitin, lignin:-
There is a surplus answer, which is incorrect, so the candidate scores 4–4 marks = 0.
(ii) ~~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.

(iii) lignin, ~~chitin~~:-
There is a surplus answer, which is incorrect, but it has been cancelled. The candidate has given more than one answer but the cancelling can be accepted and he/ she may be awarded 4 marks.
(iv) ~~lignin~~, chitin:-
The correct answer has been cancelled and replaced with an incorrect one, so no marks are awarded.
In Sections B and C, where a specific number of points is asked for, and the candidate answers by providing a list of options, the examiner will only consider the first one, two or three items offered (as appropriate) even if a correct answer appears later in the list.

MARKING SCHEME CONVENTIONS

1. Where there is a range of possible parts in an answer, words, terms, or phrases for which marks are to be awarded are separated by a solidus (/).
2. The mark allocated to an answer is indicated in bold next to the answer, or at the head of the question or section.
3. 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.
4. 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, with a total of 20 marks allocated to the question. In such a case the marking scheme might be as follows: **2 (4) + 4 (3).** This means that the first two correct answers encountered are awarded 4 marks each and each subsequent correct answer is awarded 3 marks.
5. A word, term or phrase that appears in curved brackets is not a requirement of the answer and is given as a possible alternative phrasing, or 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.
6. In Section C, examiners are directed not to read anything a candidate may have written on the question paper unless the candidate, in the answer book, makes specific reference to a particular part of a question having been answered where the question appears on the question paper.

Section A				
1				**5(4)**
	(a)		*Lipids composed of C, H, and:* Oxygen or O	(1 pt)
	(b)		*Function of lipids:* e.g. Energy, insulation [*allow* cell membrane]	(1 pt)
	(c)		*Water-soluble vitamin:* B or C	(1 pt)
	(d)		*Mineral needed by plants:* e.g. Magnesium	(1 pt)
	(e)		*Amino acids subunits of:* Protein	(1 pt)
2				**5(4)**
			Helix: E	(1 pt)
			Musca: B	(1 pt)
			Chilopod: D	(1 pt)
			Nematode: A	(1 pt)
			Planarian: C	(1 pt)
3				**5(4)**
	(a)		*DNA cut with:* Enzyme	(1 pt)
	(b)		*Removal of DNA from cell:* Isolation	(1 pt)
	(c)		*Ring of DNA in bacteria:* Plasmid	(1 pt)
	(d)		*Produced by GE bacteria:* Insulin	(1 pt)
	(e)		*Application of GE in plants:* Weed-killer resistance	(1 pt)
4				**6(3) + 2**
	(a)		*A =* Liver *B =* Stomach *C =* Pancreas	(3 pts)
	(b)		*Stored in gallbladder:* Bile [*allow* gall]	(1 pt)
	(c)		*Function of liver:* e.g. Stores glycogen, breaks down alcohol	(1 pt)
	(d)		*Muscle contraction in alimentary canal:* Peristalsis	(1 pt)
	(e)		*Causes heartburn:* Acid	(1 pt)
5				**6(3) + 2**
	(a)		*Enzymes made from carbohydrates:* FALSE	(1 pt)
	(b)		*Enzyme reacts with substrate:* TRUE	(1 pt)
	(c)		*Enzyme reactions specific:* TRUE	(1 pt)
	(d)		*Amylases digest lipids:* FALSE	(1 pt)
	(e)		*pH change affects enzyme activity:* TRUE	(1 pt)
	(f)		*Enzyme molecules are folded:* TRUE	(1 pt)
	(g)		*Immobilised enzymes have lost function:* FALSE	(1 pt)
6				**6(3) + 2**
	(a)		*Rhizopus kingdom:* Fungi	(1 pt)
	(b)		*Another fungus:* e.g. Yeast	(1 pt)
	(c)		*A =* Hypha or stolon *B =* Rhizoid *C =* Sporangium	(3 pts)
	(d)		*Fungal economic importance:* e.g. Brewing/ baking/ disease	(2 pt)

