

3.8 AGRICULTURE (443)

In the year 2018, K.C.S.E Agriculture Examination consisted of three papers; Paper 1, Paper 2 and Paper 3. The three papers tested the candidates' competence in understanding the agricultural principles, concepts and practices as stipulated in the syllabus. A wide range of knowledge and skills was tested in order to bring out the different abilities of the candidates. The format of the three papers is as follows:

- **Paper 1 (443/1):** This is a theory paper that covers General Agriculture, Crop Production, Agriculture Economics and Soil and Water Conservation. It has three sections, A, B and C, which are marked out of 30, 20 and 40 marks respectively.
- **Paper 2 (443/2):** It is also a theory paper but covers Livestock Production, Farm Power, Farm Machinery, Farm Structures and Farm Tools and Equipment. It has three sections, A, B and C, which are also marked out of 30, 20 and 40 marks respectively.
- **Paper 3 (443/3):** This is a project paper with two project questions, **Project A** and **B**. In 2017, one of the projects required candidates to grow **beans** while the second one was on rearing of **Rabbits**. Candidates selected and carried out only one of the two projects. The project paper is scored out of 100 marks.

3.8.1 CANDIDATES' OVERALL PERFORMANCE

The table below shows the general performance of candidates in the year 2018 KCSE Agriculture Examination. Performance in the previous five years has been included for comparison.

Table 16: Candidates overall performance in Agriculture for the last six years

YEAR	PAPER	CANDIDATURE	MAXIMUM MARK	MEAN SCORE	STANDARD DEVIATION
2018	1	278,658	90	20.81	11.78
	2		90	31.58	15.20
	3		20	4.24	1.88
	Overall		200	60.57	27.36
2017	1	247,265	90	26.21	13.86
	2		90	23.28	12.25
	3		20	5.41	2.31
	Overall		200	54.75	26.82
2016	1	228,443	90	26.21	14.28
	2		90	28.88	15.77
	3		20	5.66	2.34
	Overall		200	61.75	30.83
2015	1	206,127	90	43.91	17.19
	2		90	36.45	17.19
	3		20	9.29	3.02
	Overall		200	89.61	34.62
2014	1	191,362	90	40.93	15.75
	2		90	31.47	12.85
	3		20	8.63	2.76
	Overall		200	83.00	29.29
2013	1	178,771	90	29.80	13.53
	2		90	31.22	14.30
	3		20	6.19	2.28
	Overall		200	67.19	28.26

The following observations can be made from the summary in the table:

- (i) Candidates' performance in Agriculture improved. This is shown by the increase in the overall mean score from **54.75.00** in 2017 to **60.57** in 2018. **Paper 1 (443/1)** mean score dropped from **26.21** in 2017 to **20.81** in 2018. The mean score for **Paper 2 (443/2)** increased from **23.28** in 2017 to **31.58** in 2018.
- (ii) The overall standard deviation was **27.36**. The value of the standard deviation indicates that the papers adequately discriminated candidates of different abilities.
- (iii) The candidature increased from **247,265** in 2017 to **278,658** in 2018. A similar trend was also observed in the years 2016, 2015, 2014 and 2013. This is a likely indication of increasing popularity of the subject in schools.

3.8.2 ANALYSIS OF POORLY PERFORMED QUESTIONS

Below is an analysis of the items that posed some challenge to the candidates. This report highlights the questions and gives the expected responses. It also offers a general advice to teachers on the possible methodologies to emphasise during instruction.

3.8.3 Agriculture Paper 1 (443/1)

No question was reported by the Chief Examiner to have been difficult. However, candidates had challenges in handling the following questions:

Question 16

An experiment was carried out to investigate soil constituents as described below:

- Step I – An empty evaporating dish was weighed and its mass was 10 gms.
- Step II – Fresh garden soil was put on the evaporating dish and weighed. The mass was 40 gms.
- Step III – The evaporating dish containing fresh soil was put in an oven and heated at a temperature of 105 °C for 30 minutes, cooled and then weighed. The mass was 35 gms.
- Step IV – The dish containing soil was then strongly heated on a Bunsen burner for two hours while stirring. It was then cooled and weighed. The new mass was 32 gms.

- (a) Give a reason why the soil was heated
- (i) at 105 °C (1 mark)
 - (ii) strongly for two hours (1 mark)
- (b) Calculate the percentage content of the soil constituents investigated in the experiment. (3 marks)

Expectation

This question required candidates to determine the quantity of water and organic matter in a sample of soil.

