443/1 MS
AGRICULTURE
Paper 1
MARKING SCHEME

March 2021

THE KENYA NATIONAL EXAMINATIONS COUNCIL

# KENYA CERTIFICATE OF SECONDARY EDUCATION

AGRICULTURE

Paper 1

## MARKING SCHEME
(CONFIDENTIAL)

**THIS MARKING SCHEME IS THE PROPERTY OF THE KENYA NATIONAL EXAMINATIONS COUNCIL AND IT MUST BE RETURNED AT THE END OF THE MARKING EXERCISE.**

This marking scheme consists of 11 printed pages.

## SECTION A (30 marks)

| | | |
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| 1. | i) Date first symptoms were noticed;<br>ii) Symptoms noticed;<br>iii) Disease diagnosed/suspected;<br>iv) Drugs used to treat the diseases;<br>v) Cost of treatment;<br>vi) Remarks;<br>vii) Animal affected;<br>viii) Date of treatment 4 x ½ | (2 marks) |
| 2. | i) Increase soil aeration;<br>ii) Improve water holding capacity;<br>iii) Increases soil nutrient content;<br>iv) Provides food and shelter for micro-organisms; /provides humus<br>v) Binds soil particles together; /improve soil structure/ control soil erosion<br>vi) Buffers soil pH;<br>vii) Reduces toxicity of plant poisons;<br>viii) Improves soil temperatures;<br>ix) Increase water infiltration; 4 x ½ | (2 marks) |
| 3. | i) Sprinklers;<br>ii) Water pumps;<br>iii) Pipes;<br>iv) Filters; 4 x ½ | (2 marks) |
| 4. | i) Holds competitive agricultural shows/exhibitions;<br>ii) Encourages breeding and importation of pure breeds of livestock;<br>iii) Encourages and assists in official milk recording scheme;<br>iv) Organizing national ploughing contests;<br>v) Publishing a monthly journal/ Kenya farmer<br>vi) Organizing the running of young farmers clubs;<br>vii) Awarding bursaries for local and overseas students;<br>viii) Organizing tours for its members;<br>ix) Organizing national tree planting<br>x) Publishes the stud book.<br>xi) Organizing local and international exchange programmes 4 x ½ | (2 marks) |

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| 5. | Information found on delivery note.<br>i) Date of delivery;<br>ii) Quantity ~~and type~~ of goods delivered (~~quantities~~);<br>iii) Item(s) delivered/Type of goods delivered (particulars)<br>iv) Person who receives the goods/~~signature~~ stamp of receiver;<br>v) Conditions in which goods are received;<br>vi) Delivery note serial number;<br>vii) Person who deliver/from whom<br>viii) Signature of the receiver. 4 x ½ | (2 marks) |
| 6. | Implements for primary cultivation.<br>i) Jembe ~~or fork jembe~~/hoe;<br>ii) Ox-plough;<br>iii) Disc plough;<br>iv) Mouldboard plough;<br>v) Forked Jembe/Forked hoe<br>vi) Rotavitor/Rotary cultivator<br>vii) Subsoiler<br>viii) Chisel plough<br>4×½ | (2 marks) |
| 7. | Factors influencing soil formation.<br>i) Parent rock/bedrock.<br>ii) Climate;<br>iii) Topography/Slope<br>iv) Time;<br>v) Living organisms/Biotic factors 4×½ | (2 marks) |
| 8. | Importance of ridging in potato production.<br>i) For expansion of tubers;<br>ii) To conserve soil moisture;<br>iii) For easy harvesting;<br>iv) To prevent soil erosion;<br>v) To improve soil drainage.<br>vi) Prevent greening of Tubers. 4 x ½ | (2 marks) |
| 9. (a) | Thinning is the removal of excess seedlings from the seedbed while rogueing is removal and destruction of diseased or infected plants.<br>(Mark as a whole) | (1 mark) |

