

CONTENTS

<p>Group III Sciences</p>

AGRICULTURE	2
Paper 0600/01 Paper 1 - Multiple Choice	2
Paper 0600/02 Core Theory	4
Paper 0600/03 Extended Theory	7
Paper 0600/04 Practical	9
Paper 0600/05 Project.....	10

AGRICULTURE

Paper 0600/01

Paper 1 - Multiple Choice

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

General comments

The overall result was a little disappointing with a mean score of 23.3 (58.3%). There was a wide spread of marks, 1 - 37. Most candidates had little difficulty with **Questions 1, 3, 6, 9, 20, 23, 24, 26, 29, 31, 32, 37** and no further comment on these items is required. Over 60% of candidates gave correct answers to **Questions 2, 4, 5, 11, 18, 27, 33, 39**, most of which merit no further mention. There were several areas of general weakness including interpretation of data (Nos. **28, 30**), crop production (Nos. **12, 13, 14**), and crop protection (**15, 16, 17**). The overall performance for Syllabus **Section 4 - Farm Structures and Machinery** was only moderate, once again suggesting less than adequate study.

Comments on specific questions

Question 7

It was disappointing to see that a substantial number of candidates thought mineral salts were absorbed by osmosis when active transport was the correct answer.

Question 10

It should be understood that transpiration relates to the loss of water by leaves and can therefore be reduced if some leaves are removed. Options **B** and **C** relate to the conservation of soil water.

Question 11

It was disappointing to see how many candidates selected **A** which represents photosynthesis suggesting a poor understanding of basic biology.

Question 12

In a practical situation, it would require very large and uneconomic amounts of fertiliser to cause plant damage, whilst poor seedbeds can easily produce the effect given.

Question 13

Seed rate is a common term in the context of crop production and the fact that many candidates selected options **A** and **D** gives cause for concern. The term relates to seed sown over a given area, e.g. for wheat 100 -125 kg per hectare.

Question 14

It should be understood that organic manures and phosphate should be incorporated in the seedbed and usually only inorganic nitrogen and occasionally potash are applied after crop emergence.

Question 15

Whilst over 70% of candidates understood the need for a respirator, many opted for a face shield which only gives partial protection. Goggles form a good seal around the eyes.

Question 16

Less than half of the candidates knew that honeydew is produced by piercing and sucking insects.

Question 17

The overall performance suggested guesswork, but it should have been understood that herbicides that kill broad-leaved weeds will also damage broad-leaved crops. The danger of spray drift needs to be emphasised. Thus the cereal crop with its narrow leaves is the only one to be treated with *Assigan 6*.

Question 21

A surprisingly large number of candidates thought that lactation is “starting to feed on milk” when in fact it is the whole of milk production.

Question 22

Since temperature is an important factor in diagnosis of disease, the normal temperature of poultry should have been known. Too many selected **A**, 37.5C^o, assuming similarity to many mammals.

Question 25

It should have been recognised that **B**, **C** and **D** all require production rations.

Question 28

Many candidates failed to understand that all of the calves produced by a bull with genotype BB would be black.

Question 30

The response was poor, either because *carrying capacity* was not understood or because of inability to do the calculation.

Question 35

Whilst most candidates recognised that the high tanks would give the greatest pressure, only half appreciated that impurities would sink and the tank with the higher outlet (**B**) and would thus yield the cleanest water.

Question 38

Although 66% of candidates recognised the risk of over tightening by a large spanner, few recognised that the problem would be greater with a small nut.

Paper 0600/02

Core Theory

General comments

All candidates take this Paper which is set to differentiate between grades G - C. This year the range of marks was 77% to 7%, with a mean mark of 27.5%.

The format of the Paper followed the now established pattern. The structured questions deal with topics in syllabus order. Each structured question starts with parts aimed at grades G - F, followed by a middle section aimed at F - D, and finishes with more open-ended parts aimed at D - C. Diagrams are used to help key candidates into the questions. The command words such as, state, list and describe usually introduce low level question parts. Suggest and explain usually require higher level answers.

