

AGRICULTURE

Paper 5038/01

Paper 1

General comments

It is important that candidates should be able to apply knowledge and reasoning in unfamiliar situations, which may be described in questions. This ability marks out those candidates who have a real understanding of the subject, rather than an ability to recall facts only. Too many candidates rely on rote learning of information, which they write down without discriminating between relevant and irrelevant material. Candidates who do this will forfeit marks since much of what they write does not answer the question set. In addition, they waste time in giving answers that are unnecessarily long and may not have time to complete other questions. It is essential that candidates read questions carefully, in order to ensure that their answers are relevant. If candidates are to gain full marks they must ensure that they have good knowledge of the whole syllabus. There seemed to be significant gaps in knowledge in too many cases, especially where practical experience might be expected in relation to growing crop plants or keeping livestock, albeit on a small scale. Details of agricultural products and practices which are important within a country, cash crops for example, is also expected and should give greater relevance to a subject which can be seen as vital to the well-being of any country.

Comments on specific questions

Section A

Question 1

Although the structure of a grass is not required knowledge, it was expected that candidates would be able to use their knowledge of maize structure to make the relevant deductions. Unfortunately few candidates seemed to have this knowledge although it is required by the syllabus.

- (a)(i) The structures labelled were: **A** – filament, **B** – anther, **C** – stigma.
- (ii) The question asked for ways in which the diagram indicated wind pollination so references to large amounts of light pollen were not appropriate as this was not visible. The anthers and/or stigma hanging outside the flower was an accepted point, as was the feathery stigma.
- (b)(i) Candidates should have known that structure **X** is to catch pollen as is the 'silk' (stigmas and styles) at the top of the 'cob'. Surprisingly few could give a correct answer.
- (ii) A few candidates picked up the fact that the maize has separate male and female flowers, while the grass has both male and female structures in the same flower. That so few candidates realised this or could answer (b)(i) correctly demonstrates that many had little knowledge of the structure of the reproductive structures of maize, although this is a syllabus requirement.

Question 2

This question required application of knowledge and ideas to a situation, something that many candidates seem to find difficult.

- (a) Some candidates failed to associate the idea of all or part of a crop having broad leaves with the suitability of the herbicide but there were answers that gained full marks and showed an ability to reason an answer. The herbicide could be used in the cereal crop, as it is not broad-leaved. It would be inappropriate for the pasture, as the legumes are broad-leaved (visible in the diagram), although the grass is not. The root crop is also a broad-leaved (again visible in the diagram) so the herbicide should not be used.

- (b)(i)** Again, application of knowledge was required. Many candidates failed to give clear answers that demonstrated that they understood the way in which the grass regenerates, but there were some good responses stating that the growing points on the rhizomes would remain undamaged by grazing as they are underground. A few candidates also noted that the rhizomes would be undamaged by trampling by animals.
- (ii)** The idea that pieces of the rhizome would remain and could regenerate after hoeing was generally understood, as was the idea of a systemic herbicide, which is absorbed, killing the whole plant. Marks were lost where the answer was not quite precise or clear. Candidates referred to 'roots' rather than rhizomes, which are underground stems and the idea of the herbicide travelling to all parts of the plant was not always stated.

Question 3

- (a)(i)** Whilst there were many correct answers, there were also many candidates who could not name a plant disease caused by a virus. The majority of incorrect examples were fungal diseases.
- (ii)** Candidates who had given a correct answer to **(a)(i)** were often unable to give symptoms of the disease. The symptoms given should be specific to that disease, described clearly and indicating the part of the plant affected.
- (iii)** It was generally known that insects are vectors of plant disease but full marks were only gained by candidates who made it clear that viruses are generally transmitted by sap-sucking insects, which transmit the disease when moving from an infected to an uninfected plant.
- (b)(i)** The symbol shown has a precise meaning – the substance is toxic or poisonous. 'Dangerous' was not accepted as a correct answer since this could be applied to other symbols and candidates should be aware of the type of danger posed.
- (ii)** This was a simple calculation and correctly carried out by the majority of candidates, who also gave the correct units. The answer was 5 cm³.
- (iii)** This question again required application of knowledge to the information given. Only a small number of candidates associated the use of the insecticide with killing beneficial, pollinating insects that would ultimately reduce yield.

