

AGRICULTURE

Paper 5038/11
Paper 11

Key messages

- Candidates should be reminded to check carefully that they have given an answer for all **Section A** questions.
- Candidates should take note of the mark allocation for each question and plan their answers accordingly.

General comments

There were many excellent responses to the questions and candidates demonstrated that they had sufficient time to complete the paper. Candidates showed their practical experience of agriculture in several cases. The examination also tested data response. Almost all candidates attempted these questions and stronger candidates dealt with these effectively.

In many cases, there were answers which were detailed and well organised in **Section B**.

Comments on specific questions

Section A

Question 1

- (a) The majority of candidates described monoculture well.
- (b) (i) Most candidates correctly identified potential benefits of monoculture. Weaker candidates should take care to qualify some general answers as unqualified they may be insufficient.
- (ii) Many candidates correctly identified a wide range of potential problems caused by monoculture.

Question 2

- (a) This question was answered well by most candidates.
- (b) This question was answered well by stronger candidates.
- (c) (i) Some candidates limited responses to describing the effect of excess heat on soil water rather than on seedling growth. Stronger candidates correctly described specific effects with accurate terminology.
- (ii) Many candidates showed some knowledge how to protect seedlings from the effects of excess heat and stronger candidates explained how this method would work. Some weaker candidates listed methods.
- (d) This question was very well answered and most candidates suggested examples of the damage which frost can cause to crops.

Question 3

- (a) Many candidates correctly completed the paragraph describing how water is absorbed from the soil, moves up through, and leaves a plant.
- (b) This question was generally answered well. Some weaker candidates did not explain how these factors cause the effects.
- (c) Stronger candidates answered this question well. Clear, concise answers effectively describing how excess water affects root respiration were regularly seen. These answers were typically appropriately descriptive, identifying key processes and features.

Question 4

- (a) This question was answered very well by many candidates. Some weaker candidates described irrelevant aspects of crop husbandry.
- (b) (i) Most candidates answered well and correctly identified at least one sign of readiness to harvest for a named crop. A small number of candidates suggested signs of readiness which were not relevant to the crop example cited.
(ii) Many good answers explained the reasons for keeping a harvested crop in cool, dry conditions.
- (c) Candidates responses gave a wide variety of crops and appropriate products. Very occasionally, for weaker candidates, the crop and product were unrelated.

Question 5

- (a) (i) This question was answered well by almost all candidates, who correctly identified the highest level of pest damage from the presented data.
(ii) This question was answered well by almost all candidates, who correctly identified the crop with the highest total percentage loss to pests from the presented data.
- (b) (i) Many candidates correctly identified a wide range of boring pests. The most common error was to give other types of pest.
(ii) Candidates included a range of impacts. Some weaker candidates described inappropriate types of damage.
- (c) Most candidates gave good answers identifying a range of reasons why some farmers do not use chemical methods of pest control typically including a range of appropriately qualified statements.

Question 6

- (a) Many candidates described appropriate examples. For weaker candidates some rotations did not cover a sufficient number of years.
- (b) Many candidates correctly explained what is meant by the term. Some weaker candidates described a mixture of fertilisers instead. A wide range of correct examples of compound fertilisers were suggested by stronger candidates.
- (c) Most candidates constructed and labelled axes with consistent scales and displayed the unit correctly. Many went on to successfully plot points accurately and construct an appropriate line of best fit. The most common mistake was to draw incorrect axes scales.

Question 7

- (a) This question was very well answered by most candidates, who successfully described three possible further signs of livestock ill-health. The most common issue for weaker candidates was to repeat 'runny faeces'.
- (b) Most candidates correctly identified two ways in which diseases are spread between farm animals.

- (c) This question was very well answered by most candidates, who correctly identified a notifiable disease as one which must be reported to the authorities. One issue was to describe this as an easily observed disease.
- (d) Many candidates answered this question correctly, describing at least three ways in which good livestock hygiene can be maintained.

Question 8

- (a) Stronger candidates correctly identified the correct position of the organs of the ruminant digestive system.
- (b) Most candidates described the functions well. Some weaker candidates confused the functions of the intestines or left answers too vague.

