

AGRICULTURE

Paper 5038/01

Paper 1

Key messages

1. Adequate preparation for the examination is essential. This includes learning the facts, possessing the necessary skills of analysis and interpretation, and practising on questions from past papers.
2. Ensure you understand the various question instructions, and answer only what is asked. Irrelevant answers, even though correct in themselves, will not gain credit and will waste your valuable time.
3. Use the published mark schemes to identify the type of answer, both in content and length, required by different questions. Use the allocated number of marks to assist you in constructing your answer.
4. Apportion your time sensibly between questions, and between Sections A and B.

General comments

It was pleasing that almost all candidates followed instructions concerning the number of questions to be answered and in **Section A** candidates' answers were generally relevant to the question set. However, candidates should note that where **one** example (such as an advantage or disadvantage) is required in a question, a correct answer will not be selected from a list given by the candidate, as this does not clearly demonstrate the candidate's knowledge. Candidates must read questions carefully and ensure that their answers fulfil what is asked for. This is particularly important in **Section B**, where many candidates gave answers which strayed from the context of the question. Irrelevant material, though correct in itself, will not gain credit. Part of the reason for this seems to be that many candidates have good general knowledge of the subject but lack detailed practical experience in growing crops or keeping livestock. The syllabus lays emphasis on the practical nature of the subject and candidates would benefit from being able to grow crop plants or keep animals, on however small a scale. Where this is impossible, resources within the area such as farm visits or contact with local growers or livestock farmers would be an advantage.

Comments on specific questions

Section A

Question 1

- (a) Most candidates gave the correct responses: N is nitrogen, P is phosphorus and K is potassium, with only a very few confusing the second two.
- (b) The correct answer was fertiliser **B** as this contained the highest proportion of potassium, required for fruit production. Many candidates seemed unaware of the roles of the different plant nutrients in plant growth and development and consequently made an inappropriate choice.
- (c)
- (i) Many candidates gave the name of a single nutrient, such as nitrogen or phosphorus. A *straight fertiliser* is a substance containing one essential mineral so ammonium sulfate or superphosphate would have been correct answers.
 - (ii) This was generally well answered. Examples of correctly stated advantages of organic material used as fertiliser were low cost, ready availability and soil improvement. Disadvantages included the difficulties of handling or storing bulky organic material and the unknown mineral content.

Question 2

- (a)
- (i) Most candidates were able to suggest an appropriate advantage for galvanised iron as a roofing material, such as its durability or ease of cleaning. A commonly stated disadvantage referred to the fact that it is a poor insulator, although this was often poorly expressed. High cost and lack of availability were also accepted.
 - (ii) Most candidates named a suitable material and gave advantages and disadvantages which were appropriate. The commonest example of an alternative roofing material was thatch of some sort. Advantages for this could include (only one required by the question) insulating properties which maintain a more constant temperature, low cost and ready availability whilst disadvantages might be its lack of durability and tendency to harbour insects and vermin.
- (b) This was less well answered, with rather vague comments about preventing suffocation or disease. Since a building is unlikely to be airtight, suffocation is improbable unless there was extreme overcrowding. As ventilation was mentioned in the question, a reference to air-borne disease alone was not sufficient, since air-borne pathogens could enter through the mesh. Candidates should be aware that ventilation helps to prevent respiratory diseases in animals, as well as discouraging the conditions that would favour fungal infection and parasites.
- (c) This question was generally well answered, with most candidates able to make three suitable suggestions. The question required ways of preventing and controlling disease in animals *kept in the livestock house*, so answers referring to rotational grazing were not relevant in this context. 'Sanitation in the housing' is not sufficient as an answer. Specific actions, such as regular clearing of dung, replacing bedding, cleaning feeders and drinkers, use of disinfectants should be stated.

Question 3

- (a) Candidates did not show a clear understanding of this. A reasonable number of candidates were able to state that the high centre of gravity in **B**, coupled with its narrower wheelbase, would make it more susceptible to overturning but very few explained or used the diagram to demonstrate that this is because a vertical line down from the centre of gravity would fall outside the wheelbase in **B** but within it in **A**.
- (b) This was generally well answered and most candidates noted that the question asked for reasons *other than cost*. Good reasons included lack of availability of tractors, spare parts, fuel and skilled labour as well as the size of the land being worked.
- (c) Ways of reducing erosion were named but often not described or explained, as required by the question. Candidates must ensure that their responses fulfil what the question asks for. For example, contour ploughing should be described as ploughing along, rather than across, the contours of the slope, so that rainfall cannot wash soil down the furrows. In the context of the question, references to windbreaks were not relevant, as preventing erosion by heavy rain was specified. However, the action of (tree) roots to stabilise soil was accepted.