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| (b) | Nursery bed is a small piece of land where small seeds are raised into seedlings before transplanting while seedling bed is a special type of nursery which receives excess seedlings from the nursery bed after pricking out. OWTTE<br>(Mark as a whole) | (1 mark) |
| 10. | Methods of weed control.<br>(i) Chemical method/use of herbicides;<br>(ii) Uprooting;<br>(iii) Biological method;<br>(iv) Cultural method; eg: clean planting materials, proper spacing, clean seedbed preparation<br>v) legislative method<br>vi) slashing / mowing<br>early planting, mulching, cover crops, crop rotation, flooding<br>4 x ½ | (2 marks) |
| 11. | Causes of crop disease.<br>i) Fungi;<br>ii) Virus;<br>iii) Bacteria;<br>iv) Poor weather conditions/physiological conditions<br>v) Lack of essential elements/nutritional imbalance<br>4 x ½ | (2 marks) |
| 12. | Importance of land title deed.<br>i) Used to secure credit facilities for land development;<br>ii) Land disputes are minimized;<br>iii) Encourage farmer to carryout long term investment on the land;<br>iv) Enables owner to lease the farm and thus get extra income;<br>v) Provide security of ownership;<br>4 x ½ | (2 marks) |
| 13. | Agents of erosion.<br>i) Water;<br>ii) Wind;<br>iii) Human activities;<br>iv) Living organisms/~~Pests plants~~ Animals = Rej. plants and micro organisms<br>v) Ice<br>4 x ½ | (2 marks) |
| 14. | i) Forage has high dry matter content;<br>ii) Has high cellulose content;<br>iii) High lignin, tannin and silica which are indigestible;<br>iv) Has low crude protein content; | |

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|---|---|---|
| | iv) Has low leaf : stem ratio; / low palatability<br>vi) Has low dry matter digestibility; 4 x ½ | (2 marks) |
| 15. | Agricultural practices that pollute water.<br>(i) Use of inorganic fertilizers;<br>(ii) Use of excess pesticides;<br>(iii) Over cultivation / pulverization of the soil<br>(iv) Over grazing; / overstocking<br>(v) Cultivation along river banks;<br>vi) watering animals directly in the surface water sources. 4 x ½ | (2 marks) |

**SECTION B** (20 marks)

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| 16. | (a) i) Nitrogenous / straight fertilizer. / ii) Neutral<br>(b) i) It neutralizes soil acidity; / iv) top dressing<br>~~Neutral pH~~; acidity produced by ammonium ions is counteracted by calcium carbonate which is a liming material.<br>ii) It raises /increase soil pH.<br>iii) It has a liming effect.<br>(c) If 20kg N ~~requires~~ is contained in 100kg CAN ✓<br>∴ 50kg N ~~requires~~ is contained in: $\frac{100\text{kg of CAN} \times 50\text{kg N}}{20\text{kg N}} = 250\text{kg of CAN}$ ✓<br>$\frac{250\text{kg}}{50\text{kg}} = 5$ bags ✓<br>OR 100kg CAN contains 20kg N ✓<br>∴ 1kg CAN contains $\frac{20\text{kg N} \times 1\text{kg}}{100\text{kg}}$ ✓<br>= 10kg N<br>10kg N = 1kg<br>∴ 50kg = $\frac{50\text{kg} \times 1\text{kg}}{10\text{kg}} = 5$ kgs ✓ | (1 mark)<br>(1 mark)<br>(1 mark)<br>(1 mark) |
| 17. | (a) Shading;<br>(b) i) Protects seedlings from direct sunlight;<br>ii) Protects seedlings from heavy rainfall which damage seedlings / prevents splash erosion<br>iii) Conserves soil moisture / reduces rate of waterloss<br>(c) i) Should be laid along North/South orientation;<br>ii) Should allow in sunlight early in the morning and late in the evening; 1 x 1 | (1 mark)<br>(2 marks)<br>(1 mark) |

