

AGRICULTURE

Paper 0600/01
Multiple Choice

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	B	21	B
2	C	22	C
3	C	23	B
4	B	24	A
5	D	25	B
6	D	26	A
7	A	27	C
8	A	28	B
9	A	29	B
10	B	30	B
11	D	31	C
12	D	32	D
13	D	33	A
14	C	34	D
15	A	35	A
16	A	36	C
17	D	37	A
18	D	38	A
19	D	39	A
20	C	40	A

General Comments

There appears to be a slight improvement on previous years' results with a mean score of 28.35 (70.9%). The spread of marks ranged from 6 – 40. Most candidates had little difficulty with items numbered 1, 2, 3, 6, 7, 8, 10, 11, 12, 18, 19, 20, 22, 24, 25, 27, 28, 29, 31, 34, 35, 36 and 37. Over 60% of candidates gave correct answers to items numbered 5, 13, 14, 17, 26, 30, 38 and 40, but for four of these a significant number (22 – 28%) selected one particular wrong answer.

Overall, plant physiology and crop production presented few problems. The weakest topic concerned crop pests and diseases (13, 15, 16 and 17) suggesting inadequate coverage of the syllabus. There were some weaknesses in relation to livestock (21, 23 and 26) and the properties of soils (4, 5 and 39).

It is essential that candidates approach agriculture in its entirety and do not study topics in isolation. Thus, item 17, environmental influence (Syllabus **section 1.2**) relates to fungal diseases (**section 2.4.3**) Similarly the properties of soils should be related to the use of heavy machinery.

Comments on specific items.

Item Number

4. This item illustrates an experiment that all candidates should have carried out, or at least seen demonstrated. This is a clear demonstration of particle size in soils and it should be obvious that the largest particles sink to the bottom whereas the smallest rest at the top. Thus **B** was the correct response and failure to understand this means failure to understand the characteristics of soils.
5. Although 67% of candidates gave the correct answer, the remainder showed the same lack of understanding referred to in item 4.
9. Only 49% gave the correct response, **A** active transport, and it was disappointing to see that 13% gave osmosis which is concerned with the movement of water.
13. Although only a few candidates suggested fungicides, it was surprising to see that 27% chose **B**, contact insecticides. It should be understood that systemic pesticides are absorbed into the sap stream and then taken in by sap-sucking pests.
15. Only 45% gave the correct response **A** bacteria, whilst 49% selected either nematodes or viruses. If candidates had studied one bacterial disease as directed by the syllabus, they should have been able to recognise the appropriate group.
16. Although 54% of candidates gave the correct response **A**, 32% suggested **B**, a further indication of poor coverage of this part of the syllabus.
17. Although there was a good response, 25% selected **C** suggesting a failure to understand environmental influence in **section 1.2** of the syllabus.
21. 25% chose **A**, seminal vesicles. Testosterone should have indicated the testes **B**.
23. The very poor response, only 36% correct, suggests that 'high temperature' has not been taught as a sign of ill-health. Candidates should be given the approximate healthy temperatures for ruminants and poultry.
26. Although two thirds of candidates gave the correct answer, **A** bean meal, 28% suggested cereal grain which is a carbohydrate food with a low protein content. It appears as though little attention has been paid to **Section 3.4** of the syllabus (food materials suitable for the different classes of livestock)
30. Assuming that the term 'stocking rate' was understood, many candidates failed to carry out a simple calculation.
32. This was an item that candidates should have been able to work out. **A** and **B** were clearly incorrect since the cattle could simply push the rails off the post. **D** is stronger than **C** because screws will hold a rail more securely than nails.
33. Candidates should understand that a triangular structure is strong and stable because it allows no lateral movement.
39. This is an excellent example of how topics should not be studied in isolation. From their study of the characteristics of soils, candidates should have known that heavy weights cause compaction of soft or wet soils. From the diagrams, it should have been clear that the tractor with wide tyres will exert less pressure per unit area and thus reduce the risk of compaction.

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Paper 0600/02
Core Theory

General comments

This paper is set as an option to paper 3 although some questions have parts in common. It examines the core syllabus and is designed to differentiate between grades G to C. Entries remain low. It appears that Centres are only entering their very weakest candidates. Centres need to check their results closely, for they may find that their projected C/D candidates entered for paper 3 have not achieved their expected grade. Paper 3 is designed to differentiate between the higher grades and to test the supplement syllabus.