Question 4

- (a)
- (i) The correct answer was 2000 (pests per plot), given correctly by most candidates.
 - (ii) The pest population, after three weeks, was 6 600 on the untreated plot and 600 on the treated plot. Most candidates gave correct answers.
- (b)
- (i) Good answers referred to competition as pest numbers increased, leading to insufficient food to support these numbers or to the life cycle of the pest having run its course, so numbers fall. Reference to the action of natural predators could also have been made.
 - (ii) Candidates should be precise in their descriptions of a pattern seen in a graph. Just stating that there is a fall and then a rise will only receive partial credit. Details, such as the time taken for the fall in numbers, the minimum number reached and then the increase shown

over the following five weeks and the number reached in this time, should be the common correct answer here was that some pests had developed a resistance to the insecticide, producing further generations of resistant organisms.

- (iii) Some candidates could offer no suggestion here but good answers were seen, such as application of further treatment, using a higher concentration or directing the spray more effectively. This is an instance of candidates being required to apply their knowledge and not simply regurgitate learned information, a notion that seems unfamiliar to some candidates.
- (c) The question specified precautions for the operative when using the sprayer, so answers about storage or environmental precautions were not relevant. Candidates must read questions carefully and make sure answers are appropriate. There were many good answers, however, mentioning, for example, protective clothing, use of respirators and avoiding windy conditions.

Question 5

- (a) Most candidates gave the single correct answer.
- (b) Candidates needed to show the cross **Tt x Tt**, giving the genotypes **TT**, **Tt** and **tt**. Most candidates completed this but in order to gain full credit should have explained that **TT** and **Tt** have the phenotype *tall*, whilst **tt** has the phenotype *short*. Many candidates did not make this clear; labelling each genotype with its phenotypic characteristic would be sufficient to show full understanding.
- (c)
 - (i) Whilst most candidates are able to draw correct genetic diagrams, few seem to understand the implications of the predicted results. Since F1 hybrids all have the same genotype, candidates should have realised that uniformity in growth, maturity etc. would have advantages for the farmer in predictability of quality, harvesting and similar factors.
 - (ii) This required a further step in applying the genetic principles already tested; a step too far for most candidates. Those candidates who gained credit were aware that this generation would not be uniform but would show variation, as seen in their genetic diagrams in (b). This could be advantageous in giving some plants resistance to disease or pest attack. Growing F2 plants would also mean that seed from the previous F1 crop could be saved and used, which may have cost implications.

Question 6

- (a)
 - (i) Most candidates labelled the chicken's crop correctly but some confused the gizzard with the proventriculus.
 - (ii) Candidates either knew that the crop contains grit, which helps to break down hard food, or that the gizzard has muscular walls which churn food. These two adaptations work together but few candidates described both.
- (b)
 - (i) Candidates were given sufficient information to identify the ruminant's rumen as the equivalent in function to the caecum in the horse. Although some candidates knew the name of the correct structure (see below), they could not identify it on the diagram.
 - (ii) Candidates familiar with the structure of the ruminant digestive system understood that the structure was the rumen.
 - (iii) There were few full answers here. Most candidates understood that the ruminant would be unable to digest cellulose, as they do not produce an enzyme that can do this. Rather fewer explained the importance of cellulose as a major part of plant matter and a carbohydrate which is an important source of energy. Hence the food value of the animal's diet would be much reduced if cellulose was not digested. The question asked for an explanation and a full answer should include at least some of these points.

Question 7

- (a) The question referred to the metal part of the tool, so answers referring to the wooden handle were not relevant. Most candidates knew that the reason for drying and oiling is to prevent rust. However, an explanation was required by the question, so this would need expansion to explain that water and oxygen (air) are needed for rusting to occur. Cleaning and drying removes water and oiling prevents the contact of moisture and oxygen with the metal.
- (b) A rake would not be used for primary cultivation, as suggested by some candidates. Its role would be to produce a level seed bed with a fine tilth. A complete answer would then explain that the resulting fine texture of the soil would ensure that seeds are in close proximity to the soil particles and, therefore to soil moisture, needed for germination. Many candidates know the processes in producing a seed bed but are unaware of the reasons for the actions.