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| | (d) Raised nursery bed/ Tree nursery/ Conference of nursery 1 x 1 | (1 mark) |
| 18. | (a) Root nematode/ Eel worm 1 x1<br>(b) (i) Root swells/formation of root galls/ root knuckles<br>(ii) Wilting of crop even when moisture is adequate;<br>(iii) Retarded growth/ stunted growth of shoots/plants<br>(iv) Discolouration of leaves 2 x1<br>(c) (i) Crop rotation;<br>(ii) Use of nematicides;<br>(iii) Fumigation of soil;<br>(iv) Soil solarisation;<br>(v) Closed season<br>(vi) plant resistant crop varieties 2 x 1 | (5 marks) |
| 19. | (a) Consumable goods inventory. 1 x 1 | (1 mark) |

(b)

**MWAMUZI FARM**

| RECEIPTS | | | ISSUES | | | |
|---|---|---|---|---|---|---|
| **DATE** | **COMMODITY/ ITEM** | **QUANTITY** | **DATE** | **ISSUED TO** | **QUANTITY** | **BALANCE IN STOCK** |
| 7/7/18 | DAP fertilizer | 20 bags (~~50kg~~) | | | | 20 |
| 21/7/18 | DAP fertilizer | 20 bags (~~50 kg~~) | | | | 40 |
| | | | 28/07/18 | Gardener | 8 bags DAP | 32 |

(3 marks)

(c) It provides information used for drawing Profit and Loss Account and Balance Sheet.

(1 mark)

## SECTION C (40 marks)

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| 20. | (a) Risks and uncertainties in farming.<br>(i) Fluctuation of commodity prices.<br>(ii) Physical yield uncertainty where the farmer does not know how much to expect.<br>(iii) Ownership uncertainty. Farmer lose produce through theft fire, death or change in government policy.<br>(iv) Outbreak of pests and diseases which affect expected outcome.<br>(v) Sickness and injury uncertainty. Farmer affected lose ability to work due to sickness or injury.<br>(vi) New production technique ~~and~~ uncertainty. The farmer may not be certain as to whether technology is as effective as the previous one.<br>(vii) Farmer investing in machinery which may become outdated (obsolete) within a short time.<br>(viii) Natural catastrophes. Things like floods, drought, earthquakes, storms and strong winds may destroy the crops.<br>7 x 1 | (7 marks) |
| | (b) (i) (i) Results to failure in seed germination of ~~seeds~~;<br>(ii) Results to restricted root development;<br>(iii) Results to moisture stress which reduces fruit weight. and<br>(iv) slows rate of growth<br>Reduced rate of photosynthesis. 3 x 1 | (3 marks) |
| | (ii) (i) Slow growth rate of crops due to slowed photosynthesis;<br>(ii) High incidence of disease infection to crop e.g. late blight.<br>(iii) Lowers the quality of tomato fruits. 3 x 1 | 3 marks) |

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| | (iii)<br>i) • Agent of soil erosion carrying top fertile soil reducing nutrients.<br>ii) • Causes lodging and damage to crops.<br>iii) • Increases rate of evaporation from soil leading to water loss.<br>iv) • Increases spread of pests and disease attack. 3 x 1 | (3 marks) |
| | (c) Advantages of Tillage as a mechanical method of weed control.<br>i) Cheap therefore a good option for small scale farmers i.e. economical.<br>ii) Tillage opens up soil allowing infiltration of water to occur and thus minimize soil erosion.<br>iii) During tillage, earthing up is done which encourages root growth.<br>iv) During tillage, crop residue is incorporated into the soil to form organic manure.<br>v) Improves soil aeration.<br>vi) Exposes soil borne pests and disease agents. 4 x 1 | (4 marks) |
| 21. | (a) Planting of maize in the field.<br>i) Plant suitable varieties; / Recommended seeds<br>ii) Plant early at onset of rain/dry plant;<br>iii) Plant at 2.5cm to 10cm depth;<br>iv) Spacing at 20cm to 30cm by 75cm to 90cm;<br>v) Apply DAP / organic fertilizer / well rotten manure at planting at ~~(100-150)kg/ha/manure~~; / time<br>vi) Plant at 25kg seed per hectare.<br>vii) Place one or two seeds per hole;<br>viii) Plant by hand or machine planter;<br>ix) Use well rotten organic manure at handful per plant.<br>x) Apply DAP at rate of 100-150kg/ha / 1 tea spoonful per hole.<br>xi) Mix phosphatic fertilizer / well rotten manure well with soil.<br>xii) Cover seeds with soil 7 x 1 | (7 marks) |

