



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2011

Marking Scheme

Agricultural Science

Higher 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 the 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.

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.

Agricultural Science Higher Level 2011 MARKING SCHEME

Q1 Best 6 parts from (a)-(j)	(a)		Rosaceae-large flowers/parts in 5s/*insect pollinated./ Eg Rose/apple etc.(allow labelled diagrams for both) Crucifereae-parts in 4,s/cross shaped/*insect pollinated/ cabbage, kale, oilseed rape etc. <i>*allow for one point only</i>	2x(3+2)
	(b)	(i)	Condition scoring = (ratio of) lean to fat on animals body/ correct scale/feeling(by hand) along back.	4
		(ii)	Calving 2.5-3.5, service 2-3	3+3
	(c)		Active = body manufactures antibodies to particular antigen/ through contact eg virus/bacterium/exposure to vaccine/TB test. Passive = immunity is passed on/ eg. colostrum/or across placenta.	2x(3+2)
	(d)		Earthworms; adding lime/suitable pH/adding organic matter/draining wet land/aerating soil(by cultivations)	8+1+1
	(e)		Germination; use certified seed/warm conditions /good seed bed/moisture/ Establishment; don't sow too deep/pest control/weed control/fertilising/crop rotation/rolling	8+1+1 one pt. at least from each
	(f)		Mono: glucose (or named mono.) Poly: starch/cellulose Carbon, Hydrogen, Oxygen(C,H,O)	4+3 +(3x1)
	(g)	(i)	Platys: liverfluke/tapeworm Arthropoda: ticks, lice, warble fly	2+2
		(ii)	Platy: liver damage/not thriving Arthropoda: infection/ eating flesh/ irritation (disease must match named example), accept redwater disease for tick.	3+3
	(h)	(i)	Symbiosis; accept biology def /2 organisms living together each benefits	4
		(ii)	Examples; Rhizobium (or N-fixing bacteria) in clover/birds eating lice and ticks on cattle/microbes in rumen/any parasite example	3 + 3
	(i)		Add acid to sample/ bubbles /CO ₂ /test for CO ₂ / indicate carbonates	4+3+3
	(j)		Stolon; above ground horizontal stem/with buds for new plants Eg Strawberries/clover/buttercup etc Rhizome; underground modified stem/stores food/pieces with buds can reproduce,e.g. scutch /iris /...	2x(3+2)

Q2	(a)	(i)	Name: plough/iron/compaction (hard pan)	4
		(ii)	Formed; continuous tillage ploughing same depth/iron (oxides) washed down/leached from A to B horizon/using heavy machinery/not using low ground pressure tyres	4
		(iii)	Problem: hard/impervious layer/poor drainage/poor growth/ poor germination/restrict root penetration.	4
		(iv)	Removal: deep ploughing/not ploughing at the same depth in successive years/ subsoiling/ripping/forestry plough	4
	(b)	(i)	Gleisation: high rainfall/low lying area/waterlogged/acid reacts with iron/low bacterial activity/low level decomposition. Peat accumulates on top/ streaks mottling in B horizon/subsoil blue grey colour or grey	4 4
		(ii)	Check field colour differences/old hedges etc/W-shaped pattern in collecting/avoid headlands/gateways/under trees/beside watercourses/collect from top 7.5-15 cm/repeated sampling/field history/topography	4+2+2
	(c)		Place a sample of soil in flask/add distilled water/shake/filter/collect filtrate/add diphenylamine soln/blue ppt is (positive for N) OR for last two points /add iron sulphate/add sulphuric acid/brown ring formed/accept reference to colour chart	4x4

Q3			OPTION 1	
	(a)		<p>Summer grazing; involves using all the grazing to finish cattle/no hay or silage saved/little labour required/no housing/little or no concentrates/low cost(one point only for cost comparison)</p> <p>Winter fattening; most of grass is made into silage/ housing required /meal feeding needed/high labour requirement (at least one point from each)</p>	4x4
	(b)		Replacement heifers; have good teeth/feet/udder 4 teats/fertility/high milk yield/good conformation/comes from good EBI bull/come from good mother that is prolific/good milker/docile/ disease free(or healthy)/correct condition score/dairy breed or named/easy calving	4x4
	(c)	(i)	FCE; how efficiently an animal converts food consumed into weight gained/food to flesh/can be expressed as ratio e.g. pigs 1.75-3.25:1 cattle/sheep 8:1, poultry 2:1 (accept first number)	4+4
		(ii)	Body tissues develop in order/nerve-bone-muscle-fat/fat deposition increases with age/eg 24 months in cattle/depends on breed/the younger the animal the less fat it forms and more lean/fat less efficiently produced	4
		(iii)	Improve FCE; changing high quality diet/increase concentrates/less roughage/buy in new animals/breeding/disease control/housing /high temperature for pigs	4
Q3			OPTION 2	
	(a)		Grassland management; use high quality species of ryegrass or clover/fertilise/close for min.6 weeks/cut at leafy stage or high DMD or heading-out (stage)/reseed frequently/remove weeds/lime/drain/named grazing system	6+4+3+3
	(b)	(i)	Colostrum; /intestine changes after 24 hours/antibodies absorbed	2
		(ii)	Nutritious/laxative/good start in life/ antibodies/immunity/warming/easily digested	8 + 3 + 3
	(c)	(i)	Strip grazing;a moveable electric fence/advanced each day/back fence/moveable water supply	3 + 1
		(ii)	Adv; cheap/get fresh material each day/better utilisation of crop/avoids frost damage/better L.W.G.	4 + 2
			Disadv; damage to soil structure/pollution/dirty/runback for animals/footrot-disease/teeth damage from stones/labour intensive	4 + 2

