Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2019

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 2019, 5.3, p.14.*

"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."

- *Sample 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.

- *Sample Question:* The walls of xylem vessels are reinforced with ……
- *Marking scheme:* lignin **4 marks**
- *Sample answer* (i) chitin, lignin:
    - There is a surplus answer, which is incorrect, so the candidate scores 4 – 4 marks = 0.
- *Sample answer* (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.

- *Sample answer* (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.
- *Sample answer* (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.

Annotations used in the marking

Annotation	Meaning
	correct
	incorrect
	surplus answer or part of answer
	blank page or part of page
	part of answer of significance
	Correct response in Q9(b)(i) **only**

Section A **Answer any 5 questions** **5(20)**

Q1

6 + 6 + 4 + 2 + 2

(a)	Any *fat-soluble vitamin:*	A, D, E, K
(b)	*Matching disorder for named vitamin:*	Named matching disorder
(c)	Proteins are made of:	Amino Acids
(d)	Named mineral needed for plants:	e.g. Magnesium etc.
(e)	*Example of polysaccharide:*	Starch

Q2

6 + 6 + 4 + 4(1)

(a)	*Order of stages:*	B, A, D, C
(b)	*When cell not dividing:*	Interphase
(c)	*Types of cell division:*	Mitosis and Meiosis (2 points)
(d)	*Uncontrolled cell division disease:*	Cancer
(e)	*Environmental causes of cancer:*	Smoking/ radiation/ virus..(2 points)

Q3

6 + 6 + 4 + 2 +2

(a)	*Photosynthesis organ:*	Leaf
(b)	*Plant transport tissue:*	Vascular
(c)	*Outer surface tissue:*	Dermal
(d)	*Dividing cell region:*	Meristem
(e)	*Stem gas exchange:*	Lenticel

Q4

6 + 6 + 4 + 4(1)

(a)	*Normal bleeding at:*	A
(b) (i)	*Fertilisation:*	X - Any day(s) from 12 to 17 (inclusive)
(b)(ii)	*Implantation:*	Y - Any day(s) from 12 to 20 (inclusive)
(c)	*Menstrual cycle hormones:*	Oestrogen and Progesterone…. (2 points)
(d)	*Cause of female infertility:*	e.g. Failure to ovulate ….
(e)	*Infertility treatment:*	e.g. IVF ….

Q5

6 + 6 + 4 + 4(1)

(a)	*The sun is our primary energy source:*	**TRUE**
(b)	*Pollution is removal of harmful substances:*	**FALSE**
(c)	*Qualitative surveys record numbers:*	**FALSE**
(d)	*Food chains are always more than five organisms:*	**FALSE**
(e)	*Herbivores feed on plants only:*	**TRUE**
(f)	*The functional role is the niche:*	**TRUE**
(g)	*Food chains start with producers:*	**TRUE**

Q6

6 + 6 + 4 + 4(1)

(a)	*Purpose of microscope:*	To magnify
(b)	*A=*	Eyepiece
	B=	Stage
	C=	Objective lens
(c)	*Why low-power first:*	Easier to locate cells
(d)	*F:*	Indicating coarse focus knob in diagram
(e)	*Why stain:*	Easier to see cells or particular parts of cells

Section B Answer any 2 questions 2(30)

Q7

(a) **4 + 2**

(i) *Where photosynthesis occurs:* Chloroplast

(ii) *Biomolecule made by photosynthesis:* Glucose

(b) **Drawing (3) + Labels - 3(3)**

(i) *Drawing to show:* Submerged plant and lamp

Labels: (any 3 points) Water Plant or named plant/ water/lamp/ glass vessel **or** named vessel /bubbles

9 + 3(1)

(ii) *How factor varied:* Moved lamp **or** varied conc. of $NaHCO_3$ solution

(iii) *How rate measured:* Number of bubbles/per minute (or per unit time)

(iv) *Source of error:* Uncooperative pondweed/ inadequate light

Q8

(a) **4 + 2**

(i) *Food rich in protein:* e.g. Meat or any valid answer

(ii) *Why body needs protein:* Growth or repair

(b) **6 + 6 + 6 + 2 + 4(1)**

(i) *Protein test reagent:* Biuret (Sodium Hydroxide and Copper Sulphate

(ii) *Colour before test:* Blue

(iii) *Positive colour:* Purple (violet, mauve)

(iv) Piece of apparatus for test: Any valid named piece of apparatus, e.g. Dropper, test-tube, beaker etc.

(v) *Safety precaution:* *Any valid safety precaution,* e.g. Safety glasses, laboratory coat, gloves etc.

