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AGRICULTURE

<p>Paper 0600/01 Multiple Choice</p>
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<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	D	21	A
2	A	22	D
3	B	23	C
4	B	24	C
5	A	25	C
6	C	26	A
7	A	27	C
8	A	28	B
9	A	29	C
10	C	30	B
11	B	31	D
12	A	32	D
13	D	33	C
14	A	34	A
15	D	35	C
16	D	36	B
17	B	37	A
18	C	38	A
19	C	39	A
20	D	40	B

General comments

Results showed a marginal improvement on last year with a mean score of 25.776 (64.44%). The spread of marks ranged from 1 to 38. Most candidates had no difficulty with **Questions 1, 3, 6, 7, 8, 10, 11, 12, 14, 15, 17, 19, 20, 21, 22, 24, 26, 32, 33, and 36**. Over 60% of candidates gave correct answers to **Questions 9, 16, 18, 28, 37 and 40** and no further comment is necessary.

With three exceptions (**Questions 2, 4 and 5**) candidates showed a good understanding of botany and crop husbandry. There was some weakness with animal husbandry, notably health **Question 23**, diet **Question 25** and aspects of grazing management **Questions 29 – 31**. As in previous years, there are still weaknesses in relation to syllabus section 4 **Questions 35, 38 and 39**.

Interpretation of diagrams was often poor (**Questions 5, 25, 31 and 35**) and powers of observation need to be improved.

Comments on specific questions

Question 2

Organic farming is a recent introduction to the syllabus and it was evident that many candidates had no understanding of this type of farming. Consequently many gave **C** as the answer when the correct response was **A** – freedom from chemical residues – an essential feature of organic farming.

Question 4

Although over 50% gave the correct response, too many failed to realise that a layer of grass used as a mulch has a cooling effect.

Question 5

It should have been obvious from the diagrams that **O** had very poor roots and was therefore lacking phosphate provided by bone meal.

Question 23

The poor response suggests a lack of practical experience with livestock. Young animals, particularly calves, frequently lick their noses and are thus often damp. Dirty tails are a common sign of diarrhoea (scouring) and can be a significant indication of a sick animal.

Question 25

The results suggested that many candidates guessed the answer and failed to appreciate that grazing animals eat large quantities of fibre.

Question 27

Responses indicated a poor understanding of the terms but it should have been understood that genes are carried on chromosomes which are found in the nucleus of a cell. Thus a gene is the smallest structure.

Question 29

Results suggest that candidates did not appreciate that the most intensive stocking rate is that which has the greatest number of animals per unit area. Many gave the lowest stocking rate (**B**) which amounted to one animal per four hectares.

Question 30

Many candidates jumped to the conclusion that herbicides would provide the solution without realising that drainage is one of the most important forms of land improvement and that this is essential before any other treatments are applied.

Question 31

Results suggested guessing. It should have been realised that with fence rails on the inside, it would be more difficult for cattle to break out (**C** and **D**). However, screws make a firmer fixing than nails giving **D** as the correct answer.

Question 34

Although 58% gave the correct answer **A**, It was surprising to see that many considered corrugated iron (in **B**) was resistant to rust and that wood and thatch (**D**) were resistant to fire.

Question 35

Although over 50% gave the correct answer (**C**), the remainder should have realised that this was the shortest distance for the water to be carried.

Question 38

Only 42% of candidates appreciated that the first action should be to pump the lever to ensure that the machine had adequate pressure. The other actions would follow if pumping failed to correct the problem.

Question 39

Over 50% recognised that **A** would be the easiest gate for a single person to move. Many suggested **B** without realising that the person would have to carry all the weight at the latch end.

<p>Paper 0600/02</p>

<p>Core Theory</p>

General comments

This year, this paper was an alternative to Paper 3. It was set on the core syllabus and designed to differentiate between grades G to C.

Eight structured questions were set on topics in syllabus order. Each structured question started with parts aimed at grades G-F, followed by a middle section aimed at F-D. The final part, that included open-ended responses, was aimed at grades D-C. Some of this final part was common with Paper 3. Diagrams were used to help key candidates into the questions. The command words such as, 'state', 'list' and 'describe' introduced low level question parts. 'Suggest' and 'explain' indicated that higher level answers were required.

