Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2015

Marking Scheme

Agricultural Science

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

General points

- The marking scheme is a guide to awarding marks.
- Examiners must conform to this scheme, and may not allow marks for answers outside the scheme.
- In many cases only key phrases are given in the marking scheme. These points contain the information and ideas that must appear in a candidate's answer in order to merit the assigned marks.
- The descriptions, methods and definitions given in the marking scheme are not exhaustive and alternative valid answers are acceptable.
- If an examiner determines that a candidate has presented a valid answer, and where there is no provision in the scheme for accepting said answer, then the examiner must first consult with his/her advising examiner before awarding marks. In general, if an examiner is in any doubt whether a particular answer is correct he/ she should consult their advising examiner before awarding marks.
- The detail required in any answer is determined by the context, the phrasing of the question and by the number of marks assigned to the answer in the examination paper. This may vary from year to year.
- Words, expressions or statements separated by a solidus (/) are alternatives which are equally acceptable for a particular point. A word or phrase given in brackets is an acceptable alternative to the preceding word or phrase. Note, however, that words, expressions or phrases must be correctly used in context and not contradicted and where there is evidence of incorrect use or contradiction, the marks may not be awarded.
- In general, names and symbols/ formulae of elements/ compounds are equally acceptable. However in some cases where the name is asked for, the symbol/ formula may be accepted as an alternative. This is clarified within the scheme.

Cancelled answers

- If the only answer offered is cancelled ignore the cancelling and mark as usual.
- If an answer is cancelled and a second version of the answer is given, you should accept the cancellation and award marks, where merited, for the un-cancelled version only.
- If two un-cancelled versions of an answer are given to the same question or part of a question, mark both and accept the answer that yields the greater number of marks. You may not, however, combine points from both versions to arrive at a manufactured total.

Surplus answers

- In Section One, a surplus wrong answer cancels the marks awarded for a correct answer.

  e.g. Question: Choose two dairy breeds from the following list of cattle breeds:

  List: Charolais Friesian Simmental Jersey Hereford

  Marking scheme: Friesian/ Jersey/ Simmental **Any two 2 × 1 marks**

  Answer: Friesian, Jersey and Hereford – the surplus answer (Hereford) is incorrect, therefore the candidate scores 2 – 1 = 1 mark.

Conventions

- The mark awarded for an answer appears in the marking scheme next to the answer on the right hand side.
- Where there are several parts in the answer to a question, the mark awarded for each part appears as e.g.3 × 4 marks. This means there are three parts to the answer, each part allocated 4 marks.
- Award unit marks separately, e.g. if an answer merits 3(3), write: 3
  3
  3
  in the first column in the right-hand margin.
- The answers to subsections of a question may not necessarily be tied to a specific mark e.g. there may be three parts to a question - (i), (ii), (iii) and a total of 12 marks are allocated to the question. The marking scheme might be as follows: 6 marks + 3 marks + 3 marks. This means that any first correct answer is awarded 6 marks and each subsequent correct answer is awarded 3 marks.
- Square brackets/ *italics* are used where the examiner's attention is being drawn to an instruction relating to the answer or to some qualification of the answer.
- The total mark for each question should be written beside the question number, and circled.
- The cumulative total should be written in the bottom right-hand corner of each page on which a question total appears.
- All blank pages should be marked to indicate they have been inspected.

Section One

Question 1. (5 × 4m)

A	B
Petals	**Attract bees and insects**
Stamens	Male parts of flower
Xylem	Transports water through plant
Stomata	Openings on underside of leaf
Carpels	Female parts of flower
Phloem	Transports food through plant

Question 2. (4 × (3m + 2m))

Organism	Phylum	Importance in Agriculture
Roundworm	Nematoda	(Animal) parasite or pest/ weight loss or failure to thrive/ diarrhoea/ dehydration/ death/ causes disease or harm
Liverfluke	Platyhelminthes	(Animal) parasite or pest/ weight loss or failure to thrive/ anaemia/ reduced milk yield/ death/ diarrhoea/ loss of wool or hair/ causes disease or harm
Butterfly	Arthropoda	Pollination/ aids plant reproduction/ caterpillar or larval stage is a plant pest/ caterpillar stage damages plants
Mud Snail	Mollusca	(Secondary) host of liverfluke

Question 3. (10 × 2m)

(a)	F
(b)	T
(c)	T
(d)	T
(e)	F
(f)	T
(g)	T
(h)	F
(i)	T
(j)	F

Question 4. (5 ×4m)