Question 4

This question was generally well answered with many candidates achieving close to full marks.

- (a)(i)** The labelled parts were: **A** - amniotic fluid, **B** – umbilical cord, **C** – placenta, **D** – uterus/womb.
- (ii)** Candidates who identified **A** correctly were not always able to give its function clearly. Most knew that it has a protective role but an expanded answer to indicate protection from mechanical damage or in providing support was needed for both marks to be awarded.
- (b)** Most candidates were able to select the correct time periods for the stages of the cow's reproductive cycle. Whilst candidates are not necessarily expected to know and remember these figures, it should be possible to deduce which would be the correct choice for each if candidates understand what the stages are. The correct order was: oestrus cycle - 21 days, duration of heat – 18 hours, gestation – 283 days.
- (c)** This was less well answered than the rest of the question. Many candidates seemed unsure about what colostrum is and other answers were too inaccurate. Answers needed to make clear that it would be produced at the start of lactation or immediately after birth as it is the first milk produced.

Question 5

- (a) An allele is defined as the alternative form of a gene. Few candidates seemed to know this but those who did generally expressed it clearly.
- (b)(i) The only cross from two polled parents that would produce horned offspring would require both parents to be heterozygous, Pp x Pp. This can be shown as follows:

	P	p
P	PP	Pp
p	Pp	pp

Whatever the form the diagram showing the cross takes, it should make clear the parents and gametes plus the genotypes and phenotypes that result. Many candidates lose a mark because they do not indicate the phenotype of the various genotypes.

- (ii) The percentage of calves expected to have horns would be 25%. Candidates who were able to show the cross correctly generally gave the correct answer here.

Question 6

This question was not well answered in general and many candidates seemed to have little knowledge of basic engine function. Those who did, answered the first part of the question well but very few had any knowledge of *centre of gravity*, required in (b).

- (a)(i) As the piston on the diagram was shown as rising, candidates should have been able to deduce that the open valve was the exhaust (outlet) valve and the closed valve was the inlet valve. Many candidates had these two the wrong way round. Candidates should ensure that their labels point to the valves and not to the pipes leading to them. Most candidates identified the spark plug correctly but many labelled the crankshaft or connecting rod as the piston.
- (ii) An open valve with a rising piston should have identified the exhaust stroke. 'Fourth stroke' was not sufficient for a mark, as it does not clearly demonstrate the candidate's understanding.
- (iii) Those candidates who were able to answer the previous parts of the question correctly generally gained marks here. The position of the valves, the rising piston and the expulsion of burnt gases were points looked for.
- (b)(i) Candidates who gained marks here usually drew the vertical line through the centre of gravity on the diagram, showing that it fell outside the wheelbase and demonstrating some grasp of the principle. Candidates who stated that the centre of gravity was too high were awarded one mark but needed to give further explanation to gain a second mark.
- (ii) Some practical suggestion to change design to widen the wheelbase or lower the weight of the tractor was needed here. 'Lower the centre of gravity' was insufficient.

Question 7

- (a) The names of the labelled processes in the water cycle are: **A** – precipitation (an example was accepted), **B** – percolation or infiltration, **C** – evaporation. A large number of candidates found difficulty in correctly identifying or naming **B**.
- (b)(i) There were few candidates who knew that the root hairs increase surface area.
- (ii) Most candidates knew that this process is *osmosis*.
- (iii) There were some good answers, stating that minerals are absorbed by active transport, requiring energy, whereas osmosis is a passive process. A number of answers stated, incorrectly, that minerals are taken up by diffusion and others suggested that water is carried by the xylem whereas minerals are carried in the phloem, an answer that is both incorrect and irrelevant, since it does not relate to uptake but to transport.

Section B

Question 8

This question was a popular choice but many answers lacked accurate detail.

