Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2018

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 2018, 7.3, p.26.*
"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			**9 + 8 + 3(1)**	
	(a)		*Proteins made of C, H, O, and:* Nitrogen	(1 pt)
	(b)		*Monosaccharide example:* e.g. Glucose	(1 pt)
	(c)		*Solution used to test for reducing sugar:* Benedict's or Fehling's	(1 pt)
	(d)		*Mineral needed for healthy bones:* Calcium or phosphorus	(1 pt)
	(e)		*Glycerol part of which biomolecule:* Lipid	(1 pt)
2			**8 + 7 + 5(1)**	
	(a)		*A =* Ligament *B =* Cartilage *C =* (Synovial) fluid	(3pts)
	(b)		*Elbow joint:* Hinge	(1 pt)
	(c)		*Join muscle to bone:* Tendons	(1 pt)
	(d)		*Musculoskeletal disorder:* Arthritis **or** osteoporosis	(1 pt)
	(e)		*Treatment for named disorder:* Matching treatment	(1 pt)
3			**9 + 8 + 3(1)**	
	(a)		*Immobilised enzyme advantage:* Reusable	(1 pt)
	(b)		*Gel in which enzymes are trapped:* Alginate	(1 pt)
	(c)		*Example of immobilised enzyme:* Pectinase	(1 pt)
	(d)		*Substance that hardens the gel beads:* Calcium chloride	(1 pt)
	(e)		*Immobilised enzymes may be in:* Washing powder	(1 pt)
4			**8 + 7 + 5(1)**	
	(a)		*A =* Penis *B =* Testis *C =* Urethra [*allow* sperm duct or vas deferens]	(3pts)
	(b)		*Sperm cells produced in:* Testis or B	(1 pt)
	(c)		*Named male sex hormone:* Testosterone	(1 pt)
	(d)		*Infertility:* Inability to produce offspring	(1 pt)
	(e)		*A cause of male infertility:* e.g. Low sperm count	(1 pt)
5			**8 + 7 + 5(1)**	
	(a)		*A control is used for comparison in experiments:* TRUE	(1 pt)
	(b)		*Information collected in experiment is data:* TRUE	(1 pt)
	(c)		*A hypothesis is a proven idea:* FALSE	(1 pt)
	(d)		*Replicating an experiment means repeating it:* TRUE	(1 pt)
	(e)		*A theory is a disproved hypothesis:* FALSE	(1 pt)
	(f)		*A variable never changes:* FALSE	(1 pt)
	(g)		*Scientific discoveries are first published in newspapers:* FALSE	(1 pt)
6			**4(4) + 4(1)**	
	(a)		*D =* Vacuole *E =* Nucleus	(2 pts)
	(b)		*Two structures that indicate it is a plant cell:* (Cell) wall/ (large) vacuole/ chloroplast(s) ***Any two***	(2 pts)
	(c)		*Cell membrane made of:* Lipid and protein	(2 pts)
	(d)		*Which part made of cellulose:* (Cell) wall or B	(1 pt)
	(e)		*Type of microscope that shows ultrastructure:* Electron (microscope)	(1 pt)

