

# AGRICULTURE

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

## General comments

The mean score (24.784 61.96%) was slightly lower than in 2005 but not significantly so. The range of marks at 5–39 was slightly better.

Most candidates had no difficulty with items numbered 1, 2, 5, 11, 12, 13, 15, 17, 18, 19, 20, 23, 24, 25, 29, 32 and 33. Over 60% of candidates gave correct answers to questions numbered 3, 6, 9, 21, 34 and 35 and most of these require no further comment.

Although plant and animal structure and physiology were quite well understood there were a number of misconceptions as shown by poor interpretation of diagrams (Nos. 7, 10, 31, 36, 38 and 39) and data (Nos. 11, 14, 16, 40). Understanding of livestock breeding was poor.

Weakness in **Section 4** of the syllabus is a matter of some concern. It is possible, but not easy to be certain, that careless reading of questions led to some errors. Furthermore, candidates must expect to 'work out' some of the answers and not just lift them from their lecture notes.

**Comments on individual items.**

3. Although 60% of candidates gave the correct response (**D**), other answers were evenly divided, suggesting that 40% did not see that plant **Y** lacked nitrogen.
4. With only 56% giving the correct answer (**A**) to this basic soil property, there is serious doubt about candidates' understanding of crop husbandry.
7. It was disappointing to see that less than half of the candidates understood the function of phloem.
8. Answers were almost evenly divided between the four options and it is essential the candidates link "modification of parts of plants" with asexual reproduction in these two species.
9. Although the overall response was good, it was disappointing that 27% of candidates gave osmosis as their answer.
10. The overall response was weak but it was particularly depressing to read that 34% of candidates thought that the polythene bag *increased* transpiration (**D**).
14. The overall response to this item once again illustrated the poor understanding of weights and measures. Over 40% gave **B** – 30 kg when a little thought would clearly have indicated 300 kg.
16. This item was based on practical agriculture but only 37% gave the correct answer **D**. Thus 63% were unable to interpret the data or were in too much of a hurry to read the question carefully. It was expected that the action of applying *before crop emergence* would be associated with a crop which "has just been sown".
22. Responses by over 60% indicated a serious lack of thought. **A**, **B** and **C** are all well recognised indications of poor health. Straw colour (pale yellow) is the normal colour of healthy urine.
26. It should have been recognised that if one cereal is not available it should be replaced by another cereal; not a high protein food (**A**) which many suggested.
27. Although over 50% gave the correct answer (**D**), many gave **A** or **B** indicating a poor understanding of the topic.
28. 65% gave **B**, thus showing a serious lack of understanding of breeding and inheritance. Feeding a fat animal on a low fat diet will produce a thin beast but it will not change the animal's genetic make-up.
30. This was another question which required "Working out". Rotational grazing is likely to increase the stocking rate and has no effect on selective grazing.
31. Many gave **A** or **D** as their answers but as no measurements were shown on the diagram, neither is possible.
34. Once again there appeared to be a poor appreciation of measurements with 20% choosing **D**, which was clearly too small for practical use.
35. Although quite well answered, over 20% suggested **B**. Given that the latrines are on a slope above the well, it is difficult to visualise car fumes contaminating the water supply.
36. This topic has occurred many times in the past and it is almost unbelievable that 60% of candidates selected **A** as their answer. This is simply an overflow to prevent excess water damaging the dam and would not run all the time. The syllabus clearly states the need to understand that "pressure increases with depth" and **C** was the correct response.
37. Correct use of spanners is a topic which could be demonstrated easily in a classroom and candidates should be aware of the damage caused when too large a spanner such as an adjustable is used.
38. It appears as though many candidates were not familiar with a small sprayer of any type. It should have been quite clear from the diagram that the handle would build up pressure.

39. This was another question that required 'working out'. With the wheels as a pivot, **C** was clearly the best balanced load. **A** would have pressed down heavily on the animal's harness. **B** and **D** would have had the opposite effect with an upward pressure lifting the donkey off its feet.
40. Many made the serious error of selecting **D** but as no sums of money were quoted, this would be impossible.