Section B

Question 8

This question was generally well answered and a popular choice for candidates but many answers included irrelevant material. Candidates must ensure that they are answering the question set, as irrelevant material will not gain credit and may cost the candidate valuable time which should be spent on other questions.

- (a)
- (i) All candidates attempting this question remembered to state the name of a crop and many demonstrated good knowledge of this crop.
 - (ii) A description of soil preparation was asked for. Too many candidates ignored this and described planting distances, irrigation, pest control and fertiliser application for their chosen crop. Whilst much of this was correct information, it did not answer the question set.
- (b)
- (i) Candidates understood the need for weed control, with most able to explain problems of competition, harbouring pests and diseases and ultimately reduced yield. Other good points, less often stated, were the poisonous nature of some weeds, the contamination of crops, reducing their value and the difficulties that weeds may present in harvesting.
 - (ii) Methods of weed control were well known and most candidates were able to describe a variety of these, mechanical, cultural and chemical. The correct term used for a chemical that kills weeds is *herbicide* and should be used. A few candidates were able to name a specific herbicide but some gave names of chemicals which are fungicides or insecticides.

Question 9

- (a)
- (i) A full answer needed reference to growing more than one crop and growing the crops in sequence on the land. Many candidates explained clearly by using a simple diagram of the rotation, demonstrating their understanding of the principle.
 - (ii) Mixed farming was generally understood, answers explaining that it involved both arable and livestock on one farm.
 - (iii) This was a little less well known. Some candidates did not appreciate that the term refers to arable farming and is the growing of the same crop in successive seasons on a piece of land. Some answers tried to relate it to livestock.
- (b)
- (i) There were some good and very full answers about the advantages of crop rotation, referring to nutrient use, the effects on life cycles of pests and effects on soil borne disease. A common error was to state that rotation, in itself, will improve nutrient status. This is only the case if a legume is included in the rotation (mentioned in good answers). Efficient nutrient use, where crops of different rooting depths are grown in succession, was a good point but candidates could have taken this a little further by explaining that it could help avoid the formation of a soil pan and reduce the deterioration of soil structure.

- (ii) The advantages of mixed farming were also well described, with the spread of risk and the cost effectiveness of using animal waste for fertiliser and crop residues as animal feed being the commonest points made. The best answers also mentioned that it would use land more effectively and economically – some land may not be suitable for crops but could support livestock, for example.

Question 10

This was a popular question but many candidates lost their way after the first part because they forgot that the context of the question was pasture for grazing.

- (a)
- (i) Candidates answered here in the context of the question with good answers referring to control of stocking rate. This then needed to be developed to explain how overstocking would cause the progressive loss of good grasses, as the question asked for explanations. Other good points made (but not always developed) were the need for irrigation and use of fertilisers. Few candidates mentioned re-seeding with improved grasses.
- (ii) Good answers explained that the control of grazing would avoid bare soil which would be easily eroded. Many candidates then began to describe means of preventing erosion that would be appropriate in arable land but were not appropriate for pasture. This is irrelevant material so does not gain credit.
- (iii) Again, good answers pointed out that overgrazed pasture would have bare patches which would allow the establishment of weeds so control of stocking rate and overgrazing is essential. The dangers of weeds to livestock, such as toxicity or poor quality nutrition, were also mentioned, together with appropriate methods of weed control. Irrelevant material described the effect of weeds on crops and referred to methods of control appropriate to those circumstances but not applicable in pasture.
- (b) The focus of the question was pasture usage and its improvement when fencing is used, so answers referring to security, disease control etc. were not relevant. There were good answers describing controlled grazing techniques, such as rotational grazing, with the helpful use of diagrams. Full answers included the reasons why this improves pasture usage, such as preventing overgrazing and selective grazing, the facility for reserving some pasture for dry season use and enabling pasture to recover.