Question 9

- (a) This question was correctly answered by the strongest candidates, who accurately stated the meaning of the term recessive. A small number of weaker candidates described dominant instead.
- (b) (i) Many candidates answered this question well, showing a cross between heterozygous parents incorporating correct parent genotypes, parent gametes, offspring genotypes and linked offspring phenotypes. Some candidates incorrectly linked offspring phenotype and genotype.
 - (ii) Stronger candidates identified the correct expected ratio.
- (c) Many candidates made appropriate suggestions about how this could affect profits.
- (d) Most candidates correctly explained the identification of desirable characteristics, the crossing of selected parents and/or the continuation of this process over a number of generations.

Section B

Question 10

- (a) Stronger candidates effectively described how both climate and topography affect the choice of farming practice. Some candidates described climate and topographical issues without linking these to agricultural practices.
- (b) This question was answered well by some candidates. Many mentioned the potential reduction in the land area available for farming. Stronger candidates described further, including how land use could change to meet increased levels of demand for agricultural products.
- (c) Many candidates gave detailed answers explaining how soil erosion on sloping land could be minimised. These answers were often worthy of full credit, demonstrating good understanding.

Question 11

- (a) Most candidates answered this question very well. Many candidates accurately describing the inputs and products of photosynthesis.
- (b) This question was answered well by many candidates. Technical terms were used well by many. A small number of candidates incorrectly described gas exchange in plant roots.
- (c) Stronger candidates answered this question very well. There were many clear answers effectively describing how the carbohydrates produced during photosynthesis are transported around the plants and to storage organs.

Question 12

- (a) Many candidates gave detailed answers covering a range of possible causes.

- (b) This question was answered well by many candidates. Stronger candidates clearly described methods to test soil pH on a field scale. Candidates were often able to show their practical experience in their responses.
- (c) The strongest candidates gave good answers explaining how crops absorb mineral salts from the soil. Many candidates explained the role of active transport and the associated energy requirements.

Question 13

- (a) Most candidates answered this question very well. Some weaker candidates confused this with asexual reproduction.
- (b) Many candidates identified a range of the parts of a bean flower. Stronger candidates included functions often earning full credit. Some weak candidates described seeds.
- (c) Generally this question was very well answered, especially by stronger candidates. Stronger candidates included good explanations of the implications of genetic variation.

Question 14

- (a) Many candidates clearly described the features of the female reproductive system. Key terms were sometimes confused by weaker candidates.
- (b) Many candidates gave clear answers accurately describing the process of birth for a mammalian farm animal. These tended to effectively describe the behaviours well. Some very strong candidates showed their practical farming experience here.
- (c) Stronger candidates correctly identified the breadth of care needed by a mammalian farm animal between birth and weaning. The most common issue for weaker candidates was to describe the care of adult animals only.

AGRICULTURE

Paper 5038/12
Paper 12

Key messages

- Candidates should be reminded to check carefully that they have given an answer for all **Section A** questions.
- Candidates should take note of the mark allocation for each question and plan their answers accordingly.

General comments

There were some very good responses to the questions and candidates demonstrated that they had sufficient time to complete the paper. Some candidates showed aspects of their practical experience in their answers. The examination also tested data response. Almost all candidates attempted these questions and stronger candidates dealt with these effectively.

In some cases, there were answers which were detailed and well organised in **Section B**.

Comments on specific questions

Section A

Question 1

- (a) Many candidates identified the example of biological weathering. Weaker candidates showed confusion over the term biological weathering.
- (b) (i) This question was answered well with candidates correctly applying the pie chart key.
(ii) This question was answered well by many candidates.
- (c) (i) This question was answered well by most candidates, with a wide variety of responses seen.
(ii) Stronger candidates answered this question well. Weaker candidates typically showed a lack of knowledge. Some candidates described the general effects on the soil itself rather than linking to effects on soil organisms.

Question 2

- (a) This question was only answered well by the strong candidates. These candidates demonstrated a good understanding of the term.
- (b) This question was typically answered well. Most candidates described possible benefits well showing a good ability to apply knowledge to this example. Problems were also often effectively explained by many candidates.
- (c) The principle of supply and demand was explained by stronger candidates. Weaker candidates typically did not explain or link ideas.