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<p><b>Paper 0600/02</b> <b>Core Theory</b></p>
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## General comments

This paper is set as an option to paper 3. Some questions do have parts in common with paper 3. Paper 2 examines the core syllabus and is designed to differentiate between grades G to C. Entries were again down - 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 potential. Paper 3 is designed to differentiate between the higher grades and is not so accessible to the average candidate.

The paper 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, are 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.

**Questions 2, 7 and 8** tested the candidates' practical experiences and produced variable answers. All candidates should be able to describe a simple pH test. Knowledge of farm structures was poor - one would expect candidates to be able to draw a fence for enclosing cattle and indeed know how to join water pipes. By contrast **Question 3** that tested recall of knowledge about plant reproduction and processes achieved good marks. Such knowledge from books is commendable but agriculture is a practical subject and candidates should be encouraged to obtain some knowledge through experience of practical work. **Questions 4, 5 and 9** included some data response. It was encouraging to note that most candidates attempted these but it must be emphasised that answers should relate to the data given. **Questions 3, 6 and 7** required extended writing and some accounts showed good knowledge and a useful command of English. **Question 4** asked candidates to use local examples to illustrate the answers but their responses were disappointing.

## Comments on specific questions

### **Question 1**

This question required an appreciation of farming systems and farming methods.

- (a) The diagram illustrated a settled arable system. Such land can be rented by individuals or be communal and part (ii) asked for possible advantages and disadvantages of these tenures. There were not many relevant answers. Rented land by one family costs but decisions are easy since only the family involved. Communal land with many families involves many decision makers but is free and the many workers with different skills can help each other.
- (b) That produce sold as organic requires using only organic fertiliser and no chemical pesticides was well known. Few referred to the rules imposed by retail outlets. Farming organically can provide better prices for the farmer but it is not necessarily a cheaper production method - much depends on the availability of natural manures. How organic farming benefits the environment was well answered - less soil depletion and less pollution of the water courses for instance, but these statements had to be qualified to achieve a mark. A point rarely mentioned was the benefit of organic production to recycling.

### Question 2

- (a) This question failed to elicit correct answers because candidates referred to sand and clay soils rather than sand and clay particles. Sand particles are large and inert. Clay particles are small and can absorb water and exchange chemical ions.
- (b) The diagram showed an experiment to demonstrate capillarity. Water rises higher in the clay because the particles are close together so providing a large surface area for the water to adhere to.
- (c) The photograph illustrated a soil profile. Part (i) was straight forward for those who had practical experience as they could recognise and label the three layers as top soil, sub-soil and bed rock. Those with practical experience were also better able to describe a pH test. For accurate results distilled water should be used and universal indicator is preferred to litmus. Suggestions of why pH might differ between the top and bottom of the sample were varied. Credit was given for explanations that followed on e.g. 'humic acids leach from the top soil so creating a lower pH below' or 'the bedrock was alkaline and decay in the top soil produced acid conditions.' Care must be taken when teaching pH to emphasise that a low number on the scale refers to acid conditions and a high number indicates an alkaline soil.

### Question 3

This was the best answered question on the paper.

- (a) Most candidates correctly labelled stigma and ovary and describe insect pollination. Those who mentioned self-pollination were given credit as this can happen in the absence of insects.
- (b) Definitions of fertilisation were good. Mention had to be made of fusion involving gametes or male and female nuclei. Only a minority muddled fertilisation with pollination.
- (c) Knowledge of where photosynthesis occurred and factors that affected the process were well known. Most knew that phloem was involved in sugar transport and that this was called translocation. Fewer mentioned the method of transport, both mass flow and active transport were given credit.

### Question 4

This question tested the preparation of the garden plot and the growing of a crop.

- (a) Those with first hand experience were better able to provide explanations for digging in rotted manure and preparing a deep tilt. 'Goodness' is readily available from decomposed matter but it is locked in the fresh material. Answers that gave no explanation but just a statement e.g. 'rotted material provides nutrients' did not get credit. A deep tilt helps root penetration and aids the passage of air and water to the seeds and later to the roots.
- (b) It was surprising how few candidates could name a local weed although cultural methods of weed control were known such as rotations and mulching. Hand weeding and use of a hoe are usually classed as mechanical control.  
  