Paper 2 consists of nine structured questions set on topics in syllabus order. Each structured question starts with parts aimed at grades G-F, followed by a middle section aimed at F-D. The final part, that includes open-ended responses, is aimed at grades D-C. The command words such as, 'state' and 'list' introduce low-level question parts. 'Suggest' and 'explain' indicate that higher-level answers are required. Diagrams are used to help key candidates into the questions.

Candidates are expected to have practical experience of Agriculture. **Question 2 (c)** asked about the pH test and **Question 9 (a)** required an understanding of the tools needed when constructing a fence. Knowledge of asexual reproduction was disappointing. Candidates did not appreciate how the Irish and sweet potato carry out this process. **Question 4 (a)** on photosynthesis and **Question 5 (a)** on digestion, achieved the best marks on the paper. **Questions 1** and **5** included some data response, which prompted some good answers. It must be emphasised that answers should relate to the data given. **Questions 1, 5** and **9** required some extended writing. Some accounts showed good knowledge and a useful command of English, but these were a minority.

Comments on specific questions

Question 1

The question required an appreciation of types of farm livestock and their uses.

- (a) This part was meant to provide an easy introduction to the paper. However, many candidates failed to read the question carefully. In (i) the food had to be from a **living** animal so meat did not get credit. In (ii) the product asked for had to be **other than food** yet many gave a food. Also, the product had to be **directly** from the animal, for instance wool, not shoes or clothes which are manufactured from the product.
- (b) The responses to this part were encouraging. They were either general observations, such as, "meat is the most eaten food" and "horses and donkeys represent 7% of the meat eaten", or specific observations such as "buffalo are only eaten in Asia".
- (c) In (i) the expected answer was poultry or rabbits. These are small animals with short life cycles and rapid growth rates so they can live in a confined area and produce a lot of food. Candidates who wrote 'they do not require a lot of land to produce food' as a reason were just rewriting the question and did not gain marks.

Question 2

This question tested knowledge of soil and how it forms.

- (a) There was some confusion over the term *agents of weathering* in the question. The mark scheme expected specific examples such as freeze/thaw, acid rain or erosion by particles blown in the wind. However, many candidates listed general examples such as physical and chemical. These

were given credit but biological was not as it acts at **Y** not **X**. At **Y** the plants aid soil structure by root penetration and by forming humus when they die and decompose.

- (b) The missing pie chart labels were air and water. In some cases candidates had obviously not filled in the blanks that needed to be completed. Part (ii) was more difficult but many did realise that top soil contains more air, living organisms and humus.
- (c) Descriptions of how to test the pH in a soil sample were disappointing. It involves (Universal) indicator and comparing the result with a colour chart. The use of distilled water and barium sulphate was not often mentioned. Using a probe and reading off a meter as an alternative method was credited. Use of litmus paper was not allowed.

Question 3

This question tested knowledge of photosynthesis and pest control.

- (a) This part, requiring the completion of boxes using the terms given in the equation for photosynthesis, was well done. A few candidates confused carbon dioxide and oxygen.
- (b) The effects the tree in the diagram might have on the cereal plants required a little thought. Photosynthesis would not stop altogether, it would slow down and the cereal would not grow so rapidly. The tree, by providing shade, would take the cereal plants out of direct heat so the rate of transpiration would fall.
- (c) The most often quoted crop was maize but specific pests, like stem borers, or general ones like locusts, were not given. Pests like weevils and rats that attack the stored crop were not allowed. Fungi were quoted by some candidates. Some detail of the control method was needed for the mark, 'use a chemical' was too non-specific.

Question 4

- (a) This question was poorly done. Observations on the differences between the drawings of Irish and sweet potato were often too superficial e.g. 'the Irish plant is bigger'. The differences needed to be constant such as shape of leaf, position of roots, position and shape of the tubers. Only a few candidates defined asexual reproduction correctly and explained how the potatoes achieved this. Many described how sweet potatoes were propagated using cuttings.
- (b) Two points needed to be made about the weather conditions that favour the spread of blight, warm and damp (wet). Humid gained a mark.
- (c) This part required careful reading. Free draining soil with a high rain fall would be prone to leaching. LAN applied as a top dressing would make nitrates available slowly which would then enable the plants to make protein and leaf growth. As this final part of the question was targeted at C grade candidates, general answers like "improves growth" were not credited.