Question 3

- (a) Many candidates correctly identified the letter. There was some confusion between products and reactants by weaker candidates.
- (b) This question was answered well by the majority of candidates. The most common issue for weaker candidates was to confuse translocation and transpiration.
- (c) Stronger candidates answered this question well. There were many clear and detailed answers effectively describing how the carbohydrate produced during photosynthesis can be stored.

Question 4

- (a) This question was answered well by stronger candidates who showed good knowledge of maize. Weaker candidates produced some responses that were too vague for credit.
- (b) Most candidates answered well and succinctly.
- (c) This question was answered well by many candidates, who used key terms with care throughout detailed descriptions. Some weaker responses confused fertilisation and fertiliser.

Question 5

- (a) This question was answered well by many candidates, who correctly described both the planting material and how this should be planted. Practical experience of candidates was used well in some responses.
- (b) This question was answered well by most candidates.
- (c) Competition for the resources needed was often cited. Fewer candidates went on to explain an impact of this competition.

Question 6

- (a) (i) Some answers described a wide range of appropriate safety precautions. Weaker candidates included precautions for use rather than storage.
- (ii) This question was answered well by the majority of candidates. Stronger candidates showed detailed knowledge concerning practical implications of farm chemicals.
- (b) Many candidates correctly explained the need to, for example, avoid spraying on windy and rainy days and the potentially negative impact of such actions. Some candidates provided an extended list of actions without explanation.

Question 7

- (a) This question was answered well by stronger candidates. Some weaker candidates selected the wrong data from the table.
- (b) Stronger candidates made a suitable range of suggestions showing their practical experience and ability to apply their knowledge in many cases.
- (c) Many candidates correctly identified a wide range of relevant hand tools. Some weaker candidates included materials such as nails.
- (d) Many candidates answered this question well and showed good application of knowledge.

Question 8

- (a) (i) Stronger candidates correctly identified the position of the organs of the non-ruminant digestive system. Some responses gave the organs in inappropriate places.
- (ii) Most candidates identified the correct organ.

- (b) Some weaker candidates gave answers relating to ruminant digestion. Stronger candidates typically described relevant processes well.
- (c) Most candidates demonstrated a good understanding of the role of enzymes. Some explanations used appropriately detailed terms well.

Question 9

- (a) This question was correctly answered by only the strongest candidates. Some candidates referred to dominant as being the stronger gene. A small number of candidates could correctly describe an allele.
- (b)(i) The strongest candidates answered this question well, showing a cross between heterozygous parents and clear outcomes. Strong candidates correctly and clearly linked offspring phenotype to genotype.
 - (ii) This question was answered very well by most candidates who typically suggested a wide range of positive reasons for farmers.
- (c)(i) The stronger candidates typically described the use of genetic modification well.
 - (ii) This question was correctly answered only by the strongest candidates. Some very weak candidates instead suggested advantages of the technique.

Section B

Question 10

- (a) Most candidates effectively described the features of intensive grazing. Weaker candidates did not seem to know the term.
- (b) This question was answered well by many candidates. Procedures for collecting water were generally described in more detail than those for supplying water to a pasture. In stronger responses these included pipes and irrigation equipment.
- (c) Many candidates gave detailed answers. Stronger candidates explained how rotational grazing controls pasture depletion, minimises pasture wastage and enables pasture regrowth.

Question 11

- (a) Most candidates answered this question well and demonstrated a clear understanding of how systemic pesticides work. An issue for some weaker candidates was to instead describe a selective pesticide.
- (b) This question was answered very well by many candidates. Many candidates correctly identified suitable pests and gave clear descriptions of potentially harmful crop effects.
- (c) Many candidates answered this question well and accurately explained a wide variety of methods including biological and cultural techniques.

Question 12

- (a) Many candidates gave detailed answers which gained full credit.
- (b) The stronger candidates described detailed ways that waterlogged soil can be drained. The most common issue for weaker candidates was to incorrectly suggest irrigation as a way to drain the soil.
- (c) Many candidates gave good answers explaining a range of potential impacts on both crop and animal farming businesses of a water shortage. The most effective responses clearly linked to specific difficulties within a farming business.