- (a)(i)** The vegetables suggested were usually appropriate but some candidates lost the mark by omitting to include a legume. Care in reading the question is needed.
 - (ii)** Although most candidates knew that legumes can increase nitrates in the soil, there were few answers that gave further detail of how this occurs. Reference to nitrogen fixing bacteria in root nodules could have been made.
 - (iii)** The diagrams illustrating the rotation pattern were generally correct but candidates should remember to include labels for the year and number the beds, so that the meaning is clear. The diagrams could show a leafy crop following the legume, taking advantage of the added nitrates, but statements about deep-rooted crops following or preceding shallow rooted crops were needed, so the candidates knowledge and understanding could be seen.
 - (iv)** Further explanation of reasons for rotation could involve reduction of pest and disease infestations, maintenance of soil fertility as different crops take nutrients in different quantities, all of which reduces inputs and maintains yields. These two final points were not often made.
- (b)** This challenged candidates ability to apply knowledge and to reason and few could make appropriate suggestions. Candidates studying this subject should be aware of the need to use land efficiently as populations, particularly urban populations increase, if sufficient food is to be produced for their needs. A few candidates, however, realised that the land described would otherwise be wasted and gave excellent answers, including reference to cost savings and environmental factors that could result, in relation to reduction of transport and imports.

Question 9

- (a)** Some candidates were a little confused about what constitutes the three types of weathering, but there were many excellent answers where details of methods by which rocks break down were given. Weaker candidates often listed terms such as 'carbonation' or 'hydrolysis', with no indication of whether they had any real understanding of the processes involved. A good answer would briefly describe processes, indicating how it breaks down rock. This was seen to good effect where candidates described physical processes such as heating and cooling, resulting in expansion and contraction, or where plant roots grow in fissures, causing rock to fracture further. It should be noted that the physical effects of wind and water on rock depend on abrasion by particles carried by these agents, not, as many candidates stated, the agents alone.
- (b)** This section was rather less well answered than (a). Apart from adding nutrients candidates had little idea of the importance of humus in soil. Improving texture and, thus, aeration, drainage and water-holding, could have been mentioned. A failure to read the question carefully resulted in lost marks in some cases, as answers were not relevant. Air in soil would be essential for root respiration but not for photosynthesis, as the underground parts do not carry this out. It could be mentioned in relation to water, however, as the plant would have to take in water from the soil. But far more important in this respect would be the role of water in uptake of mineral, as these must be in solution, and a number of candidates made the excellent observation that water is needed for germination.

Question 10

- (a)(i)** Virtually all candidates who attempted this question named an appropriate type of livestock.
- (ii)** A single product was asked for. Pupils should read and follow instructions carefully in questions. The next section depended on the response here. If a list of products was given but the processing of only one was described in the next section, the candidate is not giving a clear answer. Occasionally the product mentioned was not the main product for which an animal is kept but very much a by-product (cattle and leather, for example). Candidates who give a list of products and then a list of processing methods are wasting time on answers that will not gain marks. In both these cases careful reading of the question is needed.

- (iii) Many answers lacked sufficient detail to gain many marks. Candidates should be able to show that they have some knowledge and, ideally, practical experience of the livestock to which they refer. There were some excellent answers, for example those that described the production of meat from poultry, including slaughtering method, how the feathers are removed, cleaning the carcass and means of storage to prevent spoilage. Weaker responses simply listed these, with no detail.
- (b) Most candidates referred to the need for light, warmth and ventilation in livestock housing. Good answers also included the provision of troughs or similar for food and water, structures that allowed easy cleaning and protection from weather and other factors, plus sufficient space. The responses looked for related to the requirements of the housing, not the provisions that the stockman would make, such as the type of food and keeping the livestock house clean.
- (c)(i) It was not clear that all candidates understood the term 'quarantine', but good answers gave a brief explanation and then outlined the importance of ensuring that imported animals do not bring disease into a country or area.
- (ii) This term appeared to be more familiar. More answers included a brief explanation of isolation, with the importance of preventing spread then being explained.

Question 11

This was a popular choice of question but answers often showed little clear knowledge and did not answer the question set.

