



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2011

Marking Scheme

Agricultural Science

Ordinary Level

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 the 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 the 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 the Examiner is in any doubt if 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 formulas of elements are equally acceptable. However, in some cases where the name is asked for, the 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 x 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.

**Leaving Certificate Agricultural Science 2011
Ordinary Level Marking Scheme**

Section One

Question 1 (20 Marks) 2(7m) + 1(2m) + 4(1m)

(a) A: Plumule ; B: Radicle

(b) (i) Suitable temperature or warmth

(ii) Water or moisture

(iii) Oxygen or air

(c) Wind/ water/ animal/ self dispersal

Any two points

[*Accept relevant description in each case*]

Question 2 (20 Marks) 2(7m) + 2(2m) + 2(1m)

(a) Manure : plant waste/animal waste/organic material/ improves soil structure

Any one point

Fertilizer : artificial material/manmade /inorganic material/does not improve soil structure

Any one point

(b) Nitrogen/Phosphorus/Potassium or N/P/K

[*Accept any order*]

(c) 10:10:20/18:6:12/CAN/Urea/Ground Rock Phosphate/Sulphate of Ammonia/any other fertilizer

Any one point

Question 3 (20 Marks) 2(7m) + 3(2m)

Body part	Location
Villi	Small intestine
(i) Left ventricle	Heart
(ii) Femur	Thigh or (hind) leg
(iii) Bronchiole	Lung
(iv) Testis	Scrotum
(v) Cerebrum	Brain or head or skull

Question 4 (20 marks) 2(6m) + 2(2m) + 4(1m)

(i) Name of organism	Liverfluke /fluke/ <i>Fasciola (hepatica)</i>	Snail/mudsnail/watersnail /garden snail/ <i>Lymnaea</i>
(ii) Phylum	Platyhelminthes	Mollusca
(iii) One characteristic of a member of the phylum	Triploblastic/bilaterally symmetrical /hermaphrodite/ dorsoventrally flattened or flat bodied [Accept characteristic(s) of liverfluke if given e.g. cuticle /(oral) sucker]	Shell/radula/muscular foot /soft bodied/ produces slime.
(iv) Importance in agriculture	(Internal) parasite of cattle (and sheep) /unsaleable livers /reduced weight gains /depressed milk yields/ loss of wool / weight loss	Host of liverfluke/eats or causes damage to plant (foliage)

Question5 (20 marks) (5 x 4m)

Livestock term	Definition
(i) Bullock (or steer)	A male calf that has been castrated
(ii) Gilt	A female pig that has not had a litter
(iii) Draft ewe	A ewe that is culled from the flock and sold
(iv) Broiler	A chicken that is reared for slaughter or reared for meat
(v) Suckler calf	A calf (in the beef herd) that sucks milk from its mother

Question 6 (20 marks) (4 x 5m)

(a) Crop Rotation: Prevents pests /prevents diseases/ more balanced uptake of nutrients/weed control/
improves organic matter content in soil Any one point (5m)

(b) Sowing certified seed: high percentage purity/high germination rate/lower disease risk/potentially
lower seeding rates/no weeds or wild oat/doesn't have to be dressed /traceability/virus free potato
seed/access to new varieties/tubers are graded for size/ higher yields/treated for diseases
Any one point (5m)

(c) Applying selective herbicide: removal of weeds without killing crop Any one point (5m)

(d) Planting winter varieties of cereals: Survive winter frosts/longer growing season/greater yield
capacity/earlier harvesting/lessens labour load in spring on mixed farms/allows earlier sowing of
catch crops on mixed farms/ better weather at sowing time/ better weather at harvest time.
Any one point (5m)

Question 7 (20 marks) (5 x 4m)

(a) TB/ pneumonia/ mastitis/ brucellosis/ scour/ navel-ill/ Clostridial disease(s) or named clostridial
disease e.g. blackleg/ footrot / farrowing fever / any other disease Any two points (2 x 4m)

(b) Silage production/ production of dairy products (cheese, yoghurt)/ digestion in ruminant/ nitrogen
fixation/ breakdown of organic material in soil/any other benefits Any two points (2 x 4m)

(c) Fungus/*Phytophthora infestans* /parasite Any one point (4m)

Section Two

Question 8

(a) 5 x (2 x 3m)

(i) Tail docking : removal of tails in new born lambs/use of ring or knife / reduces risk of maggot infestation or flystrike / facilitates mating/ keeps fleece clean Any two points (2 x 3m)