Question 13

- (a) Some candidates answered this question well and effectively described how plant breeding can be used to develop resistant and less susceptible varieties.
- (b) Many of the candidates selecting this question correctly identified the means and symptoms of fungal infection of crops.
- (c) Generally, this question was very well answered when chosen. Candidates identified and explained a wide range of ways that plant fungal disease can be prevented and/or controlled. Fewer candidates were able to correctly name a relevant plant fungal disease.

Question 14

- (a) This question was answered well by many candidates. Stronger candidates clearly described mixed farming.
- (b) Answers accurately describing the disadvantages of monoculture were more common than those describing the advantages, some of which were left insufficiently qualified and not described.
- (c) Stronger candidates correctly identified a range of potential impacts of compost on soil structure and fertility. Some very weak candidates did not seem to know the word compost, or they applied it incorrectly.

AGRICULTURE

Paper 5038/02
Coursework

Key messages

Centres should ensure they give candidates sufficient time to carry out the work and incorporate it into the overall planning for delivering both theory and practical work through the course.

Prior to marking, centres should review the marking criteria for the coursework and should also read the grade level descriptors for the key grades. This will help to ensure that the marking criteria are addressed in sufficient depth and meet the level of demand required.

General comments

The general standard of work this year was good and many centres incorporated photographic evidence. Many centres also submitted video clips with some excellent candidate commentaries, which acted as other evidence to support the centres' marking.

Generally investigations showed some fascinating and original investigative work. The enthusiasm of candidates and their hard work was often very evident, with many candidates demonstrating excellent practical skills that used a suitable scientific approach.

The strongest portfolios were produced when candidates fully discussed their findings and explained them in a way which did not assume the readers of the portfolio were familiar with the subject topics.

Unfortunately, some centres submitted investigative projects which were not individual and were teaching group based activities. The marking criteria were addressed only by very simple statements and lacked discussion and explanation. The centre then sometimes awarded high marks for each of the marking criteria unsupported by evidence to match the level of demand appropriate to the candidates' ability.

In a few cases the centre did not adhere to the marking criteria for coursework and failed to submit adequate evidence for the practical exercises. The evidence from these centres was often superficial and did not provide sufficient information to support the marks awarded. In these cases, investigations sometimes appeared rushed and superficial and the topics chosen were of a low level of demand. It is important to ensure work is original to individual candidates, that candidates are offered a wide range of exercises covering different syllabus sections and that investigation topic are equally varied.

Centres need to allocate sufficient time to deliver the practical aspect of the syllabus and to ensure practical and investigative skills have been taught and developed before embarking on producing the coursework.

Comments on specific marking criteria

Practical exercises

Most centres carried out an appropriate range of practical exercises. The practical skills were also often seen within in the candidate investigative projects.

Evidence for practical skill ability was strong with most work demonstrating high levels of competence.

Many candidates produced detailed records throughout the course with constructive critical reflections incorporating annotated photographs and video clips. Centres produced fascinating and informative short video clips and annotated commentary or additional word documents in support of the video clips. PowerPoint presentations with critical task reflection also proved popular and were most effective in allowing

candidates to illustrate and explain each exercise. The video clips should be identifiable clips as PowerPoint links do not work in all cases if not properly embedded.

Centres who offered four simple skills needed to be aware that practical exercises need to have sufficient demand to gain full credit. Simple tasks like clearing ground or digging a plot are not suitable for high marks unless linked to candidates identifying problems and resolution of the problems encountered which are described in sufficient detail. Tasks need to allow candidates to fully demonstrate their skill ability and need to be made more demanding for stronger candidates. A good example could be to clear and cultivate a plot of ground and carry out the cultivation necessary to leave the land to weather prior to preparing a seed bed, with the follow-on exercise being preparing a plot to sow a crop of beans. Centres also need to choose exercises that make best use of their local environmental situation.

There were some good examples where candidates selected some scientific exercises that incorporated some laboratory tests along with cultivation. For example, checking the pH of the plot and taking any action needed to amend the pH for a specific crop (if no action is required, candidates should give a reason as to why not), or carrying out a range of soil tests to identify the type of soil and its moisture content. This approach makes more use of different skills and enhances the quality of syllabus coverage.