Section B				
7				
	(a)		*Two stem functions:*	**5 + 1**
		(i) / (ii)	e.g. Transport/ support [*allow* photosynthesis, food storage]	(2 pts)
	(b)		*Dicot stem T.S.*	**2(6) + 6(2)**
		(i)	*Plant used:* e.g. Begonia	(1 pt)
		(ii)	*Why herbaceous:* Easier to cut	(1 pt)
		(iii)	*1. Cut with:* Backed blade or scalpel	(1 pt)
			2. What kind of T.S.: Thin	(1 pt)
		(iv)	*How transfered to slide:* e.g. Paintbrush	(1 pt)
		(v)	*Which diagram:* B	(1 pt)
		(vi)	2 *Tissues labelled:* Vascular and dermal on either diagram.	(2 pts)
8				
	(a)			**5 + 1**
		(i)	*Gas absent in anaerobic respiration:* Oxygen	(1 pt)
		(ii)	*More or less energy released:* Less	(1 pt)
	(b)			**3(4) + 6(2)**
		(i)	*1. Flask with yeast:* A *2.*	(1 pt)
			2. Reason for choice Bubbles (or CO_2)	(1 pt)
		(ii)	*Other flask:* Control	(1 pt)
		(iii)	*In original solution:*	
			1. Glucose or sugar	(1 pt)
			2. Water	(1 pt)
		(iv)	*Why waterbath:* To keep temperature constant	(1 pt)
		(v)	*Why fermentation lock:* To keep oxygen out or to avoid contamination	(1 pt)
		(vi)	*Alcohol test:* Iodoform [*allow* dichromate]	(1 pt)
			Positive colour: Yellow [*allow* green if dichromate used]	(1 pt)
9				
	(a)			**5 + 1**
		(i)	*From:* High(er) (conc. of water molecules)	(1 pt)
		(ii)	*To:* Low(er) (conc. of water molecules)	(1 pt)
	(b)			**6 + 3(2) + 4(3)**
		(i)	*Diagram of osmosis set-up:* Two solutions and a membrane	6,3,0
			Labels: e.g. Water/ salt or sugar soln./ *Visking* tubing or potato	3(2)
		(ii)	*Control:* e.g. Only water in tubing or boiled potato	(1 pt)
		(iii)	*Result:* e.g. Tubing heavier or tubing lighter or tubing swollen or more liquid in scooped out potato	(1 pt)
		(iv)	*Explain result:* Water moved from higher conc. of water molecules or to lower conc. of water molecules	(1 pt)
		(v)	*How salty water stops microorganisms growing:* Microorganisms (or named) dehydrated	(1 pt)

Section C				
10				
	(a)			**7 + 2(1)**
		(i)	*Phenotype:* (Physical) expression of the genotype [*allow* (physical) appearance]	(1 pt)
		(ii)	*Monohybrid:* One (characteristic)	(1 pt)
		(iii)	*Heterozygous:* (Alleles) different	(1 pt)
	(b)			**9(3)**
		(i)	*Other stage of cell cycle:* Interphase	(1 pt)
		(ii)	*Both types of cell division:* Mitosis	(1 pt)
			Meiosis	(1 pt)
		(iii)	*Chromosomes made of:* DNA	(1 pt)
			Protein	(1 pt)
		(iv)	*Function of spindle fibres:* To contract or to separate chromosomes	(1 pt)
		(v)	*How many chromosomes in each new cell here:* Four	(1 pt)
		(vi)	*Causes of cancer:* e.g. Radiation/ smoking/ viruses/ genetics	(2 pts)
	(c)			**8(3)**
		(i)	*Mutation:* Change in the genetic material (or named) (of a cell)	(1 pt)
		(ii)	*Example of disease caused by mutation:* e.g.Huntington's disease	(1 pt)
		(iii)	*Two symptoms:* e.g. Restlessness/ difficulty walking/ difficulty thinking/ difficulty remembering	(2 pts)
		(iv)	*Mutagen:* Causes mutations	(1 pt)
		(v)	*Two mutagen examples:* e.g. Gamma rays/ asbestos	(2 pts)
		(vi)	*Copies of a chromosome in a gamete:* One	(1 pt)
11				
	(a)			**7 + 2(1)**
		(i)	*Why plants producers:* Make their own food	(1 pt)
		(ii)	*Main source of energy:* Sun	(1 pt)
		(iii)	*Interlinked food chains:* Food web	(1 pt)
	(b)			**9(3)**
		(i)	*Plant spreading on riverbanks:* (Giant) hogweed	(1 pt)
		(ii)	*Skin damage caused:* Blisters	(1 tp)
		(iii)	*Species:* Organisms that can interbreed/ to produce fertile offspring	(2 pts)
		(iv)	*Zebra mussels from:* The Black Sea	(1 pt)
		(v)	*What attacking earthworms:* New Zealand flatworms	(1 pt)
		(vi)	*Earthworm importance in soil:* e.g. Drainage/ aeration	(2 pts)
		(vii)	*Non-native resident animal:* e.g. Sheep/ pigs	(1 pt)
	(c)			**8(3)**
		(i)	*Name of ecosystem studied:* Name	(1 pt)
		(ii)	*One plant and one animal:* Must match (c)(i)	(2 pts)
		(iii)	*Quantitative survey:* Count or estimate number of organisms	(1 pt)
		(iv)	*Quantitative survey description - plant:* Quadrat/ random/ how random/ count plants (or estimate cover)/ record/ repeat or scale up OR *Quantitative survey description - animal:* Capture/ mark or how mark/ count/ release/ recapture/ count marked/ calculation	(4 pts)

