



**Coimisiún na Scrúduithe Stáit**  
**State Examinations Commission**

**Leaving Certificate 2014**

**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:

Charolais    Friesian    Simmental    Jersey    Hereford

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

Sample answers :

Friesian, Jersey and Hereford - there is a surplus answer (Hereford), which 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.  $3 \times 4$  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:  $\begin{array}{r} 3 \\ 3 \\ 3 \end{array}$   
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
<b>Charolais</b>	<b>Continental beef breed</b>
Texel	Lowland sheep breed
Landrace	Pig breed
Friesian	Dual-purpose breed
Scottish blackface	Mountain sheep breed
Hereford	British beef breed

### Question 2. (5 × (2m + 2m))

Letter	(a) Equipment name	(b) Order of use
<b>A</b>	Roller	3 [ <i>Accept 2</i> ]
<b>B</b>	Combine (harvester)	5
<b>C</b>	Harrow / grubber	1
<b>D</b>	Seed drill / one pass	2 [ <i>Accept 3</i> ]
<b>E</b>	Sprayer	4

### Question 3. (5 × (2m + 2m))

(a) *Red water fever:*

*Type of animal affected:*

Cattle

*Symptom:*

Red coloured urine / diarrhoea / increased pulse rate

**Any one**

(b) *Orf:*

*Type of animal affected:*

Sheep / human

*Symptom:*

Lesions or sores or spots on mouth (or udder or genitals)

**Any one**

(c) *Anaemia:*

*Type of animal affected:*

Pigs

*Symptom:*

Pale skin / weight loss / rapid breathing / weakness / scour

**Any one**

(d) *Viral pneumonia:*

*Type of animal affected:*

Cattle / sheep / pigs

*Symptom:*

(Severe) coughing / rapid breathing / weight loss / discharge from eyes or nose / high temperature / fever

**Any one**

(e) *Grass tetany:*

*Type of animal affected:*

Cattle / sheep

*Symptom:*

Staggering / muscle twitching or tremors / falling down / coma / frothing at mouth / (sudden) death.

**Any one**

**Question 4.**

- (a) Crane fly or daddy-long-legs 3m
- (b) Leatherjacket 3m
- (c) (i) 1. Egg 2m  
2. Pupa / cocoon 2m
- (ii) Complete metamorphosis 4m
- (iii) Butterfly / click beetle / fly / bee 3m
- (d) Grass / cereals or named cereal / potatoes 3m

**Question 5. (10 × 2m)**

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

**Question 6.**

- (a) *Herbivore*: An animal that feeds on plants (only) 2m
- (b) Incisors / premolars / molars / canines Any three 3 × 2m

(c)

incisors	canines	pre-molars	molars
0	0	3	3
3	1	3	3

**Or**

incisors	canines	pre-molars	molars
0	0	3	3
4	0	3	3

**4 × 2m**

- (d) *Sheep dentition*: absence of canines / lack of canines on upper jaw / lack of incisors on upper jaw / number of teeth (32 v 44) / dental pad (at front) on upper jaw 4m

**Question 7. (5 × 4m)**

- (a) Eliminates or kills (broad leaved) weeds / kills weeds but does not damage crop plants / makes harvesting easier
- (b) Prevents scour in animals / prevents digestive problems / reduces oxalic acid
- (c) To indicate when the cow is on heat / heat detection / records attempted mating
- (d) Increases pH / reduces acidity / improves soil structure / supplies calcium / improves drainage / improves aeration / promotes flocculation / increases availability of nutrients / increases CEC
- (e) Prevents harm to wildlife or nesting birds / legal requirement / increases biodiversity

## Section Two

### Question 8.

- (a) Sire selection / record date of insemination / steaming up / cow at correct BCS (3 – 3.5) /  
/ reduce meal intake in final week / isolate cow before calving / clean calving box /  
/ adequate supervision / assist if necessary / call vet / proper equipment / farmer hygiene / clear  
airways or make sure calf breathing/ make sure cow licks calf / iodine on navel / colostrum  
**4 × 4m**
- (b) *Colostrum*: Rich in antibodies/ provides immunity / rich in nutrients or named nutrient /  
laxative effect / thicker / yellow in colour / higher in solids or lower water content  
**2 × 4m**
- (c) (i) Clean housing or named example (e.g. wash floors or lime on floors) / fresh straw /  
remove mucus / clean buckets / separation from cow after birth / iodine on navel / clean  
water supply / disease control / isolation of cow prior to calving  
**3 × 4m**
- (ii) Scour / joint-ill / navel ill / (viral) pneumonia / ringworm / lungworm / stomach worm /  
lice or any one named ectoparasite  
**2 × 4m**
- (d) (i) Digestion of cellulose / contains bacteria / digestion of roughage or named roughage /  
stores food / makes vitamins / makes protein  
**Any one 3m**
- (ii) Feeding of hay or straw / scratch factor / feeding of concentrates / creep feeding  
**Any one 4m**
- (iii) Reticulum / omasum / abomasum  
**3 × 3m**