Names of crop diseases were sketchy. Many weaker candidates named pests. The most frequently given control method that does not rely on chemicals was rotation. Use of resistant plants as a control method is important.
- (c) Interpreting the data proved to be too difficult for most candidates. Suggestions for why there was a greater infestation of blue-grey aphids were better and included, 'the pesticide attracted them', 'an infestation occurred just after treatment and they reproduced very quickly' or the treatment killed the aphid predators.

### Question 5

- (a) Digestion, like photosynthesis is a topic covered also in Biology and so generally produced good answers. This year was no exception.

- (b) The table of data on food stuffs did not prove so difficult to interpret as the data in the previous question. Most candidates correctly stated a protein concentrate and a food fed as roughage. The term succulent was not so well known. Candidates do find it difficult to explain what a production ration is. They know when it should be fed but do not appreciate the fact that it consists of, and is fed because of, high levels of protein or energy giving carbohydrate.

#### Question 6

- (a) Descriptions of birth were varied. Those who had seen a birth were able to provide the correct sequence of events and give detail about the breaking of the waters, position of head at birth and ejection of the afterbirth. Many candidates wasted time describing mating and gestation or post birth care which were not asked for.
- (b) This part tested genetics in a slightly unusual way without the familiar diagrams and this meant that only those who really understood the given situation provided the correct responses which were: white, homozygous recessive.
- (c) The core syllabus only requires the general idea of artificial breeding to be taught. Thus a selection of the quickest growing, best conformation, highest yielding animals made in successive generations to 'fix' the required feature is all that is needed. Unqualified statements such as 'select the best animal' did not get credit.

#### Question 7

- (a) To gain two marks for the drawing of a fence, candidates had to provide a scale and indicate suitable materials for confining cattle. Chicken wire would not do.
- (b) Of the practices listed to improve pastures, the addition of lime was the best known. It increases the pH to a suitable level. Clearing the shrubs reduces competition, especially for light, which enhances grass growth. Burning areas also reduces competition but, more significantly, it kills pasture pests, stimulates some seeds to germinate and provides potash fertiliser. Few mentioned any of these advantages of burning.
- (c) As in the previous question the final part required an explanation so an unqualified statement such as, 'reduces erosion' did not obtain a mark. Control of grazing implies either rotational grazing or an appropriate stocking rate. These prevent the exposure of soil to either weed invasion or wind erosion and stimulate pasture growth. Correct stocking rates also prevent compaction which stops air getting to the pasture roots.

#### Question 8

This question required candidates to apply their knowledge of agriculture to the effective use of farm structures.

- (a) In part (i) candidates had to appreciate that dirt/bacteria/rust contaminate water and understand that these foreign bodies would enter the barrel as a result of 'run off' from the roof or drop in from the air as the barrel had no cover.
- In part (ii) there had to be an appreciation that particles would sink to the bottom of the barrel and understand that a tap just above the base would provide water flow without 'sucking' out the dirt which would block the drip irrigation tubes.
- In part (iii) an internal connector firmly held in place by surclips was expected but credit was given for external coupling as long as there was an indication of how this would be made watertight.
- (b) Responses here showed a good understanding of the two methods of irrigation mentioned and most appreciated that drip irrigation was less wasteful and that it applied the water close to the crop roots.

**Question 9**

This question linked several parts of the syllabus and was well done by those who got to the end of the paper.

- (a) Possible products were feathers, eggs and guano as a fertiliser.
- (b) The analysis of the pie chart was well attempted. Most quoted China as showing the greatest increase. Answers varied on another significant regional change. The Rest of Asia dropped by 6%, Africa halved and S America went to zero.

In part (iii) candidates had to notice that the number of ducks available for sale was halved. In this case the law of supply and demand should result in a price increase.

- (c) The fact that ducks were mentioned rather than hens confused some candidates. These are both poultry and the symptoms of ill health like ruffled feathers, standing alone, runny nostrils and uncharacteristic droppings are common to both species.

