



Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE 2010

MARKING SCHEME

AGRICULTURAL SCIENCE

ORDINARY LEVEL

Introduction

The marking scheme is a guide to awarding marks to candidates' answers. It is a concise and summarised guide and is constructed in a way to minimise its word content.

Examiners must conform to this scheme and may not allow marks for answering outside this scheme. The scheme contains key words or phrases for which candidates may be awarded marks. This does not preclude synonyms or phrases which convey the same meaning as the answer in the marking scheme. Although synonyms are generally acceptable, there may be instances where the scheme demands an exact scientific term and will not accept equivalent non-scientific or colloquial terms.

The descriptions, methods and definitions in the scheme are not exhaustive and alternative valid answers are acceptable. If it comes to the attention of the Examiner that a candidate has presented a valid answer and there is no provision in the scheme for accepting this answer, then he/she must first consult with his/her Advising Examiner before awarding marks. In general, if in doubt about any answer, examiners should consult their Advising Examiner before awarding marks.

A key word may be awarded marks, only if it is presented in the correct context.

e.g. Question: Briefly outline how water from the soil reaches the leaf.

Marking scheme - concentration gradient / root hair / osmosis / cell to cell / root pressure/ xylem / cohesion **or** explained / adhesion **or** capillarity **or** explained / Dixon and Joly / transpiration **or** evaporation [*accept water loss*] / tension *any six* **6(3)**

Answer “ Water is drawn up the xylem by osmosis” Although the candidate has presented two key terms (xylem, osmosis), the statement is incorrect and the candidate can only be awarded 3 marks for referring to the movement of water through the xylem.

Cancelled Answers

The following is an extract from S63 *Instructions to Examiners 2010* (section 7.3, p.22)

“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/ from anther/ to stigma~~

The candidate has cancelled the answer and has not made another attempt to answer the question and may be awarded 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 One 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:

chitin, lignin – there is a surplus answer, which is incorrect, therefore the candidate scores 4 – 4 marks = 0.

~~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.

lignin, ~~chitin~~ - there is a surplus answer, which is incorrect, but it has been cancelled and as the candidate has given more than one answer (i.e. the candidate is answering the question more than once only), the cancelling can be accepted and he/she may be awarded 4 marks.

Question: Name the **four** elements that are always present in protein

Marking Scheme; carbon/ hydrogen/ oxygen/ nitrogen **4(3)**

Sample answers:

- carbon/ hydrogen/ oxygen/ nitrogen/ calcium – there is a surplus answer, which is incorrect, and which cancels one of the correct answers, therefore the candidate is awarded **3(3)** marks.
- carbon/ hydrogen/ oxygen/ calcium – there is no surplus answer, there are three correct answers, therefore the candidate is awarded **3(3)** marks.
- carbon/ hydrogen/ oxygen/ calcium/ aluminium – there is a surplus answer, which is incorrect, and which cancels one of the three correct answers, therefore the candidate is awarded **2(3)** marks.
- carbon/ hydrogen/ oxygen/ calcium / ~~aluminium~~ – there is a surplus answer, which is incorrect, but as the candidate has given more than one answer (i.e. the candidate is answering the question more than once only), the cancelling can be accepted and there is no longer a surplus answer and he/she may be awarded **3(3)** marks.

Conventions

- The mark awarded for an answer appears in bold next to the answer.
- 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.
- 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 – (a), (b), (c), (d), (e), (f) and a total of 20 marks allocated to the question. The marking scheme might be as follows – **2 (4) + 4 (3)**. This means that the first two correct answers are awarded 4 marks each and each subsequent correct answer is awarded 3 marks each.
- A word that appears in brackets is not a requirement of the answer, but is merely used 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.

Section One. 120 marks. Six questions to be answered.