Last year many candidates failed to read the stem of some questions carefully so losing marks unnecessarily, this was not a problem this year.

Questions 2, plant reproduction and **4**, nutrition, which mainly tested recall of knowledge produced the most correct answers. **Question 3**, which tested the candidate's experiences of crop growing in garden plots, was also well answered. **Question 5**, on farm structures, was open-ended and tested the candidates' ability to apply their knowledge to unfamiliar situations. Candidates should be aware that such questions will be set and they should have practice in dealing with different situations. It was obvious that many candidates are not clear on how to respond to questions that ask for the advantages or disadvantages of a particular agricultural practice. **Question 6** included some data response and calculations which the best candidates did very well. All candidates should be encouraged to attempt such questions, setting down their working as they go, for marks are awarded for method.

Comments on specific questions

Question 1

- (a) The familiar soil profile diagram was meant to provide a reassuring start to the Paper. Part (i) was well answered but part (ii) required an explanation of weathering rather than a statement. Roots grow into the cracks and expand so pushing the rock apart. Gasses in the air form acids with rain water which then react with and dissolve the rocks. For example carbon dioxide forms carbonic acid. A statement that acid rain breaks down rock did not gain credit.
- (b) The completion of the pie chart was another way of asking, 'what is a loam soil'. Better candidates did as asked and used the key provided and divided the chart up into more or less equal segments.
- (c) This tested practical experience. Lime is added to soil to flocculate clay, which results in better drainage, and to increase the pH. The answers in both situations were **B**. Many realised that lime increased the soil alkalinity but mistakenly called this lowering the pH.

Question 2

The diagrams of the grass and legume were a cue for the whole question.

- (a) This part tested recall of knowledge and was well done. A wide range of answers was credited for the features of insect pollination and for the function of the underground stem. Nodules, spelt in a variety of ways, were well identified on plant **Q**. The mark scheme only required bacteria for the answer to what was in the nodules but many cited nitrogen fixing bacteria, some even giving the generic name, Rhizobium.

- (b) The term transpiration was well known, as was the fact that large broad leaves would lose most water.
- (c) Deductions from the facts given led most to fungi as the plant pathogen, although some thought that white scale insects were the cause. Control by fungicide was the obvious answer to (ii) but many having got part (i) right stated insecticide or herbicide. These terms are not interchangeable. Removal of plants and burning were credited but breeding resistant strains was not as this is prevention not control. If a right answer to a wrong answer in (i) was given in (ii) a mark was awarded as ECF (error carried forward).
- (d) A part starting with 'suggest' means just that and the mark scheme will allow for any valid responses. Plant P would do well in competition because it has stored food reserves. These reserves can also enable new plants produced asexually to grow faster than weeds germinating from seeds. Plant Q has a supply of nitrates to use from the nodules so does not have to compete for them and the large leaves will shade developing weed seedlings.

Question 3

This question was answered well by those who had practical experience of preparing a garden plot and growing a cereal.

- (a) A variety of appropriate hand tools were accepted in (i) but shovel was rejected. Cleaning a tool after use is not really a safety precaution. The answer required a statement indicating that the tool should be used correctly, and only for the purpose it was designed for or using the tool away from others and not leaving it around after use. The reasons for turning over the soil were well known, namely to help drainage and aeration.
- (b) Candidates gave a wide range of answers in response to this question. Many did not list but made several points that led to confusion. The mark scheme listed topography, aspect and soil. This enabled credit for slope and water availability, shelter or exposure and any comments about the nature of the soil such as pH, composition and fertility.
- (c) The most frequently quoted crop was Maize. Maturity is recognised in most cereals by the changing colour of the plant and the hardness of the seeds. Harvesting is by hand, using a knife or panga, or by machine. The second mark was given for some reference to the way the cereal seed is separated from the plant foliage or removed from the field. Storage problems mainly concern either pests or fungi. Full marks were given for stated pests and the appropriate remedy e.g. rats and storage off the ground in a house with inverted cones on the supports. Fungi control requires dry storage in a ventilated house.