(vi) *Reducing sugar test reagent:* Benedict's (or Fehling's) (solution)

(vii) *Colour before test:* Blue

(viii) *Positive colour:* Red [*allow brown*]

Q9

(a) **4 + 2**

(i) *Heart muscle:* Cardiac

(ii) *Vessel that provides heart muscle with O_2:* Coronary artery

(b) **Drawing (3) / Labels - 3(1)**

(i) *Drawing to show*: Septum/ two upper chambers/ two lower chambers/ at least one valve

Labels: Aorta/ bicuspid valve/ left ventricle

(ii) *Piece of dissection equipment:* Any valid piece of dissection equipment, e.g. Scalpel ….

(iii) *Safety procedure:* *Any valid safety procedure,* e.g. wash heart.

(iv) *Dissection details – <u>Any 4 points</u>* Tray or dissection board/ another safety precaution / identify front/ left firmer than right or diagonal coronary artery / cut / left or right side / cut to expose (named) internal structure/ flag label/ correct disposal.

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

Q10

(a) **7 +1 + 1**

(i) *Habitat:* Where organism lives

(ii) *Biosphere:* Any place on earth where life can exist

(iii) *Conservation:* Wise management of ecosystem

(b) **9 + 9 + 3 + 6(1)**

(i) *Pollinator:* Name of valid example, e.g. Bee ….

(ii) *How pollinators benefit:* *Named benefit,* e.g. Food ….

(iii) *Other ways hedgerows provide benefit:* *Any 2 valid benefits, e.g.* nesting sites/ dissipate rainwater/ protect soils/ filter pollutants/ shelter livestock

(iv) *Hedgerow plants:* Any 2 named hedgerow plants, e.g. Violet/ primrose / fern ….

(v) *Hedgerow mammals:* Any 2 named hedgerow mammals, e.g. Fox/ hedgehog / rat ….

(vi) *Benefit to plant of early flowers:* Completion of life cycle before canopy closure / pollinators are present……

(c) **8 X 3**

(i) *Carnivore:* Eats (other) animals only / eats meat

(ii) *Carnivore not from hedgerow:* Any non-hedgerow carnivore, e.g. Shark

(iii) *Adaptation:* (Related feature to named carnivore in (ii)) - e.g. Streamlined body for the Shark

Benefit:(Related Benefit of adaptation stated in (ii)) - e.g. for speed, for the Shark

(iv) *How badgers should have been marked:*

Any stated named method or described; e.g. unobtrusively marked or microchip or ear tag

(v) *Calculation:* 180 x 150

÷ 40

675

Q11

(a) **7 + 1 + 1**

(i) *Dominant:* Allele (or gene) that prevents expression of another allele/ Allele expressed in heterozygous condition

(ii) *Recessive:* Allele expressed only in absence of dominant allele / Allele expressed in homozygous condition

(iii) *Gene expression:* Production of protein or development of trait

(b) **9 + 9 + 3 + 6(1)**

(i) *Black sheep's genotype:* ww

(ii) *White sheep's genotype:* Ww

(iii) *White sheep's gametes:* W and w

(iv) *Black sheep's gametes:* w

(v) *Offspring genotypes and phenotypes:* Ww = White

ww = Black

(c) **8 X 3**

(i) *Species:* (Group of) organisms that can interbreed to produce fertile offspring

(ii) *Inherited characteristic in named species:* Any valid named inherited characteristic in a named species, e.g. Beak length in the finch…

(iii) *Evolution:* Change in species over time

(iv) *Evidence for evolution:* Fossils or comparative anatomy or embryos….

(v) *Natural selection:* (Any 3 points): Variation/ beneficial/ explanation of beneficial/ variation inherited/ leads to speciation

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Q12

(a) **7 + 2(1)**

(i) *Heterotroph:* Obtains food from other organisms or cannot make its own food

(ii) *Omnivore:* Eats both plant an animal material

(iii) *Peristalsis:* (Muscular) contractions of gut wall

(b) **9 + 9 + 3 + 6(1)**

(i) *Correct order:* Ingestion, Digestion, Absorption, Egestion

(ii) Describe - 2 points for each

Ingestion: Taking in food / mouth

Digestion: breaking down food / mouth or stomach or small intestine

Absorption: (food molecules) entering blood / small intestine

Egestion: removing undigested material / rectum or anus

(c) **8 X 3**

(i) *A:* 3 or pelvis *B:* 1 or femur

C: 2 or joint *D:* 4 or marrow

(ii) *Antagonistic pair:* Muscles that move a bone in opposite directions

(iii) 1. *Compact bone*: Support

2. *Marrow:* Makes blood cells or stores fat

(iv) *Treatment for named musculoskeletal disorder:*

Arthritis: exercise or physiotherapy or joint replacement or anti-inflammatory medication **OR**

