



**General Certificate of Secondary Education
2015**

Agriculture and Land Use

Unit 1
Soils, Crops and Habitats

[GAL11]

FRIDAY 22 MAY, AFTERNOON

**MARK
SCHEME**

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

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Seed drill

Plough

Sprayer

Slurry tanker

Combine harvester

[1] for each correct answer (max [3])

[3]

3

2 (a) 2: Radicle emerges (accept reference to 'first root', do not accept 'root' only)

3: The plumule emerges/reference to further growth of radicle

4: Secondary root development/first leaves appear/plant starts to photosynthesise/shoot breaks through soil

[3]

(b) Water (accept moisture);
 Suitable temperature (accept warmth/heat);
 Oxygen (do not accept air);

[3]

6

AVAILABLE MARKS

		AVAILABLE MARKS
3	<p>(a) Annuals complete their life cycle in one year. Accept: Annuals live for one year/season [1]</p> <p>(b) Any two from:</p> <ul style="list-style-type: none"> • Weather (accept named example)/climate • Soil type/drainage capacity of soil • pH of soil • Aspect of field • Crop rotation • Pests/named pest • Fertiliser/manure (applications) – accept converse, e.g. reference to nutrients in soil [2] <p>(c) Any two from: Organic farming methods:</p> <ul style="list-style-type: none"> • Saves money on fertilisers/sprays or reduces use of fertiliser/sprays • Organic produce sells for higher price • Strengthened soil structure and formation/increased organic material in soil • Protects waterways/keeps fertilisers/pesticides from waterways • Increase consumer choice • Reduces non-renewable energy use for creation of fertilisers/pesticides • Increase local biodiversity [2] 	5
4	<p>(a) Any two from:</p> <ul style="list-style-type: none"> • Heat (for cows/chickens/dairy/farmhouse) • Light (for cows/chickens/dairy/farmhouse) • (Fuel for) machinery/tractor • Ventilation • Electrical example [2] <p>(b) (i) Biomass [1]</p> <p>(ii) Oilseed rape, maize, grass, willow or other appropriate example [1]</p> <p>(iii) Takes in carbon dioxide when growing (by photosynthesis); Which offsets the carbon dioxide produced when burnt/less fossil fuels used [2]</p> <p>(c) (i) Any two from:</p> <ul style="list-style-type: none"> • insulation • lights on timer/lights on sensor • energy saving lightbulb • efficient boiler • heat exchanger/plate cooler • Accept appropriate examples <p>(ii) Any two from:</p> <ul style="list-style-type: none"> • wind turbines • solar panels • biodigester • heat pump (accept geothermal) [4] 	10

- 5 (a)** Any **two** from:
- food processor
 - conservation worker
 - (agriculture) contractor
 - feed merchant
 - (agri-)sales
 - agricultural engineer
 - agronomist/advisor
 - (farm) inspector
 - AI technician
 - Food scientist
 - Appropriate example
- [2]
- (b) (i)** 65 000 (accept 64 000) [1]
- (ii)** 30 [1]
- (c) (i)** The number of farm workers is decreasing (with time);
The average farm size is increasing (with time);
Reference to figures from either graph:
Average farm size from 30 to 40 hectares/number of farm workers
from 65 000 to 27 000. [3]
- (ii)** • Decrease in farm workers due to mechanisation/people leaving
countryside/labour costs
or
• Increase in farm size due to removal of hedgerows/buying
neighbouring farms/narrow profit margins
or
Appropriate valid response [1]
- (iii)** 46 [1]
(Accept answer in range 44–48)

AVAILABLE
MARKS

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6 Indicative content:

- Machinery
- Maintenance of machinery
- Reference to tillage method
- Labour
- Take animals off field
- Wire field off/fencing
- Cut back hedges
- Fuel
- Seed/sowing
- Irrigation/supply of water
- Electricity
- Adding lime/pH testing
- Rental costs
- Slurry ground
- Fertiliser
- Sprays – herbicide
- Additives
- Sprays – pesticides
- Contracting costs
- Buildings for storage
- Testing/weighing/sampling
- Drying
- Refrigeration (if applicable)
- Vermin control
- Specific comments related to named crops
- Plastic covers/tyres (for silage)
- Reference to replacement costs if crop failure

Band	Response	Mark
3	<p>Candidates demonstrate a detailed and comprehensive knowledge and understanding of the main costs of crop production. They discuss the main costs of each of the three stages. Candidates apply their specific knowledge to one crop they have studied. Explicit reference to cost.</p> <p>Quality of written communication is excellent. Relevant material is organised with a high degree of clarity and coherence. Presentation, spelling, punctuation and grammar are of a high standard with appropriate use being made of specialist vocabulary.</p>	[7]–[9]
2	<p>Candidates demonstrate an adequate knowledge of the main costs of crop production and address at least two stages. The statements may be linked to crops in general.</p> <p>Quality of written communication is good. Relevant material is organised with some clarity and coherence. Presentation, spelling, punctuation and grammar are of a reasonable standard to make meaning evident. There is some use of appropriate specialist vocabulary.</p>	[4]–[6]
1	<p>General statements about costs and/or production, no connection to the crop chosen.</p> <p>Quality of written communication is basic. The organisation of material may lack clarity and coherence. Presentation, spelling, punctuation and grammar are at a basic level with little use of appropriate specialist vocabulary.</p>	[1]–[3]
	No creditable comments	[0]

AVAILABLE
MARKS

[9]

9

7 (a) Improved

Any **one** from:

- Land has been sown for agricultural or recreational purposes
- Fertiliser/herbicide has been applied
- Decreased biodiversity/monoculture consists mainly of ryegrass
- Less food sources/habitats for wildlife
- Drained
- Higher yield