**Question 9.**

- (a) (i) Perennial ryegrass or PRG / Italian ryegrass or IRG / Timothy / Cocksfoot / Meadow fescue / Meadow foxtail **2 × 3m**
- (ii) Nitrogen fixation / protein source / palatable / digestible / good ground cover / weed control / rich in minerals / less N required / saves money / improved productivity of grassland / improved silage if red clover stated **2 × 4m**
- (b) (i) Diagram **4m, 2m,0m**
- Any two labels **2 × 3m**
- (ii) Better grass utilisation or less wastage or less trampling / more efficient / time for grass re-growth / easy herd movement / disease prevention / paddocks easily closed off for silage / less stemmy grass or more leafy grass / higher milk yield (in cows) or higher weight gain (in cattle) / less labour **2 × 4m**
- (c) Increased growth rates in cattle and sheep / increased tillering / nutrient recycling / parasite control / prevents clumps of grass / less wastage of grass / easier management **2 x 4m**
- (d) (i) Nitrogen **4m**
- (ii) One (or two) plots / suitable plot size e.g. 1m<sup>2</sup> / fence off / cut grass / apply CAN to one / suitable control / suitable time period / measure grass growth / cut grass / weigh grass / conclusion **Any four 4 × 4m**

**Question 10.**

- (a) Sound feet or legs / healthy udder (no mastitis) / few, or no, missing teeth / no mouth defects / good body conformation or described / suitable body condition / healthy or free from diseases / no history of prolapse

**Any three 3 × 4m**

- (b) *Flushing*: Ewes on bare pasture / high stocking rate / ewes moved to good pasture (one month) before mating / reduced stocking rate / kept on good pasture (until 3 weeks) after mating / increased number of eggs released / more twins / higher conception rates / more regular heat periods / fewer barren ewes / safer implantation of embryo(s)

**Any two 2 × 4m**

*Sponging*: Sponge containing hormone or named hormone / ewe's vagina / removed after 12 - 14 days / PMSG injection / ewes come into heat at same time / compact lambing season / early lamb production / easier management on mixed farm / reduced labour costs / reduced ram:ewe ratio or 1 ram:10 ewes

**Any two 2 × 4m**

- (c) Colostrum / ewe's milk / hay / silage / grass / (creep) meal or concentrate feeding

**Any three 3 × 4m**

- (d) (i) Miracidium / redia / sporocyst / cercarium

**Any one 4m**

- (ii) Mud snail / freshwater snail

**4m**

- (iii) Loss in weight / failure to thrive / wool loss / anaemia / lump under jaw / diarrhoea / death

**4m**

- (iv) Drainage / fence off wet land or remove from risky areas / liming (to kill eggs) / dosing or injection / biological control / molluscicides / pour on

**2 × 4m**

**Question 11.**

- (a) Podzols are poor soils with high **lime** and fertiliser requirements. They are formed as a result of **leaching**. Aluminium and **iron** are removed from the A horizon to the **B horizon**. Podzols show a distinct red layer called the **iron pan**. Podzols are widely used for **forestry**.

**6 × 2m**

- (b) (i) Rich in nutrients or plant food / improves soil structure / dark colour absorbs heat / improves CEC / source of food for soil organisms or increases soil organism population / improves water holding capacity of soil.