(ii) Shearing : Removal of fleece or wool from sheep/keeps sheep cool in summer/ sale of wool/reduced risk of maggots or flystrike/increase mobility of sheep/ more space at housing/heavier lambs Any two points (2 x 3m)

(iii) Raddling a ram: Raddle (harness) attached to ram's chest/ raddle contains dye/dye left on ewe's wool when mounted by ram/shows which ewes have been served by ram/changed every 14 days / shows repeats/ shows ram infertility/ allows lambing dates to be predicted Any two points (2 x 3m)

(iv) Dipping sheep: Sheep immersed in tank containing insecticide/ Summer dip insecticide prevents flystrike/ Winter dip prevents infection by parasites/ 7-14 weeks protection/ immerse sheep for 1 minute Any two points (2 x 3m)

(v) Walking the flock through a footbath: prevents bacterial infection/foot rot/ prevents spread of foot and mouth disease/ solution of copper sulphate or formalin or zinc sulphate /repeated throughout year if necessary/ carried out after feet are pared Any two points (2 x 3m)

(b) 5 x (2 x 3m)

(i) Isolation pen: Housing sick animals/disease can be treated/prevent spread of disease to other animals/used to house bulls/important if buying in animals Any two points (2 x 3m)

(ii) Infrared lamp: Keeps new born lambs or piglets (bonhams) warm/located in lambing pen or farrowing crate / used to treat lambs suffering from chill/ temperature of 27°C - 30°C Any two points (2x 3m)

(iii) Creep feeder: Allows lambs or calves to feed but prevents older animals from feeding / creep feeder described/ lamb or calf gets used to eating solid food/ higher weight gains/ higher weights at weaning Any two points (2 x 3m)

(iv) Crush: Pen for holding livestock/restricts movement of animal/treated or examined by farmer or vet/ prevents injury to animal or farmer/used at calving time Any two points (2 x3m)

(v) Farrowing crate: Located in farrowing house/ 20°C/sow gives birth to bonhams/ crate allows bonhams to suck without being crushed Any two points (2 x3m)

Question 9

(a)

(i) Nitrogen fixation/ rich in protein/ weed control/palatable/high productivity/cheaper than fertilizer/reduced need for N fertilizer/ rich in minerals (4m + 3m + 3m)

(ii) More palatable/higher yield or more productive/high DMD or high digestibility/persistent/aggressive (2 x 5m)

(b) (3 x 5m)

Ley: Grassland sown by farmer/ high production level/usually only one or two grasses present or fewer weeds / temporary grassland/ grassland that is used as part of a rotation system or used as a “grass break” Any one point (5m)

Establishment: Becoming a totally independent plant/ plants form a thick sward/ grass tillers /new plant puts down roots/ new plant begins to photosynthesise Any one point (5m)

Heading out: Stage when grass flowers/ stage when 50% of grass plants begin to show their seed heads/carbohydrates begin to turn to fibre/stage of growth that is ideal for cutting for silage

Any one point (5m)

(c) (2 x 5m)

(i) Undersowing (5m)

(ii) Direct drilling/ stitching- in (slit-seeding) (5m)

(d) (3 x 5m)

(i) DMD : The proportion (expressed as a %) of the dry matter of a feedstuff which is retained in the animal’s system following digestion/degree to which the dry matter is retained and assimilated by the animal’s body/the % of the food that is kept and used by the animal Any one point (5m)

(ii) 70% - 80% (5m)

(iii) Less productivity or low yield / low DMD or low digestibility / stemmy /more weeds or named grassland weed(s)/grass is less palatable Any one point (5m)

Question 10

(a) (6 x 4m)

- 1: rainfall [*accept waterlogging*]
- 2: evaporation
- 3: 1-2m
- 4 : Acidity [*accept waterlogging*]
- 5: 8-10m
- 6: waterlogging [*accept rainfall*]

(b) (3x (3m+2m) [*3m for correct example of rock type ; 2m for correct county/region*])