Question 4

- (a) This part tested details of diet and the use animals and plants make of their food. It was the best answered section in the Paper.
- (b) Descriptions of photosynthesis varied. The 'easy' marks were for naming the process and stating that it involved the joining of carbon dioxide and water. That this occurs in the presence of chlorophyll which acts as a catalyst using the energy from light were the other marks and the action of each had to be stated to gain full credit.
- (c) Not many candidates were able to explain the reasons for feeding particular foods in maintenance and production rations. The terms were broadly understood but most answers explained why such rations were needed. Bulk foods such as potato and cassava fill the animal up so it does not gain too much energy and protein. Seeds, on the other hand such as maize or wheat, provide a concentrated source of energy and protein for animals in production to eat in quantity.

Question 5

This question was generally the least well done on the Paper.

- (a) Advantage means better than. In this case why is corrugated iron better than thatch for roofing the chicken house? It is more durable, cannot catch fire nor harbour pests. Marks were not given for comments about its insulating properties. Candidates looked for problems in part (ii) and (iii) that were not there. The mark scheme required very simple analysis-eggs are difficult to collect from one of the egg boxes and chickens could easily jump on to the roof via the egg boxes and escape. A common answer concerned entry of predators but even if they did enter in the corner they still had to gain access to the house and this was so wherever the house was situated. The concept of rotational grazing of pasture is well appreciated for cattle but, it seems, not for poultry. Overgrazing applies to poultry as does the build up disease and parasites in the ground. In view of the few candidates who appreciated this the mark scheme was broadened to include the ability to separate breeding stock, young stock or infected stock.
- (b) The advantage of this system is that it is intensive, saves land space and keeps the poultry safe from predators. It also helps the recycling of nutrients, for the droppings can be used directly by simple plants that can then provide food for the fish. No credit was given for answers that stated that the droppings were eaten by the fish. In certain conditions the droppings in the water could cause excessive plant growth that would result in lowering the oxygen content of the water so killing the fish-eutrophication. Marks were also awarded for pollution of the water and the spread of disease.
- (c) The simple answer that gained credit here was supply and demand- there is just not the demand for turkey meat and eggs. Credit was also given for stating that turkeys did not lay many eggs and for indicating that they were uneconomic to keep but this had to be qualified by reference to them eating more food or growing more slowly than hens.

Question 6

- (a) The labelling of the diagram of the male reproductive system did not pose problems other than the spelling of urethra which had to be correct in order to avoid confusion with the ureter. Any of the functions of the fluids were credited, namely the provision of a swimming medium or nourishment for the sperm or as a neutralising agent in the vagina. The production of semen was not credited as a function.
- (b) This question tested practical experience. Isolation prior to birth is important. Checking that the young is in the correct delivery position is useful. After birth disinfectant should be applied to the chord and the passing of the after birth should be confirmed. It is important to ensure that the young suckles from the mother.
- (c) The importance of colostrum was well known.
- (d) Early weaning is a practice of intensive agriculture so fell beyond the experience of most candidates. However the question asked for suggestions and any valid ones were credited. Early weaning could set the young back in terms of health and growth. One candidate correctly stated that a young ruminant's rumen might not be sufficiently developed to deal with a fibre diet. The advantage for the mother is that she has time to recover before the next birth.
- (e) This final part required analysis of data and a calculation. It was not difficult, but the format put off a number of candidates. Careful completion of the table showed there to be 100 goats in July 2003 and as the carrying capacity of the pasture is 18 (goats) x 5 (hectares) i.e. 90 that was when the pasture was first overgrazed. The effects of overgrazing are well taught but not always from the perspective of the pasture. It was this that was asked so erosion, compaction, damage to plants and slow recovery were acceptable. Insufficient food for the stock was not.