UnimprovedAny **one** from:

- Less fertiliser added
- Managed traditionally
- Increased biodiversity/more weeds/more (wild) flowers
- Not drained

Any appropriate point from either improved or unimproved, specifying which they are talking about [1]

- (b) (i) Higher yield/more efficient use of land/more profitable/longer grazing season/improved nutrition (for animals)/less competition (for grass)/better quality silage/hay [1]

(ii) Any **two** from:

- Reseed
- Drainage/method described
- Add fertiliser/manure/slurry
- Remove weeds/use herbicides
- Use pesticides
- Add lime
- Cut/top
- Increased aeration

[2]

(c) Any **two** from:

- Soil type
 - Soil pH
 - Temperature
 - Humidity
 - (Exposure to) (sun)light/shading
 - Water in soil (drainage)
 - Amount of rainfall
 - Nutrients in soil
 - Aspect, i.e. north/south/east/west facing
- (accept climate or weather but not in combination with temperature, humidity or rainfall)

[2]

AVAILABLE
MARKS

6

- 8 (a) A: Clay
B: Sand

[2]

AVAILABLE
MARKS**(b) Indicative Content****Particle size test**

- Using dry soil
- Use soil sieves
- To separate soil accordingly to particle size
- Find mass of soil collected in each sieve
- Calculate percentage of each soil particle/estimate make-up of soil

Or

- Using dry soil
- Crush sample
- Add water and shake
- Allow to settle/show layers
- Calculate percentage of each soil particle/estimate make-up of soil

Soil texture test

- Add water
- Rub between fingers to mould/shape
- Assess brittleness/soil staying together
- Assess grittiness
- Note colour

Soil pH

- Mix soil with (distilled) water (to form a solution)
- Allow to settle/filter
- Use universal indicator/pH meter/pH probe
- Compare with colour chart/current colour reference to pH scale/current numerical reference to pH scale

Drainage Capacity

- Reference to time
- Describe adding water
- Describe water moving through soil
- Reference to method, e.g. funnel/1 metre hole in field

Moisture Content

- Measure mass of soil at start
- Heat in warm oven
- Until constant mass
- Find new mass
- Use difference to calculate % water

Correct equation can cover a number of above points

General

- Reference to sampling methods

Maximum [4] for testing each requirement of maize growing

Band	Response	Mark
3	<p>Candidates demonstrate a detailed and comprehensive knowledge and understanding of soil testing. They describe three suitable tests (drainage capacity/moisture content, soil pH and particle size/soil texture).</p> <p>Quality of written communication is excellent. Relevant material is organised with a high degree of clarity and coherence. Presentation, spelling, punctuation and grammar are of a high standard with appropriate use being made of specialist vocabulary.</p>	[7]–[9]
2	<p>Candidates demonstrate an adequate knowledge of different soil testing and describe at least two suitable soil tests (drainage capacity/moisture content, soil pH and particle size/soil texture).</p> <p>Quality of written communication is good. Relevant material is organised with some clarity and coherence. Presentation, spelling, punctuation and grammar are of a reasonable standard to make meaning evident. There is some use of appropriate specialist vocabulary.</p>	[4]–[6]
1	<p>General statements about soil testing for maize cultivation.</p> <p>Quality of written communication is basic. The organisation of material may lack clarity and coherence. Presentation, spelling, punctuation and grammar are at a basic level with little use of appropriate specialist vocabulary.</p>	[1]–[3]
	No creditable comments	[0]

[9]

11

AVAILABLE
MARKS

			AVAILABLE MARKS	
9	(a) (i)	Nitrogen (accept nitrates)	[1]	7
	(ii)	Relative proportion/ratio of NPK in nutrient solution (Accept reference to percentages)	[1]	
	(b) (i)	57 kg	[1]	
	(ii)	Pest/disease/fungi/age of plant/flowers not pollinated/care of plant changed/nutrients being used up	[1]	
	(iii)	Any two from: <ul style="list-style-type: none"> • Soil not required • Can be grown on small areas of land • Correct nutrient environment is easily provided for the plant • Water stays in the system/water re-used (lower water costs)/less water lost • pH controlled • No weeding • Easier to get rid of pests and diseases • Increased yield • Consistent yield. 	[2]	
	(iv)	Any one from: <ul style="list-style-type: none"> • Large set-up costs • Expertise/training needed • Availability/affordability of water/electricity • Glasshouses need climate control • Not suitable for all crops • Expensive to run 	[1]	
10	(a) (i)	An animal or plant identified as being of conservation concern/an endangered species/whose habitat is at risk/species on 'red list'/identified as needing protection	[1]	
	(ii)	Yellowhammer, red squirrel, lapwing, curlew, barn owl, marsh fritillary butterfly	[1]	
	(b) (i)	36 000	[1]	
	(ii)	Any one from: <ul style="list-style-type: none"> • More food available • Changes in farming practices (accept correct example such as field margins left) • Raised awareness • Larger litters • Harvesting • Reduction in predators 	[1]	
	(iii)	Any two from: <ul style="list-style-type: none"> • Wild areas/set-aside/(creation of) wider field margins/plough less • Don't mow all field at same time/mow from inside of field out • Less spraying of crops • Become aware of where habitats are so as not to disturb them • Less fertiliser application • No trapping/hunting of hares 	[2]	

(c) Any **three** from:

- Grants/financial reward/avoid fines
- It creates/maintains habitats
- Increased pollinators, e.g. bees
- More earthworms (improve soil structure)
- More legumes (increase nitrogen content of soil)/less need for fertiliser
- More food for wildlife
- Balances diet of ruminants
- More natural pest control
- Ecotourism

[3]

Total

**AVAILABLE
MARKS**

9

75