Section B				
7	(a)		**5 + 1**	
		(i)	*A muscle involved in breathing:* Intercostal(s) or diaphragm	(1 pt)
		(ii)	*Lung structures in which gas exchange takes place:* Alveoli (or air sacs) [*allow* capillaries]	(1 pt)
	(b)		**2(9) + 6(1)**	
		(i)	*How resting rate measured:* Count pulse or count breaths/ time or rate/ repeat or average	(3 pts)
		(ii)	*Steps to complete investigation:* Exercise/ measure rate afterwards	(2 pts)
		(iii)	*Unfit student =* B *Fit student =* A	(2 pts)
		(iv)	*Reason for choice:* Unfit student's rate increases by much more than fit student's rate or *vice versa*	(1 pt)
8	(a)		**5 + 1**	
		(i)	*Enzyme:* Biological catalyst	(1 pt)
		(ii)	*Biomolecule enzymes made from:* Protein	(1 pt)
	(b)		**2(9) + 6(1)**	
		(i)	*Enzyme used:* Named enzyme	(1 pt)
		(ii)	*Substrate used:* Matching substrate	(1 pt)
		(iii)	*How temperature varied:* Water bath(s)/ at different temperatures	(2 pts)
		(iv)	*How enzyme activity rate measured:* Relevant change/ per unit time	(2 pts)
		(v)	*How pH kept constant:* Buffer (solution)	(1 pt)
		(vi)	*Result of investigation:* e.g. Increased activity as temperature increases **or** enzyme stops working after a certain temperature	(1 pt)
9	(a)		**5 + 1**	
		(i)	*Digestion means:* Breakdown of food	(1 pt)
		(ii)	*Carbohydrate stored in a seed:* Starch	(1 pt)
	(b)		**2(9) + 6(1)**	
		(i)	*Which type of agar:* Starch (agar) or (skimmed) milk (agar)	(1 pt)
		(ii)	*How batch B seeds treated:* Boiled	(1 pt)
		(iii)	*Why boiled:* To kill seeds or to denature enzymes [*do not allow* to kill enzymes]	(1 pt)
		(iv)	*Why seeds cut-face-down on agar:* To allow enzymes to diffuse into agar	(1 pt)
		(v)	*Solution poured over agar:* Iodine or biuret [*must match (b) (i)*]	(1 pt)
		(vi)	*Presence of which substance revealed:* Starch **or** protein [*must match (b) (i)and (b) (v)*]	(1 pt)
		(vii)	*Result for untreated seeds (batch A):* Clear under seeds *Result for treated seeds (batch B):* Blue-black or violet-purple under seeds [*allow* no clear patches] [*must match (b) (i) and (b) (v)*]	(1 pt) (1 pt)

Section C				
10	(a)			**7 + 2(1)**
		(i)	*Niche:* Role of organism (in its habitat)	(1 pt)
		(ii)	*Aquatic:* (Factors) relating to water	(1 pt)
		(iii)	*Flora:* Plants	(1 pt)
	(b)			**9(3)**
		(i)	*Producer from web:* Grass **or** blackberry	(1 pt)
		(ii)	*Omnivore from web:* Thrush	(1 pt)
		(iii)	*Herbivore from web:* Rabbit **or** mouse **or** greenfly	(1 pt)
		(iv)	*Carnivore:* Eats (only) animals	(1 pt)
		(v)	*Effect on fox population of rabbit population decline:* Decrease	(1 pt)
		(vi)	*Two reasons for decline in rabbit population:* e.g. Lack of food/ disease	(2 pts)
		(vii)	*Abiotic factor:* Non-living (factor)	(1 pt)
		(viii)	*Example of abiotic factor:* e.g. Temperature	(1 pt)
	(c)			**8(3)**
		(i)	*Kingdom to which peacock spiders belong:* Animal (kingdom)	(1 pt)
		(ii)	*Country in which peacock spiders found:* Australia	(1 pt)
		(iii)	*Peacock spiders' prey:* (Small) insects	(1 pt)
		(iv)	*How peacock spiders adapted to be predators:* Good eyesight/ can jump long distances/ camouflage ***Any two***	(2 pts)
		(v)	*How peacock spider males attract females:* Brightly-coloured abdominal flaps/ vibrating their abdomen	(2 pts)
		(vi)	*Advantage of camouflage:* Hide from predators/ hide from prey	(1 pt)
11	(a)			**7 + 2(1)**
		(i)	*Heredity:* Passing on characteristics from generation to generation	(1 pt)
		(ii)	*Gene:* Piece of DNA that codes for a protein	(1 pt)
		(ii)	*Homozygous:* Alleles are the same	(1 pt)
	(b)			**9(3)**
		(i)	*X =* Adenine or A *Y =* Guanine or G	(2 pts)
		(ii)	*Chromosomes made of DNA and:* Protein	(1 pt)
		(iii)	*Chromosome number in human cheek cell:* 46	(1 pt)
		(iv)	*Where chromosomes in a cell:* Nucleus	(1 pt)
		(v)	*Which molecule contains the base uracil:* RNA	(1 pt)
		(vi)	*Base replaced by uracil in RNA:* Thymine **or** T	(1 pt)
		(vii)	*Where in cell proteins made:* Ribosome	(1 pt)
		(viii)	*Molecule that carries DNA code to where proteins made:* mRNA	(1 pt)
	(c)			**8(3)**
		(i)	*Heterozygous plant genotype:* Tt	(1 pt)
		(ii)	*Genotypes of gametes of (i):* T and t	(2 pts)
		(iii)	*Genotype for short plant:* tt	(1 pt)
		(iv)	*Male =* XY *Female =* XX	(2 pts)
		(v)	*Why/ how males determine child's sex:* Eggs can only be X [*If no gametes mentioned, max. 1 pt*] Sperms can be X or Y	(1 pt) (1 pt)