	A = Barley	**B = Maize** [*accept* corn]	**C = Oats**	**D = Wheat**
Time of sowing	Feb – April	March – May	Feb - April	Feb - April
Use of crop	Animal feed/ malting/ food or named example/ straw bedding **Any one**	Animal feed/ silage/ food or named example/ straw bedding **Any one**	Animal feed/ food or named example/ straw bedding **Any one**	Animal feed/ flour production/ food or named example/ straw bedding **Any one**
Seeding rate (kg/ha)	150 – 200	20 - 28	140 – 165	140 – 190
Yield of crop (t/ha)	5 – 8	13 - 20	4 – 7	7 – 9

Question 5. (4 × (3m + 2m))

Apparatus	**Name**	**Use**
A	Quadrat	Sampling plants/ quantitative analysis/ studying (frequency of) plants **Any one**
B	Pooter	Collecting insects or (small) animals
C	**(**Sweep) net	Collecting insects or (small) animals
D	**(**Soil) thermometer	Measuring (soil) temperature

Question 6. (4 × (3m + 2m))

Disease	Microorganism type	Prevention / Treatment
TB	**Bacteria**	**Breeding own replacements**
Mastitis	Bacteria	Parlour hygiene/ milker hygiene/ wash udder/ avoid over-milking/ teat dip/ strip cup/ antibiotic/ dry cow therapy/ clean bedding or cubicle mats or lime/ ensure milking machine in working order/ treat wounds on teats/ fly control/ apply Stockholm tar to teats/ cull chronically infected cows
Pneumonia	Virus	Good ventilation/ draught free/ isolation/ colostrum/ vaccination/ dry housing/ avoid stress.
Ringworm	Fungus	Avoid contact with infected animals/ apply fungicide
Blackleg	Bacteria	Vaccination/ colostrum (for lambs)/ antibiotics/ booster injection

Question 7. (5 × 4m)

(a) Lameness/ old age/ infertility/ disease/ mastitis/ broken mouth/ low BCS/ poor conformation/ poor quality wool/ mouth defects / prolapse/ poor previous performance or low number of lambs

(b) Repair or regeneration of udder tissue/ improves BCS for calving/ cow does not lose condition/ allows for rapid development of calf/ gives cow a rest or allows cow to recover/ allows cow to reach milk yield potential (in following lactation) or cow will have more milk after calving

(c) Removes poorer trees/ more space/ less competition or named example/ remaining trees grow straighter or better/ improved access/ thinnings provide source of income/ use of thinnings to make products or named example

(d) Raises pH/ reduces acidity/ improves soil structure/ provides calcium/ improves aeration or opens up the soil/ flocculation/ improves drainage/ increases availability of nutrients/ improved crop growth/ higher yields/ improved microbial activity/ more earthworm activity/ improves soil fertility

(e) Avoids toxic gases or named toxic gas/ avoids harm/ prevents deaths/ animal safety

Section Two.

Question 8.

(a) (i) Perennial ryegrass or PRG/ Italian ryegrass or IRG/ Timothy [*Accept* ryegrass] **2 × 3m**

(ii) Heading out stage/ "in between" stage/ 6-8 week after closing off/ May- (early) June/ 10 -12 weeks after fertiliser applied/ when 50% grass showing seed heads [*Accept* when grass is leafy] **Any one 3m**

(iii) Dehydration/ enough time for grass, or hay, to dry/ avoid mould infestation/ avoid rotting or spoilage or heating **Any one 3m**

(iv) Lactobacillus spp./ lactic acid bacteria **3m**

(b) (i) Cut or mow/ on dry day/ allow to dry or wilt/ ted or turn or shake/ 2-3 times/ reduce degree of roughness of shaking/ row or rake or gather/ bale/ stack in field/ store in (leak proof) shed **Any four 4 × 3m**

(ii) Less weather dependent/ faster/ silage more digestible or higher DMD/ silage higher in protein/ higher feeding value or more nutritious/ higher weight gains or milk yields/ easier to feed/ more palatable/ easier to store **3 × 3m**

(iii) Easier to make in small fields/ lower capital costs or no need for a pit/ easy to transport/ easy to buy or sell/ ease of storage/ suitable for small amounts/ can be fed outside/ lower pollution risk/ lower (dry matter) losses during production or storage **3 × 3m**