**3 × 3m**

- (ii) Add FYM / add slurry / add seaweed / add sewage sludge / green manure / add earthworms / plough in organic matter or named example / crop rotation

**2 × 3m**

- (iii) (Empty) crucible or dish / weigh crucible / dry soil sample / place in crucible / mass of dry soil / Bunsen burner / pipe-clay triangle / heat strongly / stir / humus burns red / red colour is gone or smoke stops/ re-weigh / loss in mass / calculation

**Any four 4 × 4m**

- (c) (i) % sand, silt and clay in a soil / relative proportions of sand, silt and clay in a soil / how the soil “feels” or described

**5m**

(ii)

***Sandy soils***

Good drainage

Less natural fertility

Easily tilled

***Clay soils***

Poor drainage

Very fertile

Difficult to till

**2 × 2m**

**2 × 2m**

**2 × 2m**

**Question 12.**

- (a) (i) 1. Prophase 2. Metaphase 3. Anaphase 4. Telophase  
[Award maximum of 6 marks if not in correct sequence] **4 × 2m**
- (ii) Metaphase **3m**
- (iii) Chromosomes in centre of cell / attached to (spindle) fibres **Any one 3m**
- (iv) Meiosis **3m**
- (b) (i) Artificial insemination **3m**
- (ii) *Advantage:* Choice /superior bulls / lower cost / safer / prevents disease / higher conception rates / less physical damage / sexed semen **3m**
- Disadvantage: More labour / difficulty with heat detection **3m**  
[Accept “more expensive” if “lower cost” not given as an advantage]
- (c)
- (i) Possible gametes: (Y) (y) **2 × 4m**
- (ii) F1 genotype: (Yy) **4m**
- (iii) F1 phenotype: Yellow **4m**
- (d)
- (i) Genotypes of parents: (yy) × (Yy) **2 × 2m**
- (ii) Possible gametes: (y) × (Y) (y) **3 × 2m**
- (iii) Genotypes of offspring: (Yy) (yy) **2 × 2m**
- (iv) Phenotypes of offspring: Yellow Green **2 × 2m**

**Question 13. Any two parts from (a), (b), (c), (d)**

**(30m + 30m)**

- (a) (i) Without oxygen (air) **4m**
- (ii) Lactobacillus / Streptococcus / Clostridium **2 × 4m**
- (iii) Rolling / quick filling / avoid air pockets / cover / tyres on top / re-seal **2 × 3m**
- (iv) Two sterile agar plates / inoculating loop / flame loop / transfer silage onto one plate / control / seal / place in oven / 20 - 30°C / 2 - 3 days / upside down / examine / bacteria appear as shiny spots / absence of spots in control  
**Any four 4 × 3m**
- (b) (i) Growth of a new plant (from a seed) / re-growth of an embryo after dormancy / seed begins to grow / seed sprouts **3m**
- (ii) Warmth or suitable temperature / moisture or water / oxygen or air **3 × 3m**
- (iii) Keeps soil temperature higher / better germination / weed control / microclimate / earlier germination / longer growing season / higher yield / higher starch content / pest control or named example **2 × 3m**
- (iv) Seeds / count / soak seeds (for 24 hours) / seed tray or suitable container / cotton wool or suitable growing medium / warm place / regular watering / leave for suitable time / count sprouted seed / repeat / average / control / calculate % germination  
**Any four 4 × 3m**  
[Award maximum of 9 marks if candidate omits reference to calculation of % germination]

(c) (i) Annelida **3m**

(ii) Improve aeration / improve drainage / mix soil (layers) / increase humus content / decompose organic matter / deepen topsoil / (excretory products) add nutrients to soil or improve soil fertility / dead earthworms improve organic matter content of soil / improve soil structure **3 × 3m**

(iii) Add lime or maintain correct pH / drain soil / add organic matter / aerate soil **2 × 3m**

(iv) Wormery or suitable container described / layers of materials / leaves / add earthworms / cover / leave for suitable time / control / below 10 °C / observe changes in layers / leaves eaten / conclusion **Any four 4 × 3m**

(d) (i) Carbohydrates / lipids or fats / protein / vitamins / minerals **2 × 3m**  
[Accept named examples]

(ii) Carbohydrate: Energy  
Lipids: Energy / insulation / protection  
Protein: Growth / repair  
Vitamins: Prevents deficiency diseases or named deficiency disease / metabolism  
Minerals: Prevent deficiency diseases or named deficiency disease **Any two 2 × 4m**

(iii) The part of the food that contains nutrients / the part of the food that remains after water has been removed **4m**

(iv) Named foodstuff / suitable container / mass of container / mass of food stuff / dry in oven / suitable time / new mass / loss in mass / calculation

[Award maximum of 9 marks if candidate omits named foodstuff] **Any four 4 × 3m**

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