Question 5 (animal nutrition), and **6** (animal reproduction), mainly tested recall of knowledge and gave most correct answers. **Question 4**, which tested the candidate's experiences of crop growing, was well answered. However, the part in **Question 7** on farm structures, which also tested the candidate's experience of practical work, was not well done. Knowledge of asexual reproduction in potatoes was once again poor. **Question 1** included some data response and it was encouraging to note that most candidates attempted this.

Comments on specific questions**Question 1**

- (a) The non-food uses of donkeys and sheep were well appreciated by candidates. Not so many gave feathers as a use for geese. Geese also provide manure, as do the other animals. This response was credited only once.
- (b) The pie chart showed that cattle are the main source of farm income in Namibia. There is not much crop production. Several other conclusions were possible and credited.
- Fresh milk is only 2.5% of the total farming income. This indicates that cattle are kept mainly for meat.
- (c) More food from less land requires some kind of intensive farming system, and using higher yielding and disease resistant animals and plants. References to fertiliser had to indicate using more or a specific type to gain a mark. Similarly, improved pest and disease control had to be implied. Weaker candidates suggested more imports.

Question 2

- (a) The diagram showing the weathering of rocks stimulated a variety of responses and, as it was targeted at grade G/F, most were acceptable. The majority of candidates used the general terms of '*physical*', '*chemical*', and '*biological*'. Specific methods of weathering had been the intention of the question, namely breakdown by running water, rock expansion and contraction in heat and the action of tree roots. Most candidates named one organic component of soil but not the second. Descriptions of a loam soil varied in quality, the majority scoring two marks for mentioning its crumb structure that aided water holding and aeration. Few mentioned the fact that it is an equal mixture of sand, clay and organic matter.

- (b) The effect of cultivation on soil structure was better known than its effect on soil fertility. Aeration and drainage was needed for the former, while the mixing of top and sub soil and promotion of microbe activity were answers that could be cited for the latter.
- (c) Only the better candidates understood the diagram of the nitrogen cycle. X represented absorption, Y plant protein and Z denitrification. This last term, unexpectedly, was the one that was most frequently correct.

Question 3

This question tested a variety of plant processes and the response of candidates was very mixed.

- (a) The straight forward answers to parts (i) and (ii), 'by insects' and 'starch', were known by the majority, but the descriptions of how the sweet potato reproduced asexually were very poor. Many described how the sweet potato should be cultivated. What was wanted was a reference to runners, the formation of a new plant at nodes and then the withering of the runner to cause separation into a second plant.
- (b) Some candidates had good knowledge of photosynthesis and diffusion and scored maximum marks in the sections requiring factual recall of these processes. To score marks on the graph interpretation, the morning increase had to be related to an increasing light intensity. It was not enough to say that light was present. Credit was given to 'increasing temperature'.

Question 4

This question scored well for most candidates as they could use their practical experience of growing crops in their answers.

- (a) Candidates who failed to appreciate that clearing, stumping and burning were not needed as they were being carried out in the diagram to produce the cleared land, lost marks. The question asked for the tasks after clearing, such as digging, raking, levelling and fertilising. Part (ii) was probably the most difficult question on the paper. It required the connection to be made between burning and the production of ash that is high in potassium.
- (b) Facts about a named crop were well known. A specific disease was needed in part (iii) rather than virus or fungus.

Question 5

This question was generally the best done on the paper.

- (a) The missing parts of the ration-carbohydrates, vitamins and fibre were credited in any order.
- (b) A variety of animal feeds were accepted as being high in protein and water. Milk and young grass are correct for both but were credited only once.
- (c) What a maintenance ration is, and when it is fed to animals, were well understood.
- (d) The table giving details of poor health that required completing proved difficult. Naming an infectious disease was better done than suggesting selective breeding for preventing genetic defects. Those who suggested slaughter got a mark.

Question 6

- (a) The labelling of the diagram of the male reproductive system did not pose problems other than to those who thought it a female. The 'S' shaped structure is attached to muscles and can be rapidly extended to enable immediate penetration during mating.
- (b) The responses to the genetic problem were encouraging, indicating that this relatively new part of the core syllabus is receiving due attention in teaching programmes. The nature of the question asked, required an explanation that showed an understanding of how a recessive feature could be passed on through heterozygous individuals and be expressed in offspring in the absence of a dominant allele. Rote learnt genetic diagrams with no such explanation did not get credit.

- (c) Descriptions of fertilisation as the fusing of gametes or sperm and egg were needed, not descriptions of pairing. Additional marks were given for stating precisely where the fertilisation took place or for details of the actual penetration of egg cell by the sperm.

