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AGRICULTURE

Paper 0600/01

Paper 1 - Multiple Choice

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

General comments

Results showed a slight improvement on last year, with a mean score of 25.388 (63%). Most candidates had no difficulty with **Questions 4, 5, 12, 16, 18, 19, 22, 24, 25, 30, 32, 34, 36, 37** and **40**, whilst over 60% gave correct answers to **Questions 2, 7, 13, 14, 31** and no further comment is necessary on these items. There were two major areas of weakness.

- **Questions 8 - 11**, basic plant biology, revealed a considerable amount of muddled thinking resulting in a serious lack of accuracy. Knowledge on this topic appeared to be very superficial.
- Various aspects of livestock husbandry, notably anatomy and physiology (**Questions 20** and **21**) health, nutrition and breeding (**Questions 23, 26, 27** and **28**) revealed a poor understanding of the topic. It was pleasing to note some improvement in syllabus **Section 4**, although there is no room for complacency as the poor response to **Question 38** revealed.

Comments on specific questions**Question 1**

'Bushes for browsing' should have indicated goats but just over 50% of candidates recognised the fact.

Question 3

The poor leaf growth of plant **Y** should have indicated a lack of nitrogen and therefore the fertiliser with the highest proportion of this nutrient (**D**) was the one to select. Possibly some candidates were not familiar with this method of stating the nutrient ratio.

Question 6

Although just over 50% of candidates gave the correct answer (**D**), the remainder were evenly divided in their choice of the three distractors. It should have been obvious that for the system to work, the main channel (**Y**) had to be lower than the source of water - the river (**Z**).

Question 8

30% of candidates suggested that an *ovule* becomes a fruit - simply a poor understanding of basic botany.

Question 9

Results suggest only a vague knowledge of photosynthesis and respiration together with poor interpretation of data presented as a graph. Whilst respiration takes place all the time producing carbon dioxide; when photosynthesis reaches a high level a greater quantity of the gas is used. Consequently, of the given times, **A-0600** was the only occasion when production of carbon dioxide exceeded its use.

Question 10

Osmosis continues to cause confusion. Over 60% of candidates indicated that the passage of water in the *xylem* (**A**) was osmosis. However, there is no concentration gradient in the *xylem*, and in this diagram this only occurs between cells as indicated by **B**.

Question 11

Surprisingly, just over 50% of candidates gave the correct answer (**D**). The distractors are all processes leading up to fertilisation.

Question 15

Although over 50% gave the correct answer (**D**), it was disturbing that over 30% expected a *fungicide* (**C**) to control a virus disease.

Question 17

The essential feature of a *herbicide* that controls weeds in a crop, is that it is selective. The mode of action might be any of the distractors but this alone is not a guarantee of crop safety.

Question 20

Interpretation of this well-known diagram was very disappointing and it must be assumed that many candidates were unable to identify the labelled structures. Only **B** - the pancreas produces digestive enzymes.

Question 21

There is clearly confusion between the term *oestrus* and *oestrus cycle*. Consequently almost 40% of candidates gave **B** - the duration of the heat period, whilst the correct answer was **D** - the interval between the start of heat periods. Unmated cows and sows come into heat approximately every 21 days, i.e. the length of the oestrus cycle.

Question 23

Although, over half the candidates gave the correct answer **B** - dung, a substantial number suggested shape. Whilst shape may be used to assess the quality of an animal, it is not an indication of its health.

Question 26

Over 40% suggested **D** - replacing tissues but it should be recognised that this is maintenance and that muscular growth, e.g. in a growing beef animal requires a production ration.

Question 27

A quarter of candidates gave **D** – 100% suggesting that too few took the trouble to sketch a plan or otherwise were unable to work out the answer. Or was the term *heterozygous* not understood?

Question 28

With *varieties* in bold type, it should have been obvious that the question related to breeding making **B** the correct answer.

Question 29

A was the most frequent incorrect answer; it appears as though many candidates simply divided 200 by 25, and failed to appreciate that 120 should be divided by 8.

Question 33

Although most candidates recognised that there should be one part by volume of cement, many chose **B**, whilst **A** was the correct answer.

Question 35

Given the formula below the diagram, the only correct choice could be a wider pipe, i.e. the cross-sectional area.

Question 38

Although *lubrication* was in bold type, it appears that the term was not understood as a method of reducing friction, as most candidates selected **B** - by preventing rust forming. It was expected that candidates would be familiar with the use of oil in simple mechanical devices.

Question 39

Results suggest that many candidates did not read the question carefully. Consequently, the first in the list with 'high demand' was a popular choice and the problem of short supply was not considered.