12				**7 + 2(1)**
	(a)			
		(i)	*Main types of reproduction:* Asexual and sexual	(2 pts)
		(ii)	*Human reproduction:* Sexual	(1 pt)
	(b)			**9(3)**
		(i)	*A =* Vagina *B =* Uterus (womb) *C =* Ovary *D =* Oviduct (Fallopian tube) *E =* Endometrium (womb lining)	(5 pts)
		(ii)	*Function of C:* To produce eggs or to produce hormones (or named hormone)	(1 pt)
		(iii)	*Where fertilisation:* D or oviduct	(1 pt)
		(iv)	*Contraception:* Prevention of fertilisation or prevention of pregnancy	(1 pt)
		(v)	*Contraception method:* e.g. (The) Pill or condom	(1 pt)
	(c)			**8(3)**
		(i)	*Length of pregnancy:* Nine months or 38-40 weeks	(1 pt)
		(ii)	*Stage1:* Contractions begin or waters break or cervix dilates	(1 pt)
			Stage 2: Baby born through vagina	(1 pt)
			Stage 3: Placenta out through vagina	(1 pt)
		(iii)	*1. Progesterone level at birth:* Falls	(1 pt)
			2. Effect of oxytocin on uterus: (Muscles) contract	(1 pt)
		(iv)	*Milk hormone:* Prolactin	(1 pt)
		(v)	*Why colostrum important:* Rich in proteins (or fat) or rich in antibodies or rich in minerals	(1 pt)
13				
	(a)			**7 + 2(1)**
		(i)	*Chemical messengers:* Hormones	(1 pt)
		(ii)	*Parts of CNS:* Brain and spinal cord	(2 pts)
	(b)			**9(3)**
		(i)	*A =* Sensory *B =* Inter (or relay) *C =* Motor	(3 pts)
		(ii)	*Direction of impulse:* A to B to C	(1 pt)
		(iii)	*Reflex action example:* e.g. Blinking, knee jerk	(1 pt)
		(iv)	*Why reflex actions important:* Protection	(1 pt)
		(v)	*Gaps between neurons:* Synapses	(1 pt)
		(vi)	*Neurotransmitter function:* To carry impulse (to next neuron)	(1 pt)
		(vii)	*Neurotransmitter fate:* Broken down or recycled	(1 pt)
	(c)			**8(3)**
		(i)	*A =* Cerebrum *B =* Medulla (oblongata) *C =* Cerebellum	(3 pts)
		(ii)	*Function of B:* e.g. Controls breathing/ controls swallowing/ controls heart beat/ controls involuntary muscles	(1 pt)
		(iii)	*Function of C:* (Muscle) co-ordination or balance	(1 pt)
		(iv)	*Protect brain:* Skull and meninges [*allow* membranes]	(2 pts)
		(v)	*Homeostasis:* Maintaining a constant internal environment (in the body)	(1 pt)