Q4	(a)		Take 2 or more different varieties or named/chop into small pieces/weigh crucibles/weigh (wet) potato samples in crucibles/place in drying oven/@ 100 degrees/leave/reweigh at intervals/when no further weight loss /calculate % dry matter/new weight divided by old weight x100=% d.m.	2x(6x4)
	(b)		Place in sterile test tubes/add 1 ml resazurin soln (methylene blue)/stopper/shake/incubate/@37 degrees /for 10 mins/note colour change/range is blue (best)/pink (poor)/white (worst) OR two sterile agar plates/one inoculated with milk/using a sterile loop/control/seal/incubate/inverted position/at 37 degrees/24 hours or more/result-colonies in one, none in control.	
	(c)		Get 2 suitable vessels/put soil and water in each/equal amounts/add lime to one or correct flocculant/shake both/allow to settle/control remains muddy/limed sample settles quickly/demonstrating flocculation.	
	(d)		Block off area/with cage or similar/to let rain and light in/keep stock out/allow rest of field to be grazed normally/observe over period/ note composition inside and outside wire/use a line transect/ quadrat/a number of times/at random/use identification key/weeds flourish inside(correct conclusion)	
Q5	(a)	(i)	Anaemia	4
		(ii)	Haemoglobin molecule/haem group has iron at its centre/transport oxygen	4
		(iii)	Balanced diet (containing iron)/inject/as part of ration (pigs and poultry)/iron dextrose injection of pigs/allowing pigs access to soil/lick/animals on grass (greens)	4
	(b)	(i)	A= septum, B= right ventricle, C= bicuspid valve, D= Vena cava,	8x4
		(ii)	X= body(or named part), Y=lungs,	
		(iii)	Blood in X= oxyhaemoglobin/bright/oxygenated Y= deoxyhaemoglobin/dark/deoxygenated	
	(c)		Haemoglobin in urine/cell or red cell bursts/blood in urine	4

Q6	(a)		Crop is bleached (yellow)/the seed (grain) is hard /ear is drooped parallel to stem/the (flag) leaves at top are dead/the grain is easily dislodged/the moisture % is low (about 15 or less) or dry	4x4
	(b)	(i)	Soil type: malting=light(medium)(sandy) loam(less moisture retention) grey brown podzol /Feeding =heavy loam(more moisture retention) brown earth	4x(4+2)
		(ii)	Rotation: malting needs low N in soil/so no grass or other green crop in previous years/pest control (allow once only) Feeding; no rotation necessary /continuous sowing possible	
		(iii)	Fertiliser: Malting needs low N/for low protein/high sugar in grain. Feed barley needs high N in soil/ for high protein in grain.	
		(iv)	End use: Malting for brewing/distilling. Feed; for ration manufacture/animal feed. (two points from each first 4+2)	
	(c)		Testa(pericarp)/endosperm/cotyledon (one)/ coleoptile/plumule/radicle/coleorhiza/aleurone layer Diagram = 4,2,0 plus 4x1 labels	4+(4x1)