Paper 0600/02

Core Theory

General comments

All candidates take this paper which is set to differentiate between grades G to C. To gain the higher grades Paper 3 is taken in addition. *Next year this will not be the case.* Teachers will have to enter candidates for *either* Paper 2 for grades G to C *or* Paper 3 for grades C to A.

Paper 2 will be set on the Core Syllabus. The format of this paper will follow the now established pattern. Structured questions will deal with topics in syllabus order. Each structured question will start with parts aimed at grades G-F, followed by a middle section aimed at F-D, and will finish with more open-ended parts aimed at grades D-C. Diagrams will be used to help key candidates into the questions. Command words such as, state, list and describe usually introduce low level question parts. Suggest and explain usually demand higher level answers.

The range of marks achieved this year was 87% to 12%, with a mean mark of 30%, higher than

Failure to read the stem of questions was not a problem this year. However in **Questions 1 (a)** and **2 (b)(i)** the wording of the question did seem to pose problems for some candidates. The questions tested practical work such as, crop growing **2 (a)**, animal feeding **3 (a)**, crop spraying **4 (b)(iii)**, and making concrete blocks **5 (c)**, were done well by those candidates with the relevant personal experience. The data response questions, **1 (c)** and **5 (a)(v)**, gained a better response than previously. Some candidates are still not clear on how to respond to questions that ask for the advantages or disadvantages of a particular agricultural practice, **5 (a)(i)**.

Comments on specific questions

Question 1

- (a) The key did not put candidates off and most responded correctly to the statements so arriving at the correct answers, sand and clay.
- (b) This part, set on a standard soil test, was not well done. Candidates did not appreciate the fact that in order to find out the amount of humus in a soil sample any water present has to be removed first. Failure to realise this led candidates in part (ii) to suggest that water was given off when the dried soil sample was heated. A little may be released but it is the products of combustion like carbon dioxide or carbon monoxide that are given off in this stage of the test. The calculations were correctly done more times than not. The usual mistake when working out the percentage was to divide the second weight rather than the difference by the original weight.
- (c) The interpretation of the data of the plots was well done but only the better candidates could explain the reason for taking five samples, namely to overcome the possibility of one sample being uncharacteristic of the whole plot.
- (d) Seeds when germinating need water and air (oxygen) for respiration. These are provided for in a soil with a good crumb structure. Many gave 'ease of root penetration' which was not credited as this is after germination.

Question 2

- (a) The soil requirements for a named crop were well known, but the pHs given were generally too low. Climate does include both rainfall and temperature and marks were lost for not including both in the answer.
- (b) The question stem in part (i) failed to cue many candidates to give the differences between wind and insect pollinated flowers. In part (ii) most candidates stated that the advantage of rotating the crops was to maintain the balance of nutrients in the soil, fewer mentioned that it helps control disease. Organic farming was introduced into the syllabus for the first time this year and the responses in part (iii) from some candidates showed a good understanding of the topic. Organic production involves the use of *only* organic fertiliser and natural methods of disease and pest control. In part (iv) most candidates appreciated that planting across the slope prevents erosion. The descriptions of how tubers form in sweet potatoes, which was required in part (v), were often superficial - mention had to be made that it was the root that swelled with translocated starch which was the product of photosynthesis. Errors included descriptions of the method of cultivation and the process in the Irish potato.

Question 3

- (a) In part (i) many interpreted food as 'food groups' or 'food types', so gave carbohydrates and protein as answers rather than hay, silage or concentrates. Water was the expected answer to part (ii) but vitamins and mineral licks were given credit. The pregnant animal requires a production ration high in protein and carbohydrate. 'Give it more food' did not gain a mark. Food wastage can be prevented by giving animals small or measured amounts in clean containers. The former was often mentioned, the latter rarely. Controlled grazing was a frequent answer that was not relevant in the context of the question.

- (b) The definition of a balanced ration is 'a ration that provides all the nutrients in the correct proportions for an animal at a given time in its life'. The balance of the nutrients changes during development, pregnancy etc. Most gave rather general statements that gained just the single mark.
- (c) The anatomy of the pig's digestive system was well known and there were some good descriptions of how it differed from that of the ruminant. A common misconception was that the bile contained enzymes. Bile changes the pH of the gut contents and breaks down (emulsifies) the fats.

Question 4

- (a) The question on feeding of the aphid was answered well, only a few candidates did not mention both piercing and sucking. That this transmitted disease was a frequent answer to part (iii) but the harm caused by the taking of nutrients from the plants was rarely mentioned. It was encouraging to note that most attempted the 'open ended' part of the question and gave a range of suggestions. Ones given credit included, 'this is the soft part of the plant', 'this is where most nutrients are found', and 'the tip is easier to pierce'.
- (b) In the first part of the question marks were lost for imprecise suggestions. Sprays can drift and get into water courses, they might not make contact with insects on underside of leaves. Baits stay around for a time and can easily be eaten by other animals. Vapour only deters insects according to the data. The precautions listed in part (ii) had to be ones taken by the operator *when* spraying. Washing hands afterwards, carefully storing the chemical and correct labelling did not gain credit. Only one mark was available for protective clothing. Part (iii) asked for the reasons for using biological control. That it does not damage the environment was often given, it is also specific to a particular pest.