General comments

All candidates attempted all parts of every question – indicating that there was sufficient time allocated for the examination. There was no evidence of any of candidates infringing the examination rubric by attempting all of the essay questions in **Section B**. The quality of the candidates' responses in **Section B** was sustained at the higher level of last year.

Comments on specific questions

Section A

Question 1

- (a)(i) This question was answered correctly by most candidates, indicating an increasing ability of candidates to be able to extract data from charts accurately. Invariably, candidates stated the appropriate units in their responses.
- (ii) This question was answered correctly by most candidates, again indicating an increasing ability of candidates to be able to extract data from charts accurately.
- (iii) This question was answered less successfully by candidates. Weaker candidates stated simply that magnesium deficiency would result in stunted growth, making no reference to the effect on leaf colour.
- (iv) More candidates were able to describe correctly the effect of nitrogen deficiency on the appearance of plants than magnesium deficiency in the previous question.
- (b)(i) This question was answered well by most candidates. The weakest candidates tended to offer the same advantage twice.
- (ii) A range of successful problems was described by candidates. Weaker candidates often described the same characteristic of cattle manure as both an advantage and a problem.

Question 2

- (a) Relatively few candidates were able to label all three areas of the leaf correctly. Most candidates were able to label an area in which gases were stored, but weaker candidates labelled vacuoles instead. The food manufacturing cells were labelled correctly by many candidates, the most common error being to label cells of the epidermis. Fewer candidates were able to label water carrying cells correctly. Surprisingly, many candidates labelled cells totally outside the vascular area.
- (b)(i) Few candidates were able to state a correct word equation for the process of photosynthesis. Most candidates scored a mark for either products or reactants, but there was great confusion between this photosynthesis equation and the respiration equation.
- (ii) Most candidates correctly stated the role of chlorophyll in photosynthesis.
- (c) Only the strongest candidates answered this question with any degree of success. For other candidates, there appeared great confusion between translocation and transpiration. Even of those candidates who were able to name the cells involved in translocation, few were able to state which substances were involved, their origins or their destination.
- (d) Most candidates described correctly the uses of the products of photosynthesis.

Question 3

- (a) Most candidates were not able to describe the process of asexual reproduction. The most common misconception was that self-pollination was synonymous with asexual reproduction.
- (b) Relatively few candidates stated that the cost of production had a bearing on the price of a crop. Many more candidates described the effect of the yield (and hence supply) on the price. There were a limited number of excellent responses describing the effect of appropriate by-products on the price.
- (c) Most candidates were able to describe two factors successfully that would affect the demand for the crop. Still the most common misconception was that supply affects demand.

Question 4

- (a) Most candidates who attempted this question were able to describe two or three symptoms of a disease of poultry. Too many candidates just described general signs of poor health rather than the symptoms of a particular disease. A few candidates named no disease or named a disease of mammals.
- (b) There were some very detailed answers describing good hygiene procedures. Additionally, the idea of isolation and/or quarantine were well understood by many candidates. Worryingly, many candidates were eager to cull poultry suffering from curable diseases. Only the most able candidates were able to describe appropriate medicinal measures for their named disease.
- (c) Most candidates described the proximity and availability of their local veterinary services. Only the strongest candidates described the types of treatments offered there.

Question 5

- (a) This question was answered very well by candidates. The weaker candidates described the surface and atmospheric components of the cycle. Stronger candidates added the underground components to their responses.
- (b)(i) Candidates were able to describe the destructive effects of wind damage. Stronger candidates were able to relate the effect of wind to the transpiration flow. Only the strongest candidates mentioned the role of wind in pollination or seed dispersal.
- (ii) The common misconception was that low temperatures were synonymous with low sunlight levels. Consequently, many candidates failed to answer the question. Candidates who provided responses involving the effect of freezing were awarded marks.

Question 6

- (a) Most candidates were able to draw a correctly labelled diagram of a non-ruminant. There was some confusion to the site of the liver, gall bladder and the pancreas. A large number of candidates described the digestive system of a ruminant or of poultry.
- (b) Nearly all candidates were able to outline the role of enzymes in digestion. Weaker candidates were not aware of any role of microorganisms in ruminant digestion, nor where they might be found.