(c) Weigh beaker or named suitable container/ weigh beaker and silage sample/ calculate mass of silage/ dry in oven/ suitable time/ re-weigh beaker and silage/ repeat until no further loss in mass/ calculate loss in mass/ (loss in mass ÷ mass of fresh silage) x 100/ repeat/ average

[Award marks if points are shown on a labelled diagram]
[Award maximum of 12 marks if no attempt at calculation]

Or

Wring silage between hands/ note rate at which juice runs out or note the amount of juice that runs out/ if juice runs freely ⇒ 15% dry matter (DM)/ if juice drips out ⇒ 20% DM/ if very little juice runs out ⇒ 25% DM / repeat/ average **Any five 5×3m**

Question 9.

(a) (i) *Beef breeds*: Charolais/ Limousin/ Hereford/ Aberdeen Angus/ Belgian Blue **2 × 3m**

Dairy breeds: Jersey/ Holstein/ (British) Friesian/ Kerry/ Montbeliarde **2 × 3m**
[*Accept* Shorthorn]

(ii) *Beef*: Block shaped/ thick neck/ wide shoulders/ well fleshed or more muscle or heavier/ broad back/ wider hindquarters

Dairy: Wedge shaped/ long neck/ narrow shoulders/ not well fleshed/ narrow back/ narrower hindquarters

3 × 4m

(b) (i) Hand pressure applied to (specific areas of) backbone/ to assess body fatness or thinness/ scale of 1-5 in cattle/ 1 indicates overly thin/ 4 indicates overly fat/

Any two **2×4m**

(ii) 2.5 to 3 **4m**

(iii) Calf too big or calving difficulties or described/ requirement for Caesarean or calving jack or vet/ too much fat deposition in birth canal/ milk fever

Any two **2 × 4m**

(c) (i) Known supplier/ quarantine or isolate/ vaccinate/ good BCS or good quality (or one named physical characteristic indicating good quality/ check for diseases or for signs of good health/ good temperament/ good udder or good teat placement

2 × 4m

(ii) Breed own replacements or closed herd/ fencing/ hygiene/ disinfection points / quarantine/ restrict access or visitors

2 × 4m

Question 10.

(a) (i) Freeze-thaw or frost action/ heating and cooling or onion weathering/ wind action/ ice/ water/ gravity/ roots/ animal activity/ grinding/ erosion **3 × 3m**

(ii) Gravel/ sand/ silt/ clay **3 × 3m**

(b) (i) The % sand, silt and clay in a soil **6m**

(ii) *Feel method*: Rub or feel (dry) soil (between thumb and fingers)/ note grittiness or smoothness/ repeat with wet soil/ roll into a ball if possible/ make threads of it if possible/ bend into rings if possible/ compare to flow chart for results/ if soil feels gritty ⇒ sandy soil/ if soil rolls into threads ⇒ clay soil

Or

Sieve method: Dry soil/ how dried/ crush the soil/ weigh an empty weighing boat or named suitable container/ place soil in a weighing boat/ reweigh/ find mass of soil (only)/ sieve soil/ re-weigh each part/ calculate % sand, silt and clay/ use soil textural triangle/ use % figures to draw three lines/ where lines cross over indicates soil textural class

Or

Sedimentation method : Place soil sample into a graduated cylinder or named suitable vessel/ add water to vessel/ break up large lumps/ stopper/ shake vigorously/ allow to settle/ measure total depth of soil/ measure each layer of sand silt and clay/ calculate % sand, silt and clay/ use soil textural triangle/ use % figures to draw three lines/ where lines cross over indicates soil textural class

[Award marks if points are shown on a labelled diagram] **Any five** **5 ×3m**

(c) (i) Earthworm **3m**

(ii) Improve drainage/ improve aeration/ mix soil layers/ improve fertility or add nutrients/ improve structure/ improve texture/ decompose organic matter/ create humus **2 x 3m**

(iii) Mark out area to be sampled/ quadrat/ random/ how random/ remove vegetation/ apply potassium permanganate or washing up liquid or soapy solution/ suitable time/ count worms/ repeat/ average/ multiply (average) no. of earthworms × area sampled

[Award marks if points are shown on a labelled diagram] **Any four** **4 x 3m**

Question 11.