Question 5

- (a) Much information about digestion in a ruminant was given in the stem of the question so all that was required was to provide the correct links. The most common error was to link the rumen as the true stomach.
- (b) The table of data was correctly analysed by most, maize meal and sunflower cake being correctly identified as production rations.
- (c) There is some misunderstanding about the term *balanced ration*. It does contain all the parts of an animal's diet, protein, carbohydrate, fat, minerals and vitamins, but there is no such thing as the *correct amount*. The amount is related to the needs of each individual, the animal might be growing, pregnant or old and in each case the amount needed will differ.

Question 6

- (a) The illustrated safety signs were generally well interpreted. The mask sign indicates that fumes are given off so a mask would be advisable. It is not indicating a mask must be worn.
- (b) This part was well answered. Candidates appreciated that the rain would wash spray away and so prevent contact with weeds and aid possible run off into streams. Wind might also prevent contact with the weeds and cause contact with other plants. "It gets blown away" was an answer that did not get a mark.
- (c) A surprising number of candidates were unable to name a local weed. Many weeds spread by underground rhizomes or runners. Others produce a lot of wind blown seed.

Question 7

This was a straight forward question on genetics and many Centres had clearly taught this difficult topic well.

- (a) White was dominant because all the chicks were white. The features are passed on in chromosomes, genes, DNA or via the sperm and eggs (gametes). All were acceptable answers. To complete the genetic diagram the gametes had to show single letters and the chicks two, Aa.
- (b) The features to select for when breeding differs from animal to animal. Disease resistance, conformation and rapid growth rate or production levels are general to most farm livestock.

Question 8

- (a) Questions that ask candidates to give advantages and disadvantages often get poor responses. In this case the advantages were less apparent than the disadvantages. Food availability did not get a mark as it will be provided in runs. More varied diet, however, is an advantage. So too the cost, no need for poles and wire, and the fact that disease is less likely to spread. Loss of eggs, predators and theft were all common disadvantages quoted. Having two runs enables stock to be rotated so giving the grass a chance to grow and to break the cycle of parasites. Keeping cocks and hens separate did not get a mark.
- (b) This was quite an open ended question and many sensible suggestions were made and given credit even if not on the mark scheme. The use of metal for the poles, iron for the roof and concrete for the floor were common suggestions. Also credited were installation of gutters and high wire to prevent predators entering
- (c) The signs that indicate a hen is unwell were well known, drooping stance, unusual droppings and sneezing were common answers. Low egg production was allowed. Loss of feathers was not as the moult is a natural occurrence.
- (d) This calculation proved to be too difficult. 4 birds were stocked in 200 m². Therefore 10000 m² (a hectare) would stock $10000 / 200 \times 4 = 200$

Question 9

- (a) The fence to be constructed was made of poles and wire so some tools were obviously wrong. It was alarming to note how many candidates chose to cut the wire with secateurs rather than a hacksaw.
- (b) Another advantage and disadvantage question that failed to score highly. The intent of the question was to make an environmental point, namely that the wood fence was using up a valuable natural resource and the tin can fence was putting waste material to a good use. Not many appreciated these points, commenting about durability which did gain credit and appearance which did not.
- (c) This was the most difficult part of the paper. It required the candidates to justify their decision as to which fencing option was best for the farmer. It depended on the value of the vegetables. If they were a good cash crop then it was worth spending money to keep the goats out. Fencing the garden was cheaper than fencing the goats because the area needed for them was much larger. Also, the goats would still graze and provide milk when they roamed free.

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Paper 0600/03
Extended Theory

General comments

It was pleasing to note that almost all Centres entered candidates who were well prepared for the examination and most candidates attempted all questions. Candidates performed best where the questions tested application of science to agriculture, and tended to be weaker where a more in-depth knowledge and understanding of the science underpinning the agriculture was required.

Almost all candidates gave detailed answers and did their best to gain marks. A small number of candidates would have found the foundation tier paper more appropriate and Centres achieving low grades would be well advised to consider this option.