12	(a)			**7 + 2(1)**
		(i)	Xylem and phloem	(2 pts)
		(ii)	Xylem	(1 pt)
	(b)			
		(i)	1. *Aorta =* E 2. *Hepatic portal vein =* F 3. *Pulmonary vein =* D 4. *Vena cava =* J	(4 pts) **4(3)**
		(ii)	1. *Changes to blood passing through lungs:* Oxygen gained **or** carbon dioxide lost **or** water lost 2. *Changes to blood passing through kidneys:* Carbon dioxide gained **or** oxygen lost **or** urea lost **or** water lost (or gained) **or** salt lost (or gained)	(2 pts) **6 + 3**
		(iii)	*Vessel containing oxygen-rich blood:* Pulmonary vein or D **or** aorta or E **or** renal artery or G	(1 pt) **3**
		(iv)	*Closed circulatory system:* Blood circulates (or always) in vessels	(1 pt) **3**
	(c)			**8(3)**
		(i)	*A =* Hair *B =* Blood vessel(s) *C =* Sweat gland	(3 pts)
		(ii)	*Role of hair in cooling body:*Hairs lie flat *Role of blood vessels in cooling body:* Blood vessels dilate *Role of sweat glands in cooling body:* Sweat glands make sweat	(3 pts)
		(iii)	*Two other skin functions:* Prevents water loss/ prevents pathogen entry/ sense organ/ excretory organ/ stores fat/ makes Vitamin D ***Any two***	(2 pts)
13	(a)			**7 + 2(1)**
		(i)	*Part of cell associated with photosynthesis:* Chloroplast	(1 pt)
		(ii)	*Part of cell associated with aerobic respiration:* Mitochondrion	(1 pt)
		(iii)	*Part of cell associated with anaerobic respiration:* Cytoplasm	(1 pt)
	(b)			**9(3)**
		(i)	*Gas X =* Carbon dioxide	(1 pt)
		(ii)	*Substance Y =* Glucose	(1 pt)
		(iii)	*Main source of energy for photosynthesis:* Light	(1 pt)
		(iv)	*Colour of chlorophyll:* Green	(1 pt)
		(v)	*Fate of oxygen made in photosynthesis:* Respired **or** enters atmosphere	(1 pt)
		(vi)	*Environmental factors affecting the rate of photosynthesis:* e.g. Temperature/ wind speed/ time of day/ weather ***Any two***	(2 pts)
		(vii)	*Where gas X enters plant:* Stoma(ta)	(1 pt)
		(viii)	*Process by which water enters plant:* Osmosis	(1 pt)
	(c)			**8(3)**
		(i)	*Respiration:* Release of energy/ from food (molecules)	(2 pts)
		(ii)	*Why aerobic respiration more efficient:* Releases more energy	(1 pt)
		(iii)	*Fermentation organism that makes beer and wine:* Yeast	(1 pt)
		(iv)	*Two molecules produced in the fermentation:* Ethanol/ carbon dioxide	(2 pts)
		(v)	*Gas whose absence causes muscle cramps:* Oxygen	(1 pt)
		(vi)	*Substance whose presence causes muscle cramps:* Lactic acid	(1 pt)