Question 7

- (a) The facts that the sluice controlled the water level in the dam in the diagram, that furrow irrigation was being used and that a water tower or pump could provide water under pressure to the farm buildings were well known. However, the descriptions of how to join a pipe and how to make a concrete floor were poor, suggesting that not many Centres do practical exercises on farm structures. Pipes are joined using an internal joiner held in place with screw clips.
- (b) This question asked 'how to make a floor of concrete' not how to make concrete. Levelling and digging out an area, using hard core, making a frame to hold the cement in place, providing a surface to prevent slipping and to allow for drainage were all marking points. Knowledge of concrete composition did get a mark if details of the mix were given – very few candidates did so.

Question 8

- (a) A named weed of a local crop was asked for – grass is a generic name and did not get a mark. Most candidates named a long handled jembe as suitable for controlling the weed, but descriptions of how it was used to uproot the weed without disturbing the crop were inadequate in many cases.
- (b) The environmental dangers of using chemicals on the pasture were well understood, as were the methods of storing them. Many said '*chemicals should be stored away from children*'. Not only from children, they should be in a locked dry store that no one can enter without a key. General statements stating that chemicals harm the pasture did not get credit. Chemicals that might do harm would not be used by the farmer.
- (c) The farmer uses lime to increase the pH to a level of about 7 which is suitable for many pasture plants to grow. At such a pH most minerals are available to plants. Such a pH also aids microbe activity.
- (d) The leaf in the diagram could have been damaged by any biting and chewing pest, such as a locust. A named pest was needed for the mark. It was widely appreciated that such damage would decrease the amount of photosynthesis and food production. A loss of water would also result, and the entry of disease would be made easier. Both points were not often made by candidates.

<p>Paper 0600/03 Extended Theory</p>
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General comments

This was the first examination session in which this IGCSE subject was examined in this manner. Previously there had been an element of choice for candidates in Section B. However in 2004 all candidates were expected to answer all questions on the paper, and consequently candidates were expected to have studied the entire syllabus. There was evidence that this was not always the case. There were some candidates who performed consistently well in some areas of the paper and consistently poorly on other questions.

Another significant change for the 2004 examination was the introduction of a two-tiered examination process. Looking at the entry for the 2004 examination, most Centres entered candidates appropriately for the more suitable tier, i.e. 0600/03 or 0600/02. There was some evidence that some weak candidates were entered for 0600/03 and found the questions, especially those involving the analysis of data, too testing.

Nearly all candidates attempted all of the questions indicating that they had sufficient time for the examination.

Comments on specific questions**Question 1**

- (a) Candidates were required to complete a table concerning the causes and methods of prevention of poor health in animals. Nearly all candidates were able to state an example of an infectious disease, but only around half of the candidates were able to provide an example of an infectious disease which might be prevented by vaccination. Again around half of the candidates were able to identify a method of preventing an inherited genetic disease – the most common incorrect response was to suggest a change in the environment. Only the strongest candidates were able to provide an example of a stress in a farm animal. The most common mistakes were to describe stress in humans or to use synonyms for stress.
- (b) This part provides an example of how some candidates were prepared for all of the examination whilst others were not. It was typical that candidates gained both marks for this part or none, and this pattern was repeated. The most common mistake was to ignore the fact that both antibiotics and antiseptics are used in relation to bacterial diseases. Amongst the weakest candidates there was confusion over the difference in usage of the two.
- (c) This part was well answered generally. Candidates tackled it in one of two ways, either to describe local veterinary services by emphasising the localness of the service, others concentrated on the range of services offered. Both strategies were equally successful. Of course the strongest candidates used both strategies to provide very comprehensive answers.
- (d) Again this question was answered well generally by most candidates. The concepts of quarantine and restricting the movement of livestock to prevent the spread of disease were well understood. The weaker candidates provided a general overview of the theory, stronger candidates were able to expand on the issues. Some candidates were able to describe the idea of Notifiable diseases and the use of slaughter for named diseases.