Name of rock	Example	County/region where named rock type predominates
Igneous	Granite or Basalt	<i>Granite:</i> Wicklow/ Donegal
		<i>Basalt:</i> Antrim/Giant's Causeway
Sedimentary	Limestone or Sandstone or Shale	<i>Limestone:</i> Central plain of Ireland (or named county in central plain) / midlands/Burren/(N.) Clare / (S.W.)Wexford
		<i>Sandstone:</i> Cork /Kerry / Waterford.
		<i>Shale:</i> Kerry/Limerick /Clare / Leitrim/ Fermanagh /Kilkenny
Metamorphic	Marble or	<i>Marble:</i> Kilkenny/Galway /Connemara
	Schist/gneiss/quartzite or	<i>S/G/Q:</i> Galway /Mayo / Donegal/ Tyrone/ Derry
	Slate	<i>Slate:</i> Down / Armagh / Monaghan /Cavan / Meath / Louth / Wicklow//Wexford / Kildare

(c) (3 x 3m)

Weathering: Frost action or freezing and thawing/heating and cooling or onion weathering/plant action or example of plant action described/ animal action or example of animal action described/wind erosion/ water erosion/gravity/ pressure due to moving ice or glaciers/solution / carbonation or acid rain/hydrolysis/hydration/oxidation- reduction Any three points (3 x 3m)

(d) (3 x 4m)

- Soil A : Clay 4m
- Soil B : Loam 4m
- Soil C : Sandy Loam 4m

Question 11.

(a) (i) An organism that lives in or on or off another (living) organism (host)/ causing it harm (2 x 3m)

(ii) Example of parasite:

Liverfluke - sheep / lice - cattle / aphid - barley/ any other parasite (3m)

[Award 3 marks only if named parasite and named host match]

(iii) Method of removal (3m)

Dosing / spray /fungicide/pesticide/insecticide / antibiotics/ /drainage/ /biological control

[Method of removal (of parasite) must match named parasite in part (ii)]

(b) Life cycle of insect

Life cycle (Type 1)

Named insect : (Cabbage white) butterfly /clickbeetle / cranefly/ (house)fly (3m)

Diagram: (3m , 0m)

Labels: Egg/larva or named larva /pupa or chrysalis or cocoon/ adult or imago
Any three (3 x 2m)

or

Life cycle (Type 2)

Named insect : Greenfly or aphid / locust (3m)

Diagram : (3m , 0m)

[Award 3 marks if all stages of life-cycle are presented in an acceptable sequence in diagram]

Labels : Egg/nymph/adult (3 x 2m)

(c) Barley :

(i) (Sandy) loam soil / brown earth or grey-brown podzolic /good drainage/good aeration

/ pH 6.0-6.5 / crumb structure/fertile Any two points (2 x 4m)

(ii) Sowing date : September - November (Winter barley) or

February - April (Spring barley) (4m)

Method : sown with a combine drill/seed drill/ one pass Any one point (4m)

(iii) 10 : 10 : 20/ N,P, K / /apply N fertilizer in spring/ split application of N Any one point (4m)

[Accept (farmyard) manure or slurry or any relevant organic fertiliser if method and time of its incorporation into soil is given e.g. manure ploughed into soil in autumn time]

(iv) Certified seed/ seed treatment/ spray /fungicide/ pesticide/ resistant varieties/ biological control/

Autumn ploughing/ rotation Any one point (4m)

(v) Method : Combine harvester (4m)

Time : Winter barley : July **or**
Spring barley : August - September (4m)

[Accept sign(s) of ripeness e.g. harvest when grain gets hard or when stems turn yellow]

(vi) Yield : Winter barley : 7-9 tonnes/ha **or**
Spring barley : 5-7 tonnes/ha (4m)

Or

(c) Potatoes :

(i) Deep soil/ (medium) loam / well drained / good aeration / free from stones
pH 5.0 - 5.5/ brown earth or grey-brown podzolic / fertile / grow in wide range of soils
Any two points (2 x 4m)

(ii) Sowing date : Jan- May (4m)
Method : Potato planter/ sow (plant) in drills or ridges/ grow-bags/ plant with
spade Any one point (4m)

(iii) 10-10-20 /7-6-17 / N, P, K/(farmyard) manure Any one point (4m)
[Accept any other relevant organic fertiliser if method of incorporation into soil is given]

(iv) (1 in 4) rotation/spray/pesticide/ fungicide/slug pellets /earthing up
/ resistant varieties/certified seed Any one point (4m)

(v) Method : Kill off haulms (with herbicide)/elevator digger/complete potato harvester
/ dig up with spade (and gather by hand) Any one point (4m)

Time : First earlies : May - June **or**
Second earlies : July **or**
Maincrop : August- November (4m)

(vi) Yield : Earlies : 7-10 tonnes/ha **or**
Maincrop : 30-40 tonnes/ha (4m)

Question 12. Any two parts (30 , 30)

(a) Name of monogastric animal : (3m) ; Diagram : (4m ,2m, 0m) ; Labels : (4 x 2m)

Experiment (5 x 3m)

Named enzyme / matching substrate / suitable temperature /water-bath /named product
/test for product/mention of control/ control explained/ result/ conclusion

[3 marks for name of enzyme and (4 x3 m) for any 4 other points]

[Allow maximum of 3 marks for a(relevant)unlabelled diagram.]