Question 1:

Part (a)

A: Air / B: Organic Matter (humus) / C: Mineral Matter / D: Water 4(1)

Part (b) Any two from: Gravel/Coarse Sand/ Fine Sand/Silt/Clay. 2(6)

♦ *Accept "sand" alone for 3 marks*

Part (c) Earthworm, fungus, bacteria or any other relevant organism 4

Question 2: 5(4)

Agricultural activity	Machine used
1. Making bales of silage	E. Round baler
2. Harvesting barley	F. Combine harvester
3. Making hay	C. Rotary tedder or round baler
4. Harvesting potatoes	A. Elevator digger
5. Sowing seed	B. Combine drill
6. Breaking up compacted soil	D. Subsoiler

Question 3:

Part (a) Friesian and Jersey. ♦ *Accept "Simmental"*. 2(1)

Part (b) Any two from the following : Wedge(triangular) shaped/narrow shoulders(shoulderblades close together/wide hindquarters/long narrow head/long narrow neck/ barrel, chest or abdomen is not deep

♦ Accept one point regarding a "good" cow (versus a "bad" cow) e.g. healthy udder or disease-free or sound feet or high milk yield 2(3)

Part (c) Lactation – production of milk 3

Colostrum – first milk produced by cow after calving or milk with higher levels of protein or milk that provides immunity in first 24 hours after calving or milk with a laxative effect 3

Part (d) 305 days (*or accept range 295-315 days or 42-45 weeks or 10 months*) 6

Question 4: Notifiable diseases : 5(4)

Name of disease	Notifiable	Not Notifiable
Mastitis		√
Swine fever	√	
Brucellosis	√	
Liverfluke		√
Tuberculosis (TB)	√	

Question 5: 6(3) + 2

(a) A: Clover B: Oats C: Thistle D: (Sugar or fodder) beet or mangold or turnip or swede

(b) Gramineae. ♦ *Accept "grass (family) "*.

(c) Plant C or Thistle

(d) (Beet) pulp or (Beet) tops or Molasses [Do not accept sugar].

Question 6: 5(4)

(a) A: Cell Wall B: Vacuole or (cell)sap C: Nucleus

(b) Chlorophyll

(c) Photosynthesis or to make food or to absorb ("trap") sunlight

Question 7: The first five correct answers 5(1); the next five correct answers 5(3)

(a) False

(b) False

(c) True

(d) True

(e) False

(f) False

(g) False

(h) True

(i) True

(j) True

Section Two. 180 marks. Three questions to be answered.

Question 8

(a)

- (i) A: Strip Grazing / B: Paddock Grazing 3 + 3
- (ii) Strip Grazing: Land divided into strips with movable electric fence/ fence moved to create new strip when cattle have grazed old strip/ old strip fenced off and fertilized/ movable water supply 3 + 3

Paddock Grazing: Land divided into paddocks/Cattle moved to a new paddock each day/ Old paddock fertilized and regrown before cattle are moved back to it.

3 + 3

(iii) Strip Grazing:

Advantages: Fresh grass always available or not as expensive as paddock grazing or back fence prevents damage to grass regrowing / used in block grazing 3

Disadvantages: High labour or hard to contain stock with temporary electric fencing 3

Paddock Grazing:

Advantages: Fresh grass every day or grass is always at the leafy stage or grass can be saved for silage 3

Disadvantages: Expensive or need to create roads or time consuming moving animals or lots of labour needed or hard to cut grass for silage in small paddocks with large machines 3

(iv) Set stocking or block grazing or zero grazing or leader-follower or creep grazing or mixed grazing or in -situ 3

(b) (i) Perennial ryegrass (PRG) or IRG or Timothy or cocksfoot//clover or relevant crop 3+3

(ii) PRG – good productivity/palatability/digestibility/persistence/ aggressive

// Clover – high protein content/ palatable/N-fixation/ weed control/ 3 + 3

(c) Description: Three points. Accept the name of the method for one point. 3(3)

Undersowing – Grass is sown with nurse crop/Cereal is sown first, then grass seed sown/ grow together over summer/ cereal is harvested or arable silage/grass is left to grow/

Direct sowing – Plough and harrow to prepare seedbed/ Fertilize seedbed/ sow seeds using seed drill/ roll twice/ spring sown leys to be sown before May/ Autumn sown leys to be sown before September

Direct drilling – Seeds drilled into unploughed ground/using seed drill/ grass can be grazed tightly/ killed with herbicide (prior to drilling of grassland) / add fertilizer to encourage growth/slug pellets.