14				
	(a)			**10(3)**
		(i)	*Metabolism:* All the chemical reactions in a body or in a cell	(1 pt)
		(ii)	*1. Photosynthesis:* Anabolism *2. Respiration:* Catabolism	(2 pts)
		(iii)	*Why organisms need energy:* e.g. Movement/ heat/ growth	(2 pts)
		(iv)	*Where stage 1 respiration:* Cytoplasm	(1 pt)
		(v)	*Where stage 2 respiration:* Mitochondrion	(1 pt)
		(vi)	*Which type respiration gives acid:* Anaerobic	(1 pt)
		(vii)	*Which acid:* Lactic	(1 pt)
		(viii)	*Fate of acid:* Broken down	(1 pt)
	(b)			**10(3)**
		(i)	*Photosynthesis pigment:* Chlorophyll	(1 pt)
		(ii)	*Photosynthesis organelles:* Chloroplasts	(1 pt)
		(iii)	*Opening B:* Stoma	(1 pt)
		(iv)	*Cells C:* Guard cells	(1 pt)
		(v)	*Gas for photosynthesis:* Carbon dioxide	(1 pt)
		(vi)	*Water photolysis products:* Protons (H^+)/ electrons/ oxygen	(3 pts)
		(vii)	*Improve photosynthesis rate by:* Brighter light/ more carbon dioxide/ increased temperature	(2 pts)
	(c)			**10(3)**
		(i)	*Organ:* Group of tissues working together	(1 pt)
		(ii)	*Plant organ:* e.g. Leaf	(1 pt)
			Animal organ: e.g. Heart	(1 pt)
		(iii)	*Tissue:* Group of similar cells working together	(1 pt)
		(iv)	*Plant tissue:* e.g. Xylem	(1 pt)
			Animal tissue: e.g. Blood	(1 pt)
		(v)	*1. Gas needed for animal tissue growth:* Oxygen *2. Gas produced by animal tissue growth:* Carbon dioxide *3. Why sterile conditions:* To prevent growth of microorganisms *4. Cell division in tissue culture:* Mitosis	(4 pts)

15				
	(a)			**10(3)**
		(i)	*A =* Optic nerve *B =* Retina *C =* Lens	(3 pts)
		(ii)	*Iris function:* To control the amount of light entering the eye	(1 pt)
		(iii)	*Where rods and cones:* B or retina	(1 pt)
		(iv)	*Function of rods:* Monochrome vision or work in dim light	(1 pt)
		(v)	*A connects eye to:* Brain	(1 pt)
		(vi)	*Ear part corresponding to retina:* Cochlea or semicircular canals	(1 pt)
		(vii)	*Two other sense organs:* e.g. Tongue/ nose/ skin	(2 pts)
	(b)			**10(3)**
		(i)	*A =* Artery *B =* Vein *C =* Capillary	(3 pts)
		(ii)	*1. Carries blood towards heart:* B or vein *2. Contains valves:* B or vein *3. Brings blood to heart muscle:* A or artery [*allow* C or capillary] *4. Has a pulse:* A or artery *5. Delivers substances to cells:* C or capillary	(5 pts)
		(iii)	*Keep circulatory system healthy by:* e.g. Exercise/ do not smoke/ low-fat diet	(2 pts)
	(c)			**3** **+ 6 + 3(2)** **+ 5(3)**
		(i)	*Other gas excreted:* Water	(1 pt)
		(ii)	*Diagram lungs:* Trachea, lung outline, bronchus, bronchiole or alveolus *Labels:* Lung/ trachea/ bronchus/ bronchiole/ alveolus	6, 3, 0 3(2)
		(iii)	*Function of diaphragm:* To help vary the thoracic volume	(1 pt)
		(iv)	*What intercostals doing during inhalation:* Contracting	(1 pt)
		(v)	*Breathing system disorder:* e.g. Asthma or bronchitis	(1 pt)
		(vi)	*Possible cause of disorder:* Must match disorder *Possible treatment:* Must match disorder	(2 pts)

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