Question 7

- (a) The term chromosome was well understood. The term genotype was defined well by strong candidates. Weaker candidates confused phenotype with genotype or gene with genotype.
- (b) There were some very good answers to this question, especially with relation to crossing crops with the same desired characteristic. The idea of producing hybrid crops from parents with different desirable characteristics was less well explained by weaker candidates.

- (c) There has been a great improvement in the understanding of genetics compared to previous years. Crosses between two heterozygous parents to produce a 3:1 ratio were well answered. The strongest candidates were able to describe how two homozygous parents could produce heterozygous offspring. Too many candidates did not state which gene was dominant, and which was recessive.

Paper 0600/04

Practical

General comments

The maximum mark for the component is 50. The mean mark this year was 31.2 compared to 32.9 last year. 36 % of candidates gained the C grade threshold.

It is important that the Assessment Criteria included in the current year's IGCSE syllabus are checked, before starting to prepare candidates for the practical tasks.

The tasks carried out 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, together with a marking scheme that recognises different levels of achievement.

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. For example:

Exercise	Responsibility	Initiative	Technique	Perseverance	Quality
Prepare tilth		+	+	+	+
Composting	+	+	+	+	
Growing maize	+			+	+
Growing carrots	+			+	+
Transplanting	+	+	+		+
Dipping livestock	+	+	+		
Poultry care	+	+	+	+	
Build rabbit pen	+	+	+	+	+
Make bricks			+		+

Each candidate's best five marks for the criteria are then used to give a total mark.

Ideally Centres should provide one task from each of these syllabus sections.

Mark sheets take into account the different levels within the criteria by means of a graded tick list for elements of an exercise e.g. for technique in applying dip to an animal:

Has confidence in relating to animal	7 ticks = 5
Handles in the correct manner	5/6 ticks = 4
Places a halter on the animal	3/4 ticks = 3
Applies dip without wastage	1/2 ticks = 2
All required parts given application	Dipping done but none of the points on the list achieved = 1
Even application achieved	
Accurately measures dip needed	

or by descriptors that relate performance in the task to a mark e.g.

Level	Descriptor	Achievement
5/4	Shows a methodical and systematic approach to preparing the dip. Applies dip to animal carefully to all required areas. Puts a halter correctly on the animal. Handles the animal sympathetically and gently.	
3/2	Prepares dip with help. Applies dip but some wastage. Halters animal with practice. Handles animal.	
1/0	Clumsy application of dip.	

Note that the descriptors are positive to encourage achievement from the candidate.

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 would be suitable, for instance, how a garden plot was cultivated, including any problems that were encountered or how blocks were made, with emphasis on any 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 MS1 must be scaled to be out of 50.

Paper 0600/05

Project

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. This year the mean mark out of 50 was 33.6 compared to 34.1 in 2001. 75.2% of candidates gained the C grade threshold.

It is important that Teachers new to this component check the Assessment Criteria included in the current year IGCSE syllabus, before starting to prepare candidates for the project. Each year there are some candidates for whom special consideration has to be given because they have not had the required opportunities for assessing the work. This year was no exception.

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 word processed. It is important in such situations that the Teachers monitor individual's progress and record marks with explanatory annotation on the candidate record card.

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.

The most successful projects were experimental comparisons. Before starting the project the meaning of 'hypothesis' and its significance in a scientific investigation should be made clear to candidates. The regulations for Paper 5 allow for Teachers to monitor candidates' progress and to offer advice. The nature of the help given should be recorded on the individual pupil record card. It is also within the regulations for the candidates to be aware of the criteria by which they are to be assessed. It is clear that many candidates do not appreciate what is required under 'limitations'. It includes what went wrong during the investigation and flaws that have become apparent in the experimental plan. Suggestions as to how these may be overcome should be discussed.

Most Centres are now sending all the required information for external moderation. A sample of 10 projects is 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 at moderation. 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.