(a) (i) 1. Sheep/ goat/ deer **4m**

2. Pig/ horse/ poultry **4m**

(ii) B = Reticulum
C = Omasum
D = Abomasum **3 × 4m**

(iii) Abomasum/ D **4m**

(b) (i) Cellulose or fibre **4m**

(ii) Further mechanical digestion/ softens food/ increases surface area
Any one **4m**

(iii) Food is squeezed or dried/ water removed/ water re-absorbed (into rumen)
Any one **4m**

(iv) Duodenum/ small intestine **Any one** **4m**

(c) (i) Colostrum/ (whole) milk/ milk replacer/ concentrates or meals/ hay/ silage/ grass
Any four **4 × 4m**

(ii) Build-up of gas/ inability to belch/ high clover content in sward
Any one **4m**

Question 12.

(a) (i) Diagram **(4m, 2m, 0m)**

[Award 4 marks if diagram has the correct shape, a nucleus and two boundaries]
[Award 2 marks if diagram has incorrect shape or has no nucleus]

Labels: Cell wall/ cell membrane/ nucleus/ cytoplasm/ (large) vacuole/ chloroplasts
Any three **3 × 4m**

(ii) Nucleus **4m**

(iii) Mitosis **4m**

(b) Gametes (R) × (r) **2 × 4m**

F1 genotypes Rr **4m**

F1 phenotype Red **4m**

(c) Genotypes rr × Rr **2 × 2m**

Gametes (r) × (R) (r) **3 × 2m**

Genotypes Rr rr **2 × 2m**

Phenotypes Red White **2 × 3m**

[Award marks for genotypes only if gametes correct in second line]
[Award marks for phenotypes only if they match genotypes in third line]

Question 13. Answer any two parts (30m + 30m)

(a) (i) 145 -155 days **2m**

(ii) Facilitates supervision/ easier feeding/ warmer/ prevents hypothermia or chill/ avoids predation or safer/ prevents poaching/ reduces mortality/ more spring grass

3 × 3m

(iii) Good ventilation/ no draughts/ suitable floor type or named example/ hygiene/ dry (floor)/ fresh water supply/ adequate feeding space/ suitable feeding system (e.g. barrier)/ adequate floor space/ adequate space at feeding trough or at barrier/ warm

3 × 3m

(iv) *Infra- red lamp*: Warms young lambs/ warms weak lambs/ prevents hypothermia or chill

Any two **3m + 2m**

Fostering crate: To foster a lamb (from a multiple birth)/ onto ewe with one, or no, lamb/ restrains ewe/ prevents ewe rejecting adopted lamb

Any two **3m + 2m**

(b) (i) *First early*: Home Guard/ Epicure **3m**

Second early: British Queen/ Maris Piper **3m**

Main crop: Kerr Pinks/ Rooster/ Golden Wonder/ Records **3m**

(ii) Windy weather/ aphid free/ prevents viral infection/ isolation/ reduces spread of diseases

Any three **3 × 3m**

(iii) Prevents exposure to light/ prevents greening/ controls weeds/ prevents blight spores reaching tubers/ increases yield/ supports plant/ reduces frost damage

2 × 3m

(iv) Good ventilation/ dry/ frost-proof/ easy access/ high humidity/ hygiene/ free from vermin or diseases/ cold/ dark/ forced ventilation if stacks more than 1.8m

2 × 3m

(c) (i) A = Water **3m**
B = Protein **3m**

(ii) Breed/ age/ feed quantity/ feed type/ milking interval/ stage of milking/ stage of lactation/ disease/ individuality within breed

3 × 3m

(iii) Total bacterial count or TBC/ somatic cell count or SCC/ temperature/ water content/ antibiotic content/ sediment/ thermoduric

3 × 3m

(iv) Clean holding area/ milker hygiene/ parlour hygiene/ wash or wipe udder/ strip cup/ teat dip/ filter/ plate cooler/ wash equipment regularly/ clean bulk tank/ cool milk to 4 °C or less in bulk tank/ fly screens

2 × 3m

(d) (i) 20 °C **3m**

(ii) Dry sow house/ weaner house/ fattener house **2 × 3m**

(iii) Allows sow to suckle bonhams/ prevents crushing or death/ prevents sow eating bonhams/ allows bonhams access to creep

Any two **2 × 3m**

(iv) Teeth clipping/ tail docking/ iron injection/ ears notched/ ensure bonhams suck sow/ navel dip

2 × 3m

(v) 28 - 35 days/ 4 -5 weeks **3m**

(vi) Ratio of food consumed/ to liveweight gained **2 × 3m**

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