(b) 5 x (2 x 3m)

(i) Waterlogging /gas exchange or explained /respiration or explained Any two points(2 x 3m)

(ii) Rich in antibodies/highly digestible nutrients or rich in protein and minerals /laxative
effect/disease resistance/warms calf Any two points (2 x 3m)

(iii) Habitat for wildlife/shelter for farm animals/food source for wildlife/microclimate for
crops/absorb carbon dioxide/produce oxygen/biodiversity/wildlife corridors/boundaries or
fences/ reduces spread of diseases (in livestock)/ REPs /noise reduction Any two points (2 x 3m)

(iv) Optimum conditions for storage explained/prevents overheating/prevents rotting
Any two points (2 x 3m)

(v) Poorest trees removed leaving better trees/remaining trees grow at increased rate
/ remaining trees grow straighter/ remaining trees of better quality e.g. fewer knots in
timber /less competition for water or for nutrients or for light/improved access / thinnings
used to make useful product(s) or named product Any two points (2 x 3m)

(c) (i) Water 87.5% (87 - 88%) / total solids 12.5% (12 - 13%) / butterfat or fat 3.8%
(3.5 - 4%) / SNF 8.7% / Protein 3.1% (3.0 - 3.5%) /lactose 4.6% (4 - 5%)
/minerals + vitamins 0.8% (0.7 - 1.0%) Any three points (3 x3m)

(ii) Named component: (3m)

Investigation: Named reagent/procedural point one/procedural point two

/mention of control/control explained/result/conclusion Any three points (3 x 3m)

(iii) Wash udders and teats before milking/parlour hygiene/milker hygiene/ check teats for mastitis
(using strip cup)/ iodine teat dip or spray/wash clusters and milk line/ use of filter to remove dirt
particles/ wash bulk tank/ keep milk at a suitable temperature/ milk cows with mastitis separately to
rest of herd/ fly screens Any three points (3 x 3m)

(d) (i) Named producer /named primary consumer /named secondary consumer / arrows
(4 x 3m)

(ii) e.g. quadrat: Quadrat/ throw at random/ how random/ identification of plant species
/ how identified / repeat/ record plants found /graph /conclusion Any five points (5 x 3m)

(iii) Biodiversity: The variety of organisms found in a habitat (3m)

Question 13

- (a)(i) Alleles - Different forms of the same gene (3m)
- (ii) Clone - A clone is a group of cells or organisms that are genetically identical/ individual member of such a group/ identical genotype/ exact copy of cell or organism
Any one point (3m)
- (iii) Hybrid Vigour – Characteristic shown in the superior offspring of a cross between two (dissimilar) parents. (3m)

(b) The genotypes of the original parents

Gametes produced by each parent	(S)*	X	(s)*	
Genotype of F1	(Ss)*			
Phenotype of F1	<u>six-row ear type*</u>			(4* x 2m)

Genotype of second generation parents	(Ss)*	X	(Ss)*	
Gametes produced by each parent	(S)*	(s)*	(S)	(s)
Genotypes of F2	(SS)*	(Ss)*	(Ss)*	(ss)*
Phenotypes of F2	<u>Six-row*</u>	<u>Six-row</u> -*-	<u>Six-row</u>	<u>Two-row*</u> (11* x 2m)

(c)

(i) Genotypes of the parents	ss*	Ss*	
(ii) Genotypes of gametes	s*	S*	s*
(iii) Genotypes of offspring	Ss*	ss*	
Phenotypes of offspring	<u>Six-row*</u>	<u>Two-row*</u>	(9* x 1m)

(d)

- (i) B (3m)
- (ii) B (3m)
- (iii) Haploid – half the number of chromosomes/ n /chromosomes that exist singly
Diploid – Pairs of chromosomes/ 2n (3m)
- (iv) Ovary /testis/sex organs/gonads Any one point (3m)