Weaknesses

Most of the candidates were not able to calculate the percentage content of the soil constituents investigated in the experiment.

Advice to teachers

Learners should be practically engaged in the actual investigation and determination of the soil constituents.

Expected responses

- (a) (i) Get rid of soil moisture;
(ii) Destroy soil organic matter;

(b) **Water** – Fresh soil – 40gms – 10gms
= 30gms;

- Dry soil – 35gms – 10gms
= 25gms

- Water = 30 – 25
= 5gms

$$\% \text{ of water} = \frac{5}{30} \times 100 = 16.6667\%;$$

Organic matter – 25 – 22
= 3gms

$$\% \text{ of organic matter} = \frac{3}{30} \times 100 \\ = 10\%;$$

Question 18

In a maize production enterprise carried out over a period of eight years, a farmer used one hectare of land each time and applied different quantities of DAP fertiliser. DAP fertiliser costs KSh 2 500 per 50 kg bag and the harvested maize is sold at KSh 3 000 per 90 kg bag. The quantities of DAP fertiliser applied and maize harvested are as shown in this table below.

DAP fertiliser input in 50kg bags	Maize yield in 90kg bags	Total revenue KSh	Total cost KSh	Marginal revenue KSh	Marginal cost KSh
0	15.0	45 000	0	0	0
1	35.6				
2	52.0				
3	68.5				
4	71.0				
5	71.5				
6	71.5				
7	68.5				

- (a) Complete the table by determining the values of total revenue, total cost, marginal revenue and marginal cost. (2 marks)
- (b) From the information in your table, how can the farmer determine the level of production at which profit is maximum? (1 mark)
- (c) At the production level that yielded maximum profit, what was the value of each of the following?
- (i) DAP fertiliser input (1 mark)
- (ii) Marginal revenue (1 mark)

Expectation

The candidates were required to use the knowledge on the law of diminishing returns to complete the table and determine the level at which fertilizer should be applied to realize maximum profit.

Weaknesses

Most of the candidates were not able to complete the table on the law of diminishing returns and therefore could not determine the point of fertilizer application that realizes maximum profit.

Advice to teachers

The learners should be guided on how to analyze data on the law of diminishing returns, use to plot graphs and its application in farming to maximize returns.

Expected responses

(a)

DAP Fertilizer Input in (50kg bags)	Maize yield in (90kg bags)	Total revenue (KSh.)	Total cost (Ksh.)	Marginal revenue (Ksh.)	Marginal cost (Ksh.)
0	15.0	45000	0	0	0
1	35.6	106800	2500	61800	2500
2	52.0	156000	5000	49200	2500
3	68.5	205500	7500	49500	2500
4	71.0	213000	10000	7500	2500
5	71.5	214500	12500	1500	2500
6	71.5	214500	15000	0	2500
7	68.5	205500;	17500;	-9000;	2500;

(2 marks)

(b) At the stage where marginal revenue is equal or almost equal to marginal cost;

(1 mark)

(c) (i) 5 bags;

(1 mark)

(ii) KSh. 1500;

(1 mark)

3.8.4 Agriculture Paper 2 (443/2)

No question was reported by the Chief Examiner to have been difficult.

Question 19

A farmer is required to prepare 200kg of dairy meal containing 18% digestible crude protein (DCP). Using the Pearson's Square Method, calculate the quantity of sunflower seed cake (34% DCP) and maize germ (7% DCP) the farmer requires for the dairy meal. (5 marks)

Expectation

The candidates were required to use the Pearsons square method to formulate a ration using the ingredients provided.