Question 2

- (a)(i) The photograph (Fig. 2.1) showed clearly leaves that had been chewed by a pest. Most candidates were able to state the name of a pest that could have caused such damage, but a large minority of candidates stated the name of pests or diseases that attack other plant tissues, the most common misconception being that such damage could be caused by piercing pests.
- (ii) Most candidates were able to describe the effect of chewing pests on the rate of photosynthesis of the leaves. Only the stronger candidates were able to suggest that there might be any other damage to the plant such as increased water loss or providing entry for other damage causing organisms.
- (b)(i) In general, this calculation question was answered better than similar questions in previous years. Another significant improvement was that the vast majority of candidates showed their working, and so even those candidates who made a mistake with the final arithmetic could be credited with the working mark for showing that they understood the method.
- (ii) Nearly all candidates were aware that systemic pesticides killed pests, but this question discriminated significantly between the strong and the weak candidates. Weak candidates described the effect on the pest as they ate the plant tissue. Stronger candidates described how the pesticide entered and spread throughout the plant. There was some confusion amongst weaker candidates on the type of pest that could be controlled using a systemic pesticide.

Question 3

- (a)(i) Around half of the candidates were aware of the role of light in photosynthesis by providing the energy to allow the process to occur. The most common misconception was that light was necessary to produce chlorophyll/chloroplasts.
- (ii) This question was answered well by most candidates. There was a general understanding of the movement of particles from higher concentrations. Most candidates were able to qualify and amplify the basic definition of diffusion.

- (b)(i) The answers of weaker candidates concentrated on either absorption of water from the soil into a root hair cell or the passage of water via xylem cells. Only the strongest candidates were able to relate transition to osmosis in any way and very few candidates referred to the movement of water into the leaf. There was confusion between xylem and phloem with regard to the process of transpiration.
- (ii) This question was not answered well by weaker candidates. A typical answer restated the question and then amplified this by describing how the opening of the stomata was affected by temperature or humidity rather than daylight. There were some excellent answers from some candidates, such answers were typified by detailed understanding of the changes in the guard cells affecting the stomata – related appropriately to time.

Question 4

- (a) In previous years there has been confusion between fixation, nitrification and denitrification. It was pleasing to note that those candidates who had been taught this topic did not exhibit such confusion in their responses in 2004.
- (b)(i) This question was answered well.
- (ii) Strong candidates provided very detailed responses to this question, writing for much more than the three lines provided. In previous examination periods it would be typical that such a topic might form the first section of a structured essay question, and it appears that some Centres are preparing their candidates for this kind of question which does form part of the new examination. There was still confusion amongst weaker candidates concerning leaching, in particular the idea that soluble compounds are leached through the soil rather than washed away via run-off of water.
- (iii) There was a wide variation in the ability of candidates to plot a bar chart. One improvement on previous years was that all candidates were able to determine the appropriateness of the x-axis for fertiliser type and also the choice of a suitable scale was better developed than in previous years. However the regard for accuracy was very variable, a disappointingly large minority of candidates did not use a rule to plot their bar charts. A significant minority of candidates produced superb quality bar charts, labelled appropriately and clearly.
- (iv) This question was answered poorly by all but the very strongest candidates. It was the question that was omitted by more candidates than any other in the examination. It was extremely rare for candidates to show any awareness of the environmental effect of the overuse of fertilisers.
- (v) Most candidates were aware that the roots of legume plants have nodules that affect soil fertility. From this group, most of the candidates were aware that the nodules contained microorganisms that were able to fix atmospheric nitrogen. Relatively few candidates noticed that the question referred to ploughing in of the legume crop and so were unable to gain the third mark point. Again some candidates provided lengthy detailed and accurate responses to this question – this is commendable, but there were only 3 marks for the question and six lines for the response. Candidates who provide such lengthy responses to short answer question run the risk of running out of time.

Question 5

- (a)(i) This question was answered well generally. Weaker candidates provided a superficial response involving typically semen entering the uterus of a female farm animal. There were also some much more detailed responses from the stronger candidates involving reference to haploid sex cells forming a diploid zygote.
- (ii) Most candidates were able to provide at least one advantage to a farmer of using AI for livestock. Stronger candidates provided three advantages, but weaker candidates were again confused between artificial selection and artificial insemination.
- (b)(i)(ii) In general both parts were answered well by most candidates.
- (iii) Most candidates were aware of the production of colostrum at the onset of lactation.
- (iv) Most candidates were aware of the role of the colostrum but few appreciated the importance of the timing of its production by the mother.

Question 6

Nearly all candidates were able to describe an appropriate recipe for concrete suitable for a floor in a livestock building. Stronger candidates qualified this by adding methods of finishing the surface, invariably providing a reason for their statements. Very few candidates made any reference to any preparatory work for the laying of the floor or the use of any tools.