- (a)(i) A bucket or drum or tank is not a source of water. Water must have come from a source in order to fill these. 'Piped water' or 'tap water' does not describe a source. A pipe or tap could be attached to a variety of sources. If a candidate means a public, mains water supply, which has been treated, then this should be made clear.
- (ii) The uses suggested for some of the water sources were not really appropriate. Candidates should think in terms of quantity needed for a purpose, cleanliness of the supply and whether this is important as well as potential cost.
- (b) An example of a good answer specified the source of the water to be stored, for example rainwater, the method of its collection – guttering on a sloping roof and the means of storing it, such as a tank. There were some very good answers along these lines with alternative examples describing the building of a small dam to create a reservoir for storage. Reasons for storage and conservation were generally well understood, in terms of drought and dry seasons, with the best answers referring to extending growing seasons which could increase revenue, as well as saving water costs.

Question 12

- (a) This was generally well known and well answered. A common error was to confuse the reaction with respiration. Some candidates failed to mention that this process occurs in green plants, commonly in the leaves, although chlorophyll was frequently mentioned. The importance of autotrophs as producers to other living organisms was a point frequently missed. Some answers went into unnecessary detail concerning light and dark reactions, which was not relevant to the question, as it did not address the importance of the process. A description of the process should be confined to sufficient detail only to explain importance.
- (b) This was also well known and well answered. There were good answers, which gave sufficient description of the process to explain its importance. Many responses did not make the point that it is water vapour that is lost from the leaves but the effects of environmental conditions were mentioned in a number of answers. The significance of transpiration, in terms of water moving through the plant and also in cooling, was also frequently seen in answers.
- (c) This was less well understood. The term refers to the transport of carbohydrates manufactured in photosynthesis through the phloem. These substances may move to or from storage organs and examples could have been given more often. The end use of the substances, in all cells, would indicate the importance of the process.

AGRICULTURE

Paper 5038/03

Practical

General comments

The paper produced a full range of marks and all candidates appeared to be able to access the questions, with most candidates completing all parts of the paper. **Question 1** scored highly and appeared to give the candidates the feeling of being able to achieve positively. **Questions 2** and **3** proved to be good discriminators resulting in a wide range of marks.

Some Centres appeared to have taught the content of either **Question 2** or **3** but not both. Candidates need to take care to follow bullet points when instructions are given and take care to use tables for reference. They should understand that tables may show a range of tests of which they may only be asked to test a few.

Comments on specific questions

Question 1

- (a)(i) (ii) The quality of drawings was very variable and not all candidates clearly labelled recognisable parts of the plant. Marks were awarded for an appropriately named part in a relevant area. A mark was awarded for the drawing of a complete plant, and most candidates scored highly on this part of the question.
- (iii) To obtain a mark candidates simply had to relate a reason for a feature. Any plausible reason was awarded a mark, however some candidates clearly did not link the reason to a feature.
- (iv) Many candidates overlooked the word 'other' and so could not be awarded marks.

Question 2

- (i) Candidates could either do, or found great difficulty in carrying out wet tests, and in many cases did not appear confident in carrying out the procedure. By not following the step by step instructions some candidates mixed the tests for ammonium and calcium.
- (ii) Some candidates did not appreciate a negative result and appeared to use random results from the table.

This question produced good differentiation and allowed the more able candidates to demonstrate their practical skills.

Question 3

- (a) Candidates tended to score highly on this question and it was impressive to note that candidates were able to accurately calculate to two decimal places when samples had been weighed on sensitive balances.

A few Centres appeared confused and provided samples that clearly weighed more than 20 g after drying unfortunately this resulted in candidates being unable to access the marks.

- (b)** Most candidates were able to carry out a pH test although some Centres did not produce samples as suggested, some even producing two alkaline samples well above the pH of any soil. Candidates were awarded a mark for a pH ± 1 of the pH given on the Supervisor's report. Some confusion occurred in relating the colour to the pH of the sample. Some of the colours quoted bore no relevance to any pH test indicator. Most candidates understood the reason for using distilled water and marks were awarded if purity was mentioned. A wide range of appropriate answers was given as to how pH levels could be raised. A few candidates wanted to add acid, and in some cases these candidates had scored highly for the rest of the question.