Stitching in – Grassland is not killed/ old grass grazed tightly/ seeds sown directly into grassland/ grass takes over from old pasture/ if new seeds do not grow, old pasture will continue to grow/slug pellets.

Slurry seeding - Old grass grazed tightly /grass seeds and slurry mixed together/spread onto land or grass seed sown/then slurry applied after.

(d) (i) Tillering – the growth of side shoots (from base of main stem) 3

(ii) Topping – cutting the grass at the top to encourage tillering or to remove stemmy growth or to encourage leafy growth or to control weeds 3

Question 9

(a) Liming 4

(b) Any two correct elements 2 + 4

Nitrogen/Phosphorus/Potassium/Calcium/Magnesium/Sulphur/any other correct element. ♦

Accept correct symbol e.g. N.

(c) Crop named e.g. Potatoes or barley or wheat 2

(d) Correct Fertilizer e.g. Potato -10:10:20 or 7:6:17 4

(e) Cultivation must match named crop

(i) Potato – (Autumn) plough/remove stones/harrow/ make drills (ridges) 2 + 4

(ii) Potato – Spring sowing (Jan. - April) 2

(iii) Potato – Blight/potato cyst nematode/eelworm/wireworm/slugs/aphids 2 + 4

(iv) Potato - Spray (fungicide)/spray (insecticide)/crop rotation/certified seed 4

(v) Potato – First earlies: May-June // Second earlies : June-July 2

//Maincrop: August-November.

(vi) Potato – First and second earlies - 7-10 tonnes/Ha. 6

//Maincrop - 30-40 tonnes /Ha.

OR

[Marked as above]

(i) Barley – (Autumn) plough/harrow/roll seedbed

(ii) Barley – Winter barley :September-October // Spring barley : February - April.

(iii) Barley – wireworms/ loose smut/ powdery mildew/aphids/ birds

(iv) Barley- crop rotation/spray (fungicide)/spray (insecticide) / certified seed

(v) Barley- Winter barley :June-July // Spring barley: August-September

(vi) Barley - Winter barley : 7-9 tonnes/Ha // Spring barley : 5-7 tonnes/Ha

(f) Any four relevant points 4 + 4 + 4 + 6

Measure area of a field/using trundle wheel/measure 1m² area/ clear area of grass/use scissors/pour washing up solution on bare soil/ wait for earthworms to come to surface/ count earthworms inside measured area/ repeat/average/multiply no. earthworms by area of field

Question 10 20(3)

(a)

- i. A: (Right) atrium/ B: (Left) ventricle / C: Septum
- ii. White blood cells/Red blood cells (corpuscles)/platelets
- iii. Fight infection or needed for immunity// carry oxygen//blood clotting
- iv. Iron deficiency
- v. Iron injection (in first week of life)

(b)

- i. A: Ovary/B: Vagina/ C: Uterus (womb)
- ii. Stock ewes on poor quality pasture and then less heavily on better quality pasture or Improved feeding before mating
- iii. **Any three from:** More eggs released/greater chance of multiple births/higher conception rates/more regular heat periods/better attachment of embryo/ synchronised oestrus
- iv. Artificial insemination
- v. **Any one from:** Better choice of sire or cheaper (than keeping a bull on a small farm) or better choice of breed or safety or no need to keep bull or improved genetics or easier to transport or less wastage