Most candidates were able to state at least one factor to be considered when deciding on the site of a farm building. Invariably this first factor referred to access to the building. Stronger candidates went on to mention climactic considerations or those to do with topography. The most common mistake was to refer to the proximity of a market.

Question 7

(a)(i) Some candidates gained maximum marks for this question while others gained none. This data analysis type of question will appear in future examinations and so it is a skill that will need to be given full attention.

(ii)(iii) These questions were marked depending on the candidates' response to the previous question. Nearly all candidates were able to provide both a suitable suggestion for the year of greatest rainfall and an appropriate reason.

(b)(i) Weaker candidates were able to explain how mulches prevented excessive evaporation of water from soil. Stronger candidates provided other advantages of mulching, most commonly referring to the effect on reducing weed growth.

(ii) Only the strongest candidates provided an appropriate suggestion for the term "living mulch". The most common inappropriate suggestions involved mulching with materials that were not living.

Question 8

(a)(i) Compared to previous years, a far greater proportion of candidates understood the term cultivar, and so this question was answered well by most candidates.

(ii) In general this question was answered well by most candidates.

(iii) This question was not answered so well. Many candidates referred to marketing the crop rather than storing it. Also there were several responses that referred to conditions which would cause rotting and decomposition of the crop rather quickly. Stronger candidates provided detailed conditions for appropriate storage.

(b) In general this question was answered well by most candidates.

Paper 0600/04

Practical

General comments

Teachers should check the Assessment Criteria, that are included in the current year IGCSE syllabus, before starting to prepare candidates for practical tasks. Each year there are some candidates for whom special consideration has to be given because teachers have not provided the required opportunities for assessing the work. This year was no exception. The candidates should also be made aware of these criteria.

The tasks selected for assessment should provide opportunities for candidates with a range of ability to demonstrate their practical skills. One way of achieving this is to construct worksheets that offer options and extension work. The work is then assessed using mark schemes that recognise different levels of achievement.

Mark sheets can differentiate the levels within the criteria by means of a graded tick list for the elements of an exercise, or by descriptors that relate performance in a task to a mark. The descriptors used should be positive so as to encourage positive achievement from the candidate.

Both the work sheets and mark schemes used should be included with the 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.

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 are suitable, for instance, how a garden plot is cultivated or how cement blocks are made. In each case, the candidate can include any problems encountered and emphasise any safety precautions needed. Measurements on plant growth, crop yield or production figures from animals can be tabulated and then represented as a graph or pie chart. Such pieces of work are very useful for external moderation.

Teachers are reminded that the marks entered on the mark scheme must be scaled to be out of 50.

The Centres offering this option this year had done so previously and demonstrated good practice. There were no obvious problems arising from the external moderation of the work submitted.

<p>Paper 0600/05 Project</p>
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General comments

This paper continues to attract a small entry of above average candidates. With such a small entry the statistics can vary considerably from year to year.

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 year IGCSE syllabus. Each year there are some candidates for whom special consideration has to be given because teachers have not provided the required opportunities for assessing the work. This year was no exception.

The two assessment criteria that caused problems this year were 'limitations' and the 'background study'. 'Limitations' should include what went wrong during the investigation, and any flaws in the experimental plan that became apparent. Suggestions as to how these may be overcome should be discussed. The background study should include relevant details about the materials being used, and make reference to the facts supporting the science or ideas of the project. Sources should be noted and listed in the bibliography.

For these criteria, as for all the others, the regulations for Paper 5 allow teachers to monitor candidates' progress and to offer advice. The nature of the help given should be recorded on the individual pupil record card.

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 computer. It is important in such situations that the teachers monitor each individual's progress and record marks with explanatory annotation on their record cards.

Some Centres are making good use of the internet to obtain information for the background study. The layout and presentation of the majority of the work was of a high standard.

As in previous years, experimental comparisons were the most successful projects. Those involving measuring the growth rate or yield of plants and animals in different situations were popular.

Most Centres are now sending all the required information for external moderation. A sample of ten projects are needed – the one awarded the top mark, the one given the lowest mark and others that represent the full spread of marks. The annotation by the teachers of the candidate record card is appreciated and is of great help. Comments indicating how much guidance has been given, and problems encountered, help the External Moderator understand how the teacher has awarded marks and applied the assessment criteria.