Question 11

- (a)
- (i) This was generally well answered with candidates showing knowledge of the importance of root hairs and the process of osmosis. Use of the term *water potential* would make descriptions clearer and, ideally, candidates should now use the term *partially permeable* rather than *semi-permeable*.
- (ii) Fewer candidates showed much knowledge of mineral salt uptake. Most understood that minerals must be in solution but few knew that the process was an active one, against a concentration gradient and requiring energy.
- (b) Most answers referred to the importance of soil cultivation and good answers developed this to explain that this improves aeration and drainage. Reference could have been made to improved root respiration, which would also be facilitated by improving soil texture with organic matter. Mention of crop rotation was a valid point, as was use of suitable spacing of plants and application of appropriate phosphate fertilisers.

Question 12

In this question many candidates again ignored the context and wrote irrelevant answers, especially in (b).

- (a)
- (i) All candidates remembered to state the type of livestock that they had chosen.

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- (ii) The question asked for the *main* product. Many answers gave a list, including incidental products, such as leather or horns in the case of cattle. Correct answers should be selected from a list as the candidate is not clearly demonstrating their knowledge. In the case of poultry, if layers are specified, the main product is not meat, likewise for broilers the main product is not eggs.
- (iii) There was little convincing detail here. There should have been descriptions of storage conditions, of processing (e.g. sterilisation or pasteurisation of milk) and grading and packaging, where appropriate.
- (b) The question was about records kept for a breeding programme, not general livestock records. A time scale (from one mating to the next) was also specified. Too many answers described a general farm diary. Candidates who answered well realised that the records would be significant in terms of selection for future breeding, so identities of the parents and numbers, health and quality of offspring as well as details about problems during gestation and birth would be important. Other points, such as dates of mating, birth and weaning would be significant. Rations during gestation could be noted but more general points about rations, routine treatments, cleaning of housing etc. were not relevant.

AGRICULTURE

Paper 5038/03
Practical

Key messages

1. Adequate preparation for the examination is essential. This includes learning the facts, possessing the necessary practical skills, and developing these skills with reference to past examination papers.
2. Work methodically and carefully, and ensure you answer all parts of the question.
3. Answer only what is asked. Irrelevant answers, even though correct in themselves, will not gain credit and will waste your valuable time.
4. Use the published mark schemes to identify the type of answer, both in content and length, required by different questions. Use the allocated number of marks to assist you in constructing your answer.
5. Apportion your time sensibly between questions.
6. When using colour tests, allow time for the colours to develop before writing your answers.

General comments

Candidates appeared to cope well with the demands of the paper. All candidates attempted all three questions with even the weakest candidates demonstrating sound practical skills and competence, and answers to questions were sound and well reasoned.

Comments on specific questions

Question 1

- (a) (i) Candidates appeared competent at carrying out pH tests, although some candidates may have attempted to describe the colour of the solution before allowing the tubes to settle.
- (ii) Candidates gave good reasons for selecting an alkaline soil although some only gave one reason which tended to be vague.
- (b) (i) Candidates gave good descriptions of the soil samples although in a few cases it appeared that candidates had mixed up the labels since the descriptions were very good but for one of the other samples.
- (ii) Candidates matched soils appropriately; most managed to match all three for one mark.

Question 2

Wet tests have previously been poorly attempted by many Centres. Candidates appear to have worked through these tests logically and carefully, with many candidates achieving full marks.

- (a) Accurate and careful observations were made for AS7 and AS8.
- (b) Observations were full, accurate and detailed.
- (c) Conclusions drawn from the tests were sometimes confused, in particular, when an element was absent they attempted to find another reason. However, most candidates performed well.

Question 3

- (a) Candidates all seemed to understand the features and adaptations of a wind pollinated flower, although some candidates only described one feature or failed to develop a second point clearly.
- (b)(i) Some candidates appeared to simply dissect the flower in half and did not remove as separate parts a sepal, petal and stamen. The quality of diagrams was good with most candidates producing large, clear and well labelled structures. Some candidates produced drawings of exceptionally high quality with detailed and annotated labels. Although beyond the requirements of the question, these were a pleasure to see.
- (ii) This proved to be the most demanding task, with a few candidates simply cutting the ovary in half. However, most did successfully show a longitudinal section and were able to label the ovary and ovule. The scale was not always included but was generally accurate and appropriately drawn.

Centres' completion of the Supervisor's Report was most helpful. Where Centres had difficulty in providing the exact requirements the mark scheme was able to be adapted for the replacements described.