14	(a)			**10(3)**
		(i)	*A =* Semi-circular canal(s)/ *function =* balance	(2 pts)
		(ii)	*B =* Cochlea/ *function =* hearing	(2 pts)
		(iii)	*C =* Ear drum/ *function =* hearing	(2 pts)
		(iv)	*Eustachian tube connects middle ear to:* Throat	(1 pt)
		(v)	*Auditory nerve connects ear to:* Brain	(1 pt)
		(vi)	*Disorder of eye or of ear:* e.g. Long-sightedness **or** short-sightedness **or** hearing loss **or** glue ear *Disorder correction:* e.g. Convex lens for long-sightedness **or** concave lens for shortsightedness **or** laser surgery **or** hearing aids for hearing loss **or** grommets for glue ear	(1 pt) (1 pt)
	(b)			**10(3)**
		(i)	*Disease Edward Jenner discovered a vaccination against:* Smallpox	(1pt)
		(ii)	*How vaccination works:* Non-disease-causing/ (dose of a) pathogen/ stimulates immune response/ detail of immune response ***Any three***	(3 pts)
		(iii)	*Immunity:* Ability of the body to resist infection	(1pt)
		(iv)	*Active immunity:* Antibodies made by the body *Passive immunity:* Antibodies introduced into the body	(1pt) (1 pt)
		(v)	*Pathogen:* Disease-causing organism	(1pt)
		(vi)	*How colostrum protects babies from disease:* Contains antibodies/ contains lymphocytes/ nutritional boost (improves general health) ***Any two***	(2 pts)
	(c)			**10(3)**
		(i)	*Canine =* C *Molar =* A *Incisor =* D *Pre-molar =* B	(4 pts)
		(ii)	*Full dental formula for adult human:* <u>i2. c1. pm2. m3</u> [*Format correct: 1 pt*] i2. c1. pm2. m3 [*Numbers correct: 1 pt*]	(2 pts)
		(iii)	*Type of tooth much larger in dogs:* Canine [*allow* molar]	(1 pt)
		(iv)	*Why type of tooth is larger in dogs:* To tear (flesh or meat) [*if molar in (iii), allow* to crush bones]	(1 pt)
		(v)	1. *Liquid made by mouth glands:* Saliva 2. *Enzyme the liquid contains:* Amylase	(1 pt) (1 pt)

15	(a)			**10(3)**
		(i)	*A* = Stigma *B* = Anther *C* = Ovary (or ovule)	(3 pts)
		(ii)	*Cause of hay fever:* Pollen	(1 pt)
		(iii)	*Seeds contained in:* C or ovary (or ovule)	(1 pt)
		(iv)	1. *Dormancy:* Period of no germination or no growth (after dispersal, despite conditions necessary for germination being present) 2. *Advantages of dormancy:* Ability to survive: adverse conditions/ winter or cold/ drought/ waterlogging ***Any two***	(1 pt) (2 pts)
		(v)	1. *Seedless fruit:* e.g. Grapes 2. *Advantage of seedless fruits:* Allows artificial control of development/ more energy for fruit/ easier to eat ***Any one***	(1 pt) (1 pt)
	(b)			**10(3)**
		(i)	*A* = Phloem *B* = Xylem C = Root hair	(3 pts)
		(ii)	*Root modified for food storage:* e.g. Carrot	(1 pt)
		(iii)	*Other root functions:* To absorb water (or minerals)/ to anchor plant/ asexual reproduction ***Any two***	(2 pts)
		(iv)	*First root from seed:* Radicle	(1 pt)
		(v)	*Difference between monocot and dicot:* e.g. Monocot has parallel veins, dicot has network of veins	(1 pt)
		(vi)	*Monocot plant:* e.g. Grass/ tulip/ daffodil *Dicot plant:* e.g. Oak/ laurel/ rose	(1 pt) (1 pt)
	(c)			**10(3)**
		(i)	*Tropisms:* Growth responses of plants/ to stimuli	(2 pts)
		(ii)	*Tropism in diagram:* Phototropism	(1 pt)
		(iii)	*Other tropism stimulus:* Water **or** gravity **or** touch **or** chemicals	(1 pt)
		(iv)	*Growth regulator:* e.g. Auxin	(1 pt)
		(v)	*Uses of artificial growth regulators:* e.g. rooting powder/ fruit ripening ***Any two***	(2 pts)
		(vi)	*How thorns protect plants:* Discourage animals from eating them	(1 pt)
		(vii)	*Other plant protective features:* e.g. Stings/ cuticle/ poison ***Any two***	(2 pts)

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