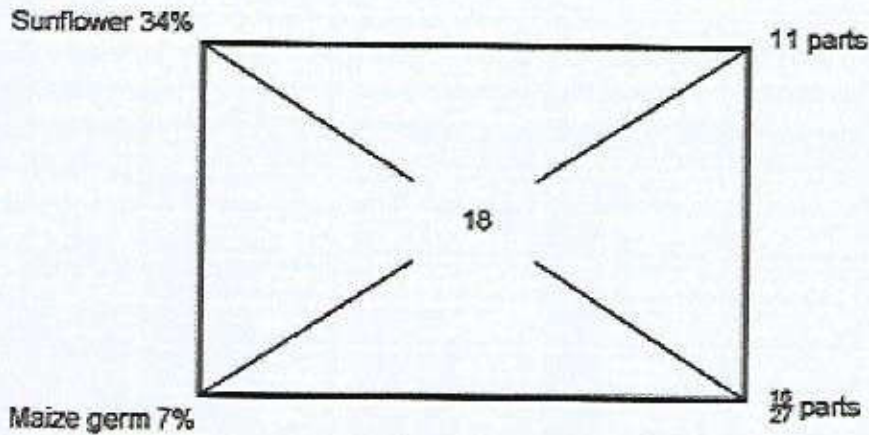
Weaknesses

Most of the candidates were unable to determine the quantity of sunflower seed cake and maize germ required to prepare the dairy meal.

Advice to teachers

Guide learners on how to use the Pearson's square method to calculate the quantity of the specified feed stuffs required to make the animal feed.

Expected responses



$$\text{Sunflower } \frac{11}{27} \times 200 = 81.48\text{kg};$$

$$\text{Maize germ } \frac{16}{27} \times 200 = 118.52\text{kg};$$

Question 20 (c)

- (c) Draw a diagram of the animal identified by the number 148 on the farm. (1 mark)

Expectation

Candidates were required to use the template of ear notching provided to determine the identity of an animal.

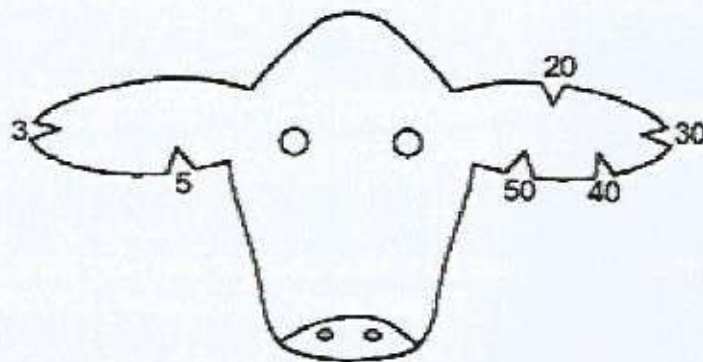
Weaknesses

Most of the candidates were unable to determine that during notching, you take on the formula that gives the least number of notches.

Advice to teachers

Learners should be properly guided on how to identify animals using a template provided on ear notching. The notching should aim at having the least number of notches.

Expected responses



3.8.4 Agriculture Paper 3 (443/3 – PROJECT)

The agriculture project paper is administered to provide an opportunity for the candidates to show and put into practice, the psychomotor skills acquired during the four years period in secondary school.

Candidates are tested in practical skills in the growing of a selected crop from land preparation to harvesting, rearing selected livestock to maturity or constructing a farm structure such as beehive, feed trough, rabbit hutch, compost pit/heap, among others.

The instructions are taken to schools, which then provide the required inputs for candidates to carry out the project work independently. The project takes eight months, from February to September of the given year.

In the year 2018, candidates chose between bean production and making of compost manure. The agriculture teacher's duty was to objectively assess and evaluate each candidate's work at all the stages of project implementation. **The assessment by the teacher should be based on the class such that there is an even distribution of scores from the lowest, average and finally to the highest performers.**

3.8.5 GENERAL ADVICE TO TEACHERS

- (i) The whole syllabus should be effectively covered during instruction because examination items will be sampled from the entire syllabus. A topic should not be ignored because it was recently or is never tested. All the topics are tested.
- (ii) The teacher/school should acquire the relevant reference materials and assist candidates to obtain and use the recommended textbooks. The approved books are found in the orange book published by the Kenya Institute of Curriculum Development.
- (iii) The use of textbooks by teachers should always be guided by the syllabus. The specific objectives stipulated in the syllabus should be correctly interpreted to ensure the topics in question are taught at the appropriate breath and depth.
- (iv) A variety of teaching methods and resources should be utilised by teachers to ensure that the content is effectively delivered during instruction. Resource persons/guest speakers and field visits should be arranged and used in areas where the teacher and the school lack the resources to teach the topic/lesson effectively. Agriculture is a science and should be treated accordingly during instruction. The teaching and learning process should go beyond the mere statement of facts. The candidates should be able to explain and apply the knowledge acquired during instruction. Many candidates had problems in answering questions of high cognitive demand.
- (v) All the suggested practical activities in the syllabus should be carried out to prepare candidates adequately for questions that require application of psychomotor skills acquired during instruction.