Question 1

- (a) Most candidates were able to explain how the tree might affect photosynthesis and transpiration. A few candidates assumed the tree would block all light.
- (b) (i) This answer was expressed in a wide range of ways and all positive responses were credited.
- (ii) Most candidates could only name one of the two conditions essential for photosynthesis.
- (iii) Most candidates gave the answer of starch, glucose or carbohydrate, but a worrying number of candidates considered oxygen or even carbon dioxide to be a main product.
- (c) (i) Candidates clearly understood movement and storage of the products of photosynthesis.
- (ii) This question was well answered.
- (iii) Candidates suggested some good uses of crops other than food. Many candidates linked this to soil conservation and improvement and gave some interesting and varied answers.

Question 2

- (a) Soil tests are clearly carried out in a wide range of ways. Credit was given for any three possible steps leading to an accurate result. There is clearly a misunderstanding between Soil Indicator or Universal Indicator and/or Indicator paper, with too many candidates seeing the later as litmus paper. Candidates were awarded up to two marks for good procedure, even if litmus paper was used.
- (b) (i) Almost all candidates understood how to raise the pH of soil.
- (ii) A worrying number of candidates were unable to interpret a simple chart to extract appropriate data.
- (iii) Quite a few candidates failed to give a reason for change not linked to farming practices.
- (iv) Only the more able candidates were able to link a fall in pH to activities such the removal of crop products such as milk and meat.
- (c) Almost all candidates attempted this question, and the most able gave detailed answers showing good understanding.

Question 3

- (a) and (b) There parts were both well answered.
- (c) The answers for explaining the effect of weather on herbicide spray were poorly explained, most were credited marks.
- (d) Potentially a difficult question on spacing was generally well understood by candidates.
- (e) (i) The term *systemic* was either answered correctly or the word was confused with having a system for spraying.
- (ii) A worrying number of candidates did not fully understand the effect of using a systemic pesticide on food crops.

Question 4

- (a) Natural asexual reproduction was poorly explained by most candidates.
- (b) The spread of fungal infestation was not well understood, but marks were awarded for any conditions under which the fungus would survive.

Question 5

- (a)(i) and (ii) both parts of this question were answered well.
- (b) Almost all candidates could describe one cause of soil erosion, but for some the second cause was basically the same and related to water run-off.

Question 6

- (a) Most candidates answered this correctly.
- (b) *Monoculture* appeared to be well understood.
- (c) The harmful effects of intensive agriculture were well understood, although a few candidates failed to take note of the words "other than soil erosion".

Question 7

- (a) Candidates found it difficult to explain the term *water catchment area*.
- (b) Mulching and minimum tillage were well understood.
- (c) (i) Compared to previous years, this was poorly answered, although most candidates understood settlement of particles.
- (ii) Most candidates did not interpret this question well. The idea of keeping treated water dark to prevent algae growth was not understood and the link to high position and gravitational flow was seldom quoted.

Question 8

- (a) Almost all candidates were able to give three suitable characteristics in animal breeding, and many quoted high sex drive.
- (b) (i) A.I. appeared to be well understood.
- (ii) Most candidates understood the terms *genotype* and *phenotype* and expressed them in a way that was easily understandable.
- (c) Some excellent answers were given, but some confused a breeding programme with a cultural or feeding system and careful husbandry.

Question 9

- (a) Although few candidates made a direct link to it being much cheaper to fence an area for vegetables, a wide range of economic factors were given and credited.
- (b) This question was well answered.
- (c) This question was again well answered, although some forgot to show their workings.
- (d) A good and interesting range of reasons were given for looking at a farm cash flow over more than one year, and showed that candidates were aware of the economic factors affecting a production system.

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Paper 0600/04

Practical

General comments

The entry for this component remained constant this year.

Once again some Centres entered work that was clearly project based which made marking difficult as the assessment criteria could not be met. Teachers should check the Assessment Criteria, which are included in the current year IGCSE Syllabus, before starting to prepare candidates for practical tasks. This will help in the planning of exercises that can differentiate between A* and G Level candidates. The failure of exercises to differentiate is the most common criticism in Centre reports. Too many exercises test basic skills only.

One way of achieving differentiation is to construct worksheets that offer options and extension work. The work is then assessed using mark schemes that recognise different levels of achievement. The mark schemes should be included with the samples of candidates work sent for external moderation.