Osteoporosis: diet or exercise **OR**

Another valid treatment for a valid musculoskeletal disorder

Q13

(a) **7 + 2(1)**

(i) *Enzyme:* Biological catalyst

(ii) *Aerobic:* Requires oxygen

(iii) *Fermentation:* Anaerobic respiration

(b) **9 + 9 + 3 + 6(1)**

(i) *Gas X:* Oxygen

(ii) *Gas X produced by:* Photosynthesis

(iii) *Gas Y:* Carbon dioxide

(iv) *Gas Y produced by:* Burning or anaerobic respiration

(v) *Stage 1:* Cytoplasm

Stage 2: Mitochondria

(vi) *Larger amount of energy:* Stage 2

(vii) *Requires gas X:* Stage 2

(viii) *Role for energy produced:* Protein synthesis or cell division or other valid role….

(c)

(i) *Selectively-permeable membranes:* <u>Any 2 points</u>

Cell membrane/ chloroplast/ mitochondrion/ nuclear membrane ….

(ii) 1. *Diffusion*: Movement of molecules from high conc. to low conc.

2. *Osmosis*: Movement of water across a semi permeable membrane **OR**

Movement of water from dilute to a more concentrated solution

(iii) *Which cell turgid:* A

(iv) *What caused D:* Plasmolysis [*allow cell lost water*]

(v) 1. *Why food salted or sugared:* Preserves food or stops food rotting **or** kills micro-organisms

2. *How it works:* Microorganisms lose water (by osmosis)

Q14

(a) **Drawing (3) / Labels 2(3)**

(i) *Drawing to show:* Outer coat and DNA / RNA fragments

Labels: (2 points) Protein (coat)/ DNA or RNA or nucleic acid

(ii) *Why virus non-living*: Non-cellular/cannot reproduce without host

(iii) *Viral diseases:* Any 2 named viral diseases, e.g. Flu/ measles/ chicken pox/ AIDS….

(iv) *Bacterial reproduction:* Binary fission

(v) *Bacterial shapes:* Rods / cocci/ spirals

(b) **3 (6) + 4 (3)**

(i) Endocrine: Ductless (gland) or secretes directly into blood or lymph

(ii) *A:* Thyroid *B:* Pancreas

(iii) *Hormone:* Chemical messenger

(iv) *A produces:* Thyroxine *B produces:* Insulin

(v) *Hormone for medical treatment:* A named valid hormone for medical treatment,

e.g. Oestrogen or progesterone ….

(c)

(i) *Asexual reproduction:* No gametes involved or one parent

(ii) *1. Natural vegetative propagation:* Any 2 valid methods, e.g. runner (strawberry) / tuber (potato) / bulb (onion) /....

2. State what each *part:* *Any valid example; R*unner is a stem/ tuber is a stem/ bulb is a bud/.....

(iii) *Artificial propagation methods:* Any 2 valid methods of artificial propagation; e.g. Cuttings/layering/grafting/ micro-propagation....

(iv) *Advantages:* Any 2 valid advantages; e.g. fast / good traits kept ....

(v) *Disadvantage:* No widespread dispersal or more competition or susceptible to same diseases ....

Q15

(a) **6 + 8(3)**

(i) *A:* Dendrite *B:* Axon *C:* Cell body [*allow nucleus*]

(ii) *Part that receives impulses:* A or dendrite or Cell Body or C

(iii) *Schwann cell substance:* Myelin

(iv) *Other neuron types:* Sensory / interneuron (2 points)

(v) *Parts of CNS:* Brain and spinal cord (2 points)

(b) **6 + 8(3)**

(i) *A:* (Renal) vein *B:* (Renal) artery *C:* Ureter

(ii) *Contains urine:* C

(iii) *Attached to kidney by C:* Bladder

(iv) *Excretion:* Removal of waste / made in the body (2 points)

(v) *Excretory organs:* Any 2 valid excretory organs, e.g. Lungs/ skin ....

(c) **6 + 8(3)**

(i) *Yeast:* Fungi *Amoeba:* Protista

(ii) *A:* Bud *B:* Pseudopod or false foot

(iii) *Present in both:* Nucleus or membrane or other valid part….

(iv) *Economic importance of yeast:* Brewing or baking

(v) 1. *Saprophyte:* Organism that feeds on dead (organic) material

2. *Parasite:* Organism that feeds on live (organic) material and causes harm