Practical exercises must be marked against the criteria and full marks only awarded for excellent work which is well evidenced. A few centres awarded high marks with little or no evidence to support or justify the marks. The awarding of the highest marks should be for candidates of exceptional skill and ability producing practical outcomes which fully meet all the marking criteria statements and match the level of demand.

Practical Investigation.

1. The selection of relevant questions (hypothesis) for the investigation.

Most candidates produced a hypothesis but unfortunately they were sometimes not fully developed, justified or explained in context.

Candidates need to relate their hypothesis to their own research.

Centres should annotate candidates' work to indicate the amount of support given in forming the hypothesis to make this clear to moderators. Only fully independent selection and the formation of an appropriate challenging hypothesis should be awarded full credit.

The strongest candidates collected a good range of supportive background information and used this to support the formation of their hypothesis. They used the underlying agricultural principles and related scientific knowledge that would underpin their investigations. Candidates should discuss the research and reasons for arriving at their chosen hypothesis fully. This criteria is best covered when candidates have been given sufficient time to plan and prepare for their investigation.

2. The planning of the investigation and the principles on which it is based.

Planning was reasonable this year, and the strongest candidates clearly linked their plan to their hypothesis and supported this with evidence suitably referenced.

The plan needs to be clearly explained to enable the reader to replicate the investigation in a scientific way. It should incorporate the necessary steps required to carry out the investigation and the resources required including the time scale needed for the investigation.

Some of the strongest candidates referred to their background research and hypothesis and used this to develop a suitable plan for carrying out their investigation. Where amendments to the plan were required these candidates explained and justified their modifications of the plan.

Some candidates were able to gain access to livestock or land to carry out their individual practical investigation.

3. The handling of evidence.

The data collected was sometimes quite simple and only just sufficient to produce a simple analysis of the results. If candidates are to produce meaningful data, they need to have collected a comprehensive range of results which were taken throughout the investigation. Simply producing a bar chart of final crop yield is insufficient to access the higher marks. The results need to be recorded in detail and candidates need to indicate any specific procedures which were used to make the collection of accurate data. They should take care to use an appropriate and reliable sample size. Problems encountered should be indicated and discussed in the conclusion.

Presentation of the data was sometimes simplistic. The strongest candidates incorporated more than one method of analysing the outcome of their investigation. Tables and charts should be clearly labelled using appropriate units and conventions. Graphs need to be annotated to ensure the reader can understand what is being shown.

The strongest candidates annotated their graphs and charts to identify anomalies or relevant points of interest such as environmental events beyond their control, e.g. storms, droughts, wild animals etc. This approach showed that investigative agriculture often presents variables beyond candidates' control yet needs to be considered when presenting and interpreting data.

4. The ability to make deductions from the evidence or the data acquired.

Candidates needed to do more than simply state or describe the results they obtained. The strongest candidates fully explained the reasons for their results and their conclusions related to the data and outcomes of their investigation. Candidates needed to draw conclusions and explain and discuss their results and outcomes in detail.

5. The ability to recognise limitations of the investigation.

The strongest candidates took care to fully explain how future amendments or alterations could possibly have overcome problems which they encountered. Some candidates made general statements which were not explained sufficiently to meet the marking criteria. More detail and clear explanation was needed to ensure candidates fully access the available marks.

6. Description of investigation, presentation, layout and originality (candidate's own work).

Most centres marked this section accurately and in general the investigations were reasonably well presented. It was evident that across the ability range that candidates were motivated and produced valuable coursework enhancing their understanding of the theory. Some of the strongest work demonstrated an appreciation of the importance of the practical aspects of work carried out by the candidates in agriculture.

When choosing practical exercises or topics for investigation it is important to identify the level of demand presented by the topic. Stronger candidates need to be advised to devise investigations with sufficient complexity to allow them to produce work which will access the top bands of the marking criteria.

Candidates should present their work using appropriate sub-headings and making full use of diagrams/charts. These need to be fully explained and annotated, referenced and linked to the discussion in producing deductions and conclusions.

In some cases photographs and local maps greatly improved the reports making it easier to see and understand the work undertaken and showing the outcomes candidates achieved. Work was generally supported with annotated photographs, which were often given a specific heading and discussed in detail.