Q7	(a)	(i)	Interphase: before prophase/a resting stage before or after cell divisions/between meiosis 1 and meiosis 2/between meioses(cell divisions)/cell organelles duplicate.	3x4																									
		(ii)	Haploid; condition where cell contain half the usual no of chromosomes/1 copy of each chromosome/1 set of chromosomes/23 chromosomes in man/n																										
		(iii)	Inbreeding: allowing related animals to breed																										
	(b)		<p>Parental genotype HLhl x HLhl or HhLl x HhLl</p> <table border="1" data-bbox="408 611 1214 943"> <tr> <td>x</td> <td>HL</td> <td>Hl</td> <td>hL</td> <td>hl</td> </tr> <tr> <td>HL</td> <td>HHLL</td> <td>HHLl</td> <td>HhLL</td> <td>HhLl</td> </tr> </table> <p>4 gametes each side</p> <p>(i) Hairy = 12/16 (or correct fraction or %)</p> <p>(ii) Short = 4/16</p> <p>(iii) Hairy and short = 3/16</p> <p><i>Accept first number alone in each case where 16 boxes are shown.</i></p>	x	HL	Hl	hL	hl	HL	HHLL	HHLl	HhLL	HhLl	Hl	HHLl	HHll	HhLl	Hhll	hL	HhLL	HhLl	hhLL	hhLl	hl	HhLl	Hhll	hhLl	hhll	2 + 2 8x1 4 4 4
x	HL	Hl	hL	hl																									
HL	HHLL	HHLl	HhLL	HhLl																									
Hl	HHLl	HHll	HhLl	Hhll																									
hL	HhLL	HhLl	hhLL	hhLl																									
hl	HhLl	Hhll	hhLl	hhll																									
	(c)		<p>RR = red WW(rr) = white RW(Rr) = roan</p> <p>Eg; RRxWW = RW or RR x rr = Rr</p>	3x4																									

		Q8	ANSWER ANY 2 FROM (a), (b), (c)	(24, 24)
Q8	(a)		One week before farrowing date/around day 108/wash sow/delouse/dose /for endo parasites(worms)/vaccinate sow/against erysipelas/clean out farrowing pen area/put sow in farrowing crate/with adequate food or water/temp 20 degrees	6x4
Q8	(b)	(i)	BOD: Biological (biochemical) oxygen demand/is a measure of the amount of oxygen required by 1 litre of pollutant/bacteria use up oxygen when breaking pollutants down	4
		(ii)	Milk/slurry(FYM)/silage effluent/dirty yard (tank) water	4
		(iii)	Bacteria use up oxygen/decomposition/oxygen levels drop/fish die/deoxygenation / eutrophication/algal bloom/toxicity	2x4
		(iv)	Strategies; ensure dairy waste goes into enclosed waterproof tank/ collect dairy washings in a tank with sufficient capacity:/ensure rain does not wash slurry onto or off land/off concrete area/which should have a fall towards centre of yard and sump/don't apply slurry on frozen /wet soils/when rain is expected/have sufficient capacity for slurry(tank)/wilt silage/to reduce effluent/collect effluent in a tank from pit/spread on land in correct conditions	2x4
Q8	(c)	(i)	Essential; must be in animal diet/cannot be manufactured by an animal/ruminants don't need essential amino acids can make their own. Non essential; can be made by the body/from other nutrients/not needed for growth/in abundant supply	4+4
		(ii)	Annual; plant grows flowers seeds and dies in 1 growing season/completes lifecycle in one year Biennial; plant grows year 1 stores food regrows year 2/flowers seeds and dies in two years /completes lifecycle in two years	4+4
		(iii)	Drainage; the removal of excess water (when soil is saturated, flooded)/stops poaching. Irrigation; adding water to soil/in times of moisture stress/soil moisture deficit/drought/to stop plants drying up or wilting	4+4
		(iv)	Eelworms; nematodes/no legs/non-segmented/roundworms Wireworm; larvae/of clickbeetle/ arthropod/legs/segmented or any insect characteristic	4+4

Q9 4 parts from 5	(a)	Equation may cover all points/anaerobic respiration (fermentation)/production of alcohol/production of CO ₂ /alcohol and CO ₂ used in brewing/CO ₂ used to raise bread	4x(4+4+4) At least one point from each
	(b)	Calves or offspring are tested/growth rate/FCR/compared /with progeny of other bulls/kept under the same conditions/records kept/large statistical sample/very reliable in predicting results of a mating with a particular bull/more reliable than performance test/can predict lift in milk yield/fat or protein increase in a herd.	
	(c)	Systemic; chemicals are absorbed by plants/ through stoma/up xylem/down phloem(translocated) (vascular system only accepted instead of either xylem or phloem)/aphids suck sap/ingest chemical/longterm control	
	(d)	Caused by wrong soil type/deficiency in soil or parent rock/over cultivation/over liming/ph too high/ph too low/soil exhaustion/named example e.g. boron deficiency causes crown rot in beet/incorrect rotation/monoculture/leaching/reclaimed land	
	(e)	To attract bonhams away from sow/ and avoid being crushed/ higher temp too hot for sow /bonhams small lose heat easily/farrowing house 20*C for sows /up to 30* in creep area/to attract them to feed	