That isolation prevents the spread of disease to other individuals and, that in isolation treatment is easier, were well known and enabled some candidates to finish the paper with full marks in the final section.

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Paper 0600/03  
Extended Theory

## General comments

This was only the third examination session in which this IGCSE subject was examined in this manner. Previously there had been an element of choice for candidates in a **Section B**. As in 2004 all candidates were expected to answer all questions on the paper this year, and consequently Centres were expected to have prepared the candidates by teaching the entire syllabus content to them. Once again, there was much evidence that some Centres had not prepared their candidates in this manner, because candidates from those Centres performed consistently well in some areas of the paper and consistently poorly on other questions. Naturally there are Centres who prepared their candidates adequately for the examination by teaching all of the syllabus content, and these Centres should be congratulated once more.

Looking at the entry for the 2006 examination, most Centres entered candidates appropriately for the more suitable tier, i.e. 0600/3 or 0600/2. Once more there was evidence that some weak candidates were entered for 0600/3 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) Many candidates were able to name to name three appropriate animals. Most candidates were able to provide appropriate uses of livestock by animals. There was greater knowledge about the use of mammals than fish.
- (b)(i) Most candidates were able to identify from the chart that North America showed the smallest percentage increase in population. The most common misconception was to suggest Europe was the correct response, but the population in Europe showed a decrease.
- (ii) Nearly all candidates were able to identify Africa as the continent with the greatest increase in food production. Very few candidates were able to state that this was due to the greatest increase in population, not simply an increase in population.
- (c) Few candidates were able to describe why some types of land were unsuitable for agriculture, in many cases candidates stated soil conditions which were able to be changed by agriculture, and often went onto describe how this could be done.
- (d) Weaker candidates were able to describe the effect of higher food production on the environment. The better answers usually related to deforestation and the effect on either the land or the atmosphere. There were a few detailed responses describing the overuse of agriculture chemicals and a suitable environmental effect such as eutrophication.

### Question 2

- (a)(i) Most candidates were able to identify that area 2 would have the greater yield, but only the most able were able to provide a reason why. The most common misconception was that the amount of water lost was caused by the plants not being to be able to use the water and so instead it went to waste.



- (a) (ii) Stronger candidates provided suitable suggestions regarding the difference in drainage between the two areas, but most candidates provided unsuitable suggestions which implied that the drainage tests were not carried out in a fair manner.
- (a) (iii) Stronger candidates provided a suitable material for reducing water loss through the ditch walls, but most candidates responded by suggesting instead a method to reduce evaporation from the ditches.
- (a) (iv) This question was answered well.
- (a) (v) This question was answered well.
- (b) Many candidates explained how leaching involved named soil cations and anions dissolving in water and moving downwards in the soil. Most answers very much vaguer and described minerals and nutrients being washed away, often implying that run-off water carried them away across the surface.

### Question 3

- (a) (i) Many candidates were able to identify a clay soil.
- (a) (ii) There were few candidates who were able to suggest appropriately the properties of this clay soil. Many candidates provided contradictory statements, for example 'well drained' and 'good water holding' properties.
- (b) Few candidates were able to describe a correct method of determining the pH of a soil sample, either by a chemical test or by use of a meter. The most common misconceptions were that the test could be done dry, or that a settling agent might not be useful or that litmus could be used as an indicator for testing soil pH.
- (c) (i) Most candidates were able to identify sweet potato as the crop which could grow in the most acidic soils.
- (c) (ii) Many candidates misinterpreted 'widest range' for 'highest pH', and so they named the two crops which grew in the most alkaline soils. Of the other candidates, most identified sweet potato correctly, but failed to identify sorghum.

### Question 4

- (a) (i) Most candidates were able to recognise the anther in the figure.
- (a) (ii) There were some very good descriptions from candidates from some Centres. However, other candidates were confused between the processes of pollination, fertilisation and germination and so provided responses which, although biologically valid, did not answer this question.
- (c) (i) This question was answered poorly. Only the strongest candidates were able to provide a response which did not refer to dominant being the opposite state to being recessive.
- (c) (ii) There has been a measurable and significant increase in the ability of candidates to understand and complete questions concerning genetic crosses. This question was answered very well.

### Question 5

- (a) This question was answered well by candidates from Centres in which there had been preparation of the candidates for data analysis questions. Many candidates from some other centres appeared to find great difficulty in analysing Table 5.1.
- (a) (iv) The dilution calculation question was answered well by most candidates and appropriate working was obvious with their responses.

**(b) (i)** Most candidates provided a superficial answer to describe how a root crop may be removed from the ground. Better answers from some candidates included details of how the harvesting is done in practice rather than in theory. A significant minority of candidates were not able to identify a root crop.

**(b) (ii)** This question was answered well.

#### **Question 6**

**(a)** Most candidates understood that controlled grazing allowed pasture to recover. Fewer were able to link the effect of controlled grazing on the life cycles of pests and diseases or how it helped prevent selective grazing. Generally most candidates made a good attempt at the question overall.

**(b)** The candidates from some Centres were able to state two other uses of fencing and sketch them appropriately. Most of the uses referred to control of differing types of livestock. There were very few answers referring to hedges or to windbreaks. The candidates of some Centres found this question difficult.

#### **Question 7**

**(a)** This question was answered well.

**(b)** Only the most able candidates were able to link age and differences in livestock rations. Weaker candidates provided responses which may be appropriate for humans rather than livestock. There was wide use of the terms production or maintenance ration, but without the understanding of these terms.

#### **Question 8**

**(a) (i)** The more able candidates were able to provide a good rationale for ensuring animals gave birth at a time when there was a maximum chance of survival of the livestock. Weaker candidates appeared to read the question as 'controlling breeding' and provided answers about AI or artificial selection.

**(a) (ii)** Relatively few candidates were able to state even a single record which referred to the control of breeding. Vague answers such as financial record or production records were not awarded marks.

**(b)** This question was answered well.

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**Paper 0600/04**  
**Practical**

## **General comments**

There was no apparent difference in centres offering this option this year but the marks awarded were down on last year.

Teachers should check the assessment criteria, which are included in the current year IGCSE syllabus, before starting to prepare candidates for practical tasks. It is important that teachers are familiar with the criteria, to help them plan graded exercises, and that the candidates know how they are going to be assessed.

The most common criticism in centre reports concerns a lack of provision for adequate differentiation. Too many exercises test basic skills only.

The tasks selected for assessment should provide opportunities for candidates from the whole ability range 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 candidates.

Centres have to demonstrate how they recognised and graded candidates of varying abilities.

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, 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 is 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.

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**Paper 0600/05**  
**Project**

## General comments

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

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.

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 given general teaching on how to decide on a hypothesis, 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.

Assessment criteria that continue to cause problems are the 'planning' and 'limitations'. The plan put forward must clearly provide answers to the hypothesis (questions posed), relate to the science of the background study and indicate how variables are to be controlled. It should be a detailed account of the experimental method and the procedures to be followed. Under 'limitations' any flaws in the experimental plan that became apparent should be commented on 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.

Some topics are not dealt with in depth by textbooks and the levels of research for background studies done by some candidates on the Internet and from periodicals were most commendable.

The presentation of many of the projects was excellent, many demonstrating good use of computer graphics.

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 student 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 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. However, this year, some centres provided opportunities for surveys and these achieved a higher standard than is normally the case. The topics chosen by the candidates showed a real awareness of Agriculture in the wider context of country and Society, for example: AIDS, Bird Flu, Foot and Mouth, Organic farming and Genetically Modified Food. One valid criticism of the work is that not enough questionnaires were completed. It is important that sufficient people are sampled to collect enough data for subsequent analysis.

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 10 projects - the one awarded the top mark, the one given the lowest mark and others that represent the full spread of marks. It would help handling if projects were presented in plastic binders rather than bulky hard covered ring files.

The annotation by the teachers of the candidate record cards is appreciated and is of great help at external moderation. Comments that indicate how much guidance has been given and the problems encountered help the external moderator understand how the teacher has awarded marks and has applied the assessment criteria.

With such a small entry the statistics can vary considerably from year to year. This year 63.5% of candidates gained the C grade threshold on this option.