Question 5

- (a) Too many candidates gave cheap as an advantage in part (i). The Core Syllabus specifically asks for the properties and uses of materials to be learnt e.g. durability, insulation. The roof over hang shown in the drawings prevents direct sunlight and rain getting into the house and the blocks would be best for a chicken house as they are easier to clean and would not harbour pests. Answers to both these parts were generally good. The syllabus does require a certain level of mathematics to be shown and the working out of spraying applications and stocking rates are two obvious places fulfil this obligation. Not many candidates correctly gave the carrying capacity as 48. Most realised that overcrowding resulted if the carrying capacity was exceeded but did not state this led to disease and cannibalism.
- (b) This open ended question produced many thoughtful responses that gained credit. The expected answer that linked the difference in the number of chicken and rabbit farms to 'supply and demand' was frequently suggested.
- (c) The description of how to make concrete blocks was best done by those candidates who had carried out this practical for they were able to provide the details such as the mixing proportions the nature of the mould and the drying times. General descriptions achieved only one or two marks.

Question 6

- (a) The completion diagram showing the water cycle was straight forward yet very few candidates gained full marks. The fact that 1 and 2 were both respiration might have confused some, although transpiration was also given credit for 2. Leaching, drainage infiltration and percolation were all alternatives for 4.
- (b) The name of the gas used for photosynthesis was usually given correctly but the explanations of how water and minerals reached the leaf were muddled. Water enters the root by osmosis, mineral salts by active uptake. Both then rise in the xylem.
- (c) Candidates found this question the most difficult on the paper. The long handle provides for efficient leverage - a small movement by the man translates over the fulcrum as a larger movement at the pump. 'Makes the raising of water easier', did not get a mark. The two diagrams provided for the next part of the question should have enabled those who had no firsthand experience of a water pump to work out its operation. Water is sucked in to the pump as the rising rod causes the valve B to open. When the rod is lowered the pressure closes valve B while valve A opens as it passes down through the water. This water is trapped and then lifted as the rod rises with A closed and B open which sucks in more water.

Paper 0600/03
Extended Theory

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 the last few years.

Comments on specific questions

Section A

Question 1

- (a)(i) The question was answered well by those candidates who had read the question stem; many able candidates were able to outline how forested land might be prepared for sowing a cereal crop. However, it was clear that some candidates did not read the entire question and gave a response regarding seed sowing rather than land clearance.
- (ii) This question was answered well. A range of appropriate problems associated with deforestation was described by candidates.
- (iii) Most candidates were able to provide a brief outline regarding the drainage of soil, the more able candidates were able to expand their responses and provide appropriate detail regarding their chosen method.
- (b) An increased proportion of candidates, but still a minority, appreciate that cultivars are varieties of a crop. There is still the misconception that cultivars are some kind of agricultural tool.
- (c) This calculation was answered well by most candidates, usually they provided appropriate working in order to describe their method. A few candidates did not state units for their answer, thereby failing to achieve the correct answer.

Answer: (c) - 4ml.

Question 2

- (a) Most candidates were able to describe one advantage of rotational grazing compared with extensive grazing. The most common response involved the prevention of overgrazing. More able candidates described the concept of using rotational grazing to break the life cycle of pests. Only the most able candidates were able to state three advantages. The most common misunderstanding with this question involved an evaluation of the role of fencing.
- (b) This question was not answered well by most candidates. The responses tended to be vague and ignored the reference to timing in the question. Very often, the fertilising procedures described were not appropriate for a pasture.
- (c) Most candidates were able to draw part of some type of livestock fence. Both poultry and livestock fences were described - labels regarding construction, materials and dimensions were rewarded. A few candidates incorrectly described a diagram to illustrate rotational grazing.
- (d) Most candidates were able to describe the use of hedges as windbreaks. They were also able to describe the maintenance of hedges. Relatively few candidates were able to describe how a new hedge is established.

Question 3

- (a)(i) Most candidates were able to determine the maximum yield of the crop.
- (ii) Only the most able candidates understood that this crop should be harvested as soon as it achieves the maximum yield. Therefore, there were incorrect responses below the time of the maximum yield and those that would leave the potatoes in the ground too long.
- (iii) Again only the most able candidates were able to draw a suitable graph for a crop infected by a fungal disease after 100 days. The most common misunderstanding involved graphs that separated from the existing graph from day 0.
- (iv) Very few candidates were able to state that spores were involved in the spread of fungal diseases.
- (b) This question was answered well. Most candidates described how to total inputs/costs and also outputs/yield. The most able candidates were able to relate their answer to this crop.