Question 11

- (a) (i) Shape of an animal or distribution of muscle on animal 4
- (ii) Beef animals have muscular shoulders and hindquarters/ beef animals are rectangular in shape (or “square -shaped”) / Beef animals are wide at shoulders and hindquarters/dairy animals are not muscular (energy goes into milk production) 4+4
- (iii) 2 - 2 ½ years 4
- (iv) After this age fat is put on instead of muscle or Meat quality is better 4
- ◆ *Accept “resources not wasted”*
- (b) (i) Any two from: Texel/Wicklow Cheviot/BlackfaceMountain/Galway/Suffolk/
Border Leicester/ any relevant breed 4 + 4
- (ii) 3-6 kg 4
- (iii) Feeding: Colostrum or Ewe suckles lamb 4
- Management: Any two from: clear mucus/ help to suck/ kept under
Infra-red lamp/ stomach tube/ glucose injection/ warming
box/ mark lamb/ place ewe + lamb in individual pen/ iodine/
hygiene/ (suitable) bedding 4 +4
- (c) (i) Only young animal has access to food 4
- (ii) Supplements milk from mother/ supplements grass /extends the grazing season/
increased weaning rates/increased stocking rates/animals reach genetic potential
quicker/suffer less set-back at weaning or adapt quickly/improve lifetime
performance even post weaning / balanced diet / Rumen development 3(4)

Question 12 Answer any two parts from (a), (b), (c), (d) . 30 marks each.

- (a) (i) Any two weeds: e.g. Thistle/nettle/daisy/dandelion/ragwort 2(4)
- (ii) One piece of equipment: e.g. Quadrat or Line Transect 4
- (iii) Use e.g. quadrat: Any three points: description/throw/random/
how random/count or estimate plants/repeat/ average/calculate or scale up
4 + 4 + 4 + 6
- (b) (i) 20°C 4
- (ii) To prevent sow from crushing her bonhams or easier to manage (sow)
or easier to feed (sow) Any two points 2(4)
- (iii) 1. Dry sow house 2. Weaner house 2(2)
- (iv) Any three criteria from: Good health or one indication of good health e.g. smooth
shiny hair, bright lively eyes /firm body tissues/sound legs and feet/long body/well formed
hams/fourteen teats/good constitution/litter size/ degree of heritability of characteristics/
growth/good FCR 4 + 4 + 6
- (c) (i) Any three advantages: Natural amenity/REPS/natural fencing/land boundary/shelter for
animals/habitat for animals/sound barrier / Replenish oxygen 4 + 4 + 6
- (ii) Any two ways: Do not spread in wet weather/ use correct fertilizer/ use correct
amount of fertilizer/ do not apply during drought/ do not apply during rapid growth/do
not apply too close to waterways/ do not apply on sloping land / Correct pH 4 + 6
- (iii) Organic farming: A system of farming which avoids the use of soluble fertilisers or
pesticides or growth regulators or feed additives/ or other chemicals 6
- (d) (i) Germination: Seed begins to grow (into a new plant) 4
- Establishment: new plant puts down roots or begins to photosynthesise 6
- (ii) Any four points from: seeds/on cotton wool/in test tubes/one tube no
moisture/how/one tube no O₂/how/one tube unsuitable temp./how/one tube has
all three suitable conditions/period of time/results/conclusion 4 + 4 + 4 + 6

◆ All above points can be got from a suitably labelled diagram

Question 13

All parts 3 marks each

- (a)
1. dominant
 2. recessive
 3. heterozygous
 4. homozygous
 5. genotype
 6. phenotype

(b) (i)

Gametes E x e

Genotype : Ee

Phenotype : Erect ears

(ii) Genotype of second parent Ee

Gametes E X E e

Genotypes of offspring: EE and Ee

Phenotype of offspring : Erect ears

(c) (i) Meiosis

(ii) L: Spindle (fibre)

M: Chromatid/Chromosome