Ideally Centres should provide one task from each of the syllabus sections; soil, growing crops, livestock husbandry, farm structures and agricultural economics. Very few Centres do this. Centres that just test the aspects of preparing a garden plot, growing and harvesting crops, are reducing the opportunities for candidates to demonstrate a full range of skills. Such work realistically covers three practical exercises, seed bed preparation and planting, tending the growing crop with measurements of growth plus harvesting with a calculation of yields. To complete the selection a soil test practical and a farm structures activity, such as block making, should be undertaken. Activities with livestock could also be carried out for two exercises, but it is appreciated that not all Centres have the facilities for keeping animals.

It is not essential to test all candidates on the same exercises. Nor is it essential that every task should be used to assess all of the criteria.

It is important that some of the tasks should generate written work that can be used as proof of individual involvement and provide an indication of quality. Descriptions, for instance, how a garden plot is cultivated or how cement blocks are made are suitable for this purpose. The candidates should refer to any problems encountered in their work and emphasise any safety precautions taken. Measurements on plants' growth and crop yields or production figures from animals provide data that can be tabulated and then represented by a graph or pie chart. Photographs of candidates carrying out tasks are also useful evidence of work done.

Internal moderation only needs to be carried out by teachers when there is more than one teaching group in the Centre.

For external moderation a sample of ten candidates' work, together with their record cards, is required with the work sheets and marking schemes used for assessment. The work sent should include the top and bottom marks and a range in between. Any difficulties experienced by the Centre in carrying out the assessments can be included. The Centre summary mark sheet should be sent with the samples along with a copy of the MS1 on which the Centre marks have been entered.

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Paper 0600/05

Project

General comments

This paper continues to attract a small entry of above average candidates worldwide.

It is important that teachers new to this component check the Assessment Criteria before starting to prepare candidates for the project. These criteria are included in the current IGCSE syllabus.

It is expected that prior to the selection and carrying out of the project candidates will have been made aware of the assessment criteria and taught what a hypothesis is and how to design a questionnaire, control variables, collect data and select suitable graphs. The nature of limitations should be discussed and the required layout of the project should be described.

The regulations for paper 5 allow teachers to monitor candidates' progress and to offer advice. In some assessment criteria the amount of help given will affect the mark awarded. The nature of the help given should be recorded on the individual pupil record card.

Assessment criteria that continue to cause problems are the 'planning', 'deductions' and 'limitations'. The plan put forward must enable answers to the questions posed to be found out. It should indicate how variables are to be controlled. It ought to include a detailed account of the experimental method and the procedures to be followed. For 'deductions' the evidence needs to be thoroughly analysed and commented upon with adequate detail. Under 'limitations' any flaws in the experimental plan that became apparent should be commented upon as well as describing the things that went wrong due to unforeseen circumstances and human failings. Suggestions as to how the limitations may be overcome should be put forward.

The presentation of many of the projects was, once again, excellent. Many demonstrated good use of computer graphics. In a minority of Centres computer graphics should be introduced as the method of candidate recording.

Group projects are quite acceptable but the individual contribution of each candidate has to be assessed. This is made more difficult if the projects are produced on a word processor. It is important in such situations that the teachers monitor each individual's progress and record marks with explanatory annotation on their record cards. Candidates in group projects should be encouraged to put their own 'stamp' on common sources.

As usual experimental comparisons provided successful projects. Those involving measuring the growth rate or yield of plants and animals in different situations were popular. Taking measurements of plant growth provides an opportunity to evaluate the significance of different measurements. Length and width of leaves are not good indicators of growth in many plants, height is more significant. Several candidates measured under five leaves which is not a sufficient number to produce valid data.

Some pleasing surveys were included this year and they achieved a good standard. The topics chosen by the candidates showed a real awareness of Agriculture in the wider context of country and Society, for example: AIDS, soil erosion and effect of ticks on livestock production. Candidates must ensure that sufficient questionnaires are completed in order to collect enough data for subsequent analysis. The data from the questionnaires must be tabulated prior to producing pie charts or bar graphs.

Internal moderation only needs to be carried out by teachers when there is more than one teaching group in the Centre.

For external moderation the Board requires a sample of ten projects – the one awarded the lowest mark and others that represent the full spread of marks. It would help if projects were presented in plastic wallets rather than bulky hard covered ring files.

The annotation by teachers of the candidate record cards is appreciated and is of great assistance for external moderation. Comments that indicate how much guidance has been given and the problems encountered by the candidate help the external Moderator to understand how the marks have been awarded. This is an area which should be developed by more Centres.

Each Centre should ensure that the Moderator copy of form MS1 after completion be sent with the sample of work for moderation.