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| | (b) Factors determining spacing ~~crops~~ in bean production<br>(i) Type of machinery used; use of machines require wider space;<br>(ii) Soil fertility; fertile soil – closer spacing;<br>(iii) Type of beans/varieties of beans/ growth habit / indeterminate beans/sp. spreading beans require wide spacing;<br>(iv) Moisture availability; High rainfall – closer spacing;<br>(v) Use of the crop – ~~forage crop~~ / grain pod beans require closer spacing.<br>(vi) Pest and disease control; ~~wider~~ crop spacing control pest/ and disease spread.<br>~~(vii) Growth habit of the crop; indeterminate /spreading type requires wider spacing~~.<br>vii) Number of seeds per hole – more seeds per hole require wider spacing.<br>7 x 1 | (7 marks) |
| | (c) -i) Facilitates production of many seedlings in a small area;<br>ii) Routine management practices are easily and timely carried out in a nursery than in the main seed bed;<br>iii) Makes it possible to provide the best conditions for growth such as fine tilth, levelled field and shade;<br>iv) Facilitates the planting of small seeds which develop into strong seedlings that are easily transplanted;<br>v) It ensures transplanting of only those seedlings that are healthy and vigorously growing;<br>vi) Excess seedlings from the nursery may be sold, thus become a source of income to the farmer.<br>vii) reduce time trees take in the main field to mature.<br>6 x 1 | ( 6 marks) |

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| 22. | (a) Maintenance of plucking table in tea.<br>(i) Cut back the tea bush to 5cm above the last pruning height after 2 – 5 years;<br>(ii) Carry out tipping after 3 months;<br>(iii) After many such pruning, tea bush is cut down to 45cm above the ground;<br>(iv) Rehabilitation done after every 40 – 50 years;<br>(v) Use a plucking stick to maintain plucking table during harvesting.<br>5 x 1 | (5 marks) |
| | (b) Procedure for transplanting onions seedlings.<br>(i) Water the nursery bed ~~one day~~ before transplanting;<br>(ii) Selecting healthy and vigorous growing seedlings;<br>(iii) Lift the seedlings using a garden ~~trowel and~~ put them into a container for transporting to the seedbed;<br>(iv) Plant one seedling per hole at the same depth as it was in the nursery.<br>(vii) Firm the soil around the base.<br>(vi) This should be done preferably late evening or during a cloudy day.<br>(viii) Mulch the seedlings and water them regularly.<br>(xi) Put appropriate amount of fertilizers/manure into planting holes and mix with soil.<br>(xii) Transplant when seedlings are about one month old.<br>(xiii) Plant at spacing of 30cm between rows by ~~10cm~~ between plants.<br>7 x 1 | (7 marks) |
| | (c) Micro-catchments<br>(i) Negarim micro catchment;<br>Are closed grid of diamond shape or open-ended "V"s formed by constructing small earth ridges with infiltration pits for purpose of collecting water.<br>(ii) Contour bunds; | |

These are earthen bunds constructed along the contours' and are spaced 5m to 10m apart.

(iii) Contour Ridges;

Are small earth ridges constructed along contours and are spaced 1.5m to 5m apart and are used to conserve water.

(iv) Semi-circular bunds;

These are semi-circular shaped earth bunds with tips, constructed along contour. Used in rangeland hence appropriate for pasture and tree planting.

(v) Trapezoidal bunds;

Are earth bunds which are trapezoidal in shape. They capture surface flow and allows the excess; water to overflow around wing tips.

(vi) Contour stone bunds;

Formed by heaping small stone~~bunds~~s along the contours to slow surface flow and filter eroded soil.

(vii) Rock dams;

Constructed across valleys to slow surface flow.

(viii) Water spreading bunds;

They are used to divert water from watercourse onto crops or pasture.

ix) planting pits; these are extra large planting holes where water from the surrounding collect around the plant base.

8 x 1 (8 marks)