



Coimisiún na Scrúduithe Stáit  
State Examinations Commission

Leaving Certificate Examination 2023

**Agricultural Science**  
Individual Investigative Study  
Coursework Brief  
Common Level

100 marks

## Information for candidates, teachers and schools

- A new specification for Leaving Certificate Agricultural Science was introduced in September 2019 and was examined for the first time in 2021.
- The examination comprises two components: a written paper and a coursework component. The coursework component consists of a report on an Individual Investigative Study and is worth 100 marks, which is 25% of the overall marks for Leaving Certificate Agricultural Science. The remaining 300 marks (75%) are for the final written examination.
- The State Examinations Commission will annually issue a coursework brief for the Individual Investigative Study, shortly after the candidates begin Year 1 of the course. Candidates will submit their reports to their teachers towards the end of Year 2 of the course, by a date specified by the Commission. Schools will subsequently submit the reports to the Commission.
- The brief is thematic, is related to a topic of agricultural significance, and is common to Ordinary Level and Higher Level. All candidates (Ordinary Level and Higher Level) are required to carry out an investigative study in response to the brief, and to do so in the context of a specific agricultural enterprise. Candidates complete and submit a report on the investigative study, in the specified format.
- Candidates are not required to nominate their examination level at the time of submission of their report on the Individual Investigative Study.
- The report on the Individual Investigative Study must be presented in the digital completion booklet provided by the State Examinations Commission. This will be available for download in due course from [www.examinations.ie](http://www.examinations.ie).
- The school authority should retain securely a digital copy of each candidate's report until after results have issued and all appeal processes have been completed. This includes the reports of candidates who have not appealed.
- The planning, execution, and reporting of the Individual Investigative Study must be completed under the supervision of the class teacher in accordance with the conditions set out by the State Examinations Commission in Circulars S69 04 and S68 08, which are available at [www.examinations.ie](http://www.examinations.ie). The report must be the candidates' own individual work, giving a true and accurate account of investigative activities that they themselves have carried out. Each report is authenticated by the candidate, the teacher, and the school management authorities. Where a report cannot be authenticated as a candidate's own work, (because, for instance, the candidate has not facilitated adequate supervision by the teacher through ongoing engagement and oversight) it will not be accepted for assessment. This will result in the forfeit of the marks associated with this examination component. Any incidence of suspected copying, improper assistance from another party, plagiarism or procurement of work prepared by another party will be thoroughly investigated.

Where a candidate is carrying out work related to their Individual Investigative Study outside of the classroom, such as experimental work that is field-based rather than laboratory-based, and is taking place at a location that the teacher does not have ready access to, it is particularly important for both teacher and candidate to retain records of the candidate's regular engagement with the teacher to facilitate discussion and supervision of the work, and subsequent authentication of the work presented. Planning and development of this work should take place in Agricultural Science class under the supervision of the Agricultural Science teacher. The completion of the report should likewise be adequately monitored by the teacher.

## Instructions for candidates

- The investigative study that you undertake must be your own individual work. While you can seek advice from your teacher and others in guiding you, it is up to you to select the topic and to develop your own research question. You must decide what experiments and investigations are necessary to address your research question and then plan and carry these out yourself. When selecting a specific agricultural enterprise as the context for your study, you should select one that you will have sufficient access to over the course of your studies in order to carry out any experiments or investigative activities that can only meaningfully be carried out there.
- Like the investigative activities themselves, the report must also be your own individual work. Both the investigation and the report are authenticated by you, your teacher, and the management authority of your school. Authentication is an important part of how the State Examinations Commission ensures fairness to all candidates in the assessment of coursework. It is your responsibility to ensure that your teacher has adequate oversight of the planning and carrying out of the research activities that you undertake and the writing of the report, so that he or she can confirm that it has all been your own unaided work.
- If your teacher cannot confirm that the report is your own work and that it is a faithful account of activities that you carried out under his or her supervision, it will not be accepted for assessment by the State Examinations Commission. In that case, you will forfeit the marks for this component of the examination.
- You should keep all notes in relation to your coursework (such as records of the planning, research and execution of the study). You should retain such material until the appeals process has concluded. Such material plays an ongoing role in your teacher's oversight of your work and you may also need to make it available to staff of the State Examinations Commission if the authenticity of your work is called into question.
- All secondary sources used (books, journals, web-sites, and so on) must be duly acknowledged. If you include material copied directly from the Internet or from other sources and do not identify it clearly as such, this will be regarded as plagiarism.
- Responsibility for complying with these examination requirements rests with you, the candidate. If you do not fulfil the requirements, your teacher and the school will have no choice but to bring this to the attention of the State Examinations Commission.
- Your report must be completed using the digital completion booklet provided by the State Examinations Commission. Your report should not exceed 2500 words (including titles of diagrams and other images, but excluding the list of references at the end of the report). The booklet gives a suggested range for the number of words for each stage of the report, and these are also listed in the guidance on the report structure below. Penalties will not apply for exceeding the word count in individual sections, but may apply if you exceed the overall total of 2500 words.
- Do not physically attach any other material or enclose it with your booklet. Examiners will mark the digital version of the booklet only and not any other material attached or enclosed.

- You must submit your final report to your teacher for onward transmission to the State Examinations Commission, on or before **21 April 2023**. Your report should be submitted using the digital booklet supplied by the State Examination Commission for the 2023 examinations. Information in relation to file naming and submission will issue in advance of the submission date in 2023. It is your responsibility to ensure that all electronic material submitted is free from viruses, so that the file can be opened for assessment.
- When your work is being marked, assessment criteria will be applied, and marks will be allocated to the various sections of the report as outlined below in the section *Report structure and mark allocations*.
- Any case of suspected copying, plagiarism, improper assistance, or procurement of work prepared by another party will be thoroughly investigated. These actions are breaches of examination rules and attract the penalties described in the Rules and Programme for Secondary Schools. The penalties include: loss of the marks for the coursework, loss of the subject, loss of the entire examination in all subjects, being debarred from the Certificate Examination in subsequent years. There may be serious consequences for any person who provides you with inappropriate assistance, as this is an offence under the Education Act 1998.

## Thematic brief 2023

The theme for the 2023 brief is “**Exploring nutrition and nutrients - the importance to Irish Agriculture of their effective use and management**”.

Use the theme, “**Exploring nutrition and nutrients - the importance to Irish Agriculture of their effective use and management**”, as a “lens” to look through while undertaking the learning contained in the specification’s strands and crosscutting themes.

**In your Individual Investigative Study, you should do the following;**

- Choose a specific agricultural enterprise<sup>1</sup> and a topic relevant to that enterprise and to