Answers: (a)(i) 40 tonnes per hectare, (ii) 160 days (± 5).

Section B**Question 4**

- (a) Despite the explicit requirement to explain the effects of physical weathering, most candidates described the effects of either chemical weathering or biological weathering or both. Many candidates were able to describe a single aspect of physical weathering - either the action of flowing water, of wind, of temperature or of ice. Very few described more than one weathering agent.
- (b) Nearly all candidates described the effect of leaching on minerals, but there was confusion regarding the difference between the percolation of water and run-off. The importance of the solubility of leached minerals was not well explained nor the subsequent effect on the plants, other than a general statement regarding a lowered yield.

Question 5

- (a)(i) Most candidates were aware that the transpiration stream involved the movement of water and usually mineral salts. However, most candidates did not describe any of the functions of the transpiration stream, but repeated how water was lost from a leaf surface.
- (ii) It was common that candidates scored half of the marks on this question. The role of the stoma in water loss was well known, but few understood the importance of the guard cells or of the process of diffusion.
- (b) The movement of systemic chemicals via the phloem was described by most candidates, but not that they need to be soluble. Few candidates understood how systemic pesticides entered plants, but were aware how they moved once inside plants' tissue.

Question 6

- (a) The process of artificial insemination is well understood by most candidates and they were able to provide many advantages.
- (b)(i) Conversely, only a few candidates could appreciate that artificial insemination is *not* artificial selection. Consequently, most described the role of *artificial insemination* as in improving yield and therefore, did not gain marks on this question.
- (ii) There were very good descriptions of mating or of weaning from candidates, but only a small proportion were able to describe anything of the birth process other than what can be observed externally. Therefore occurrences in the uterus, the rupturing of the amniotic sac, the passage through the cervix and the vagina were not mentioned by most candidates. Some candidates were able to describe how the young animals were born head first and attached to the umbilical cord and the placenta.

Question 7

- (a) This question was answered well. The siting, materials, shape and methods of preventing were equally well described.
- (b) Most candidates were aware of the process of treating water by boiling. Many also were aware of the role of filtering. Fewer candidates understood the process of filtering in treating water. Many were aware that some chemicals could be added to treat water, but few named such a chemical.
- (c) Few candidates were aware how to replace a tap washer or even were aware where to find the washer in a tap. The idea of turning off the water supply before the process was not common, but many candidates stated that a spanner or a wrench could be used.

Paper 0600/04

Practical

General comments

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.

The range of tasks offered to candidates by most Centres was appropriate so that candidates were able to demonstrate their practical abilities. However, some Centres did not allow candidates to access all of the necessary criteria for the highest marks.

Most Centres provided tasks appropriate to allow candidates to demonstrate responsibility. Generally this was well evidenced, but a few Centres failed to provide worksheets to prove this skill.

Fewer Centres provided scope for their candidates to demonstrate initiative. In the majority of Centres, candidates were not encouraged enough to describe either how they had overcome problems or when had made a choice which they could justify. Some of the provided worksheets were too restrictive and did not allow candidates any chance to show initiative.

The evidence for candidates' practical technique in their tasks was well evidenced.

Several Centres did not allow their candidates the opportunity to demonstrate perseverance. The inadequate evidence for these candidates came from practical tasks that were completed in a single practical session. This could be resolved by such Centres requiring their candidates to perform at least one task involving the growth of a suitable crop. This would necessitate the task lasting more than one practical session and therefore would allow candidates to demonstrate perseverance.

The evidence for candidates' final outcomes from the practical tasks was appropriate and well demonstrated.

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.

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.

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.

The most successful projects involved candidates stating clear hypotheses or reasons for their intended project. Those candidates who failed to provide such relevant questions had great difficulty in completing a project that was anything other than a series of unrelated activities.

Planning was a weakness of many candidates. For many, there was an implied vague plan running through the practical part of the project, consequently such candidates gained low scores in this area. A few Centres had emphasized the importance of planning and invariably this led to such candidates producing high quality projects.

The background studies were generally well done, although some Centres had candidates producing large amounts of background information that was not relevant to their subsequent projects.

The practical part of the study and the handling of evidence were well described by nearly all candidates.

The ability to make deductions from the evidence was not well presented. Many Centres assessed candidates leniently in this area by awarding marks for presenting the same evidence in two forms, for example as a table and a graph, rather than stating deductions.

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.

Centres assessed, and candidates demonstrated, perseverance and overall description and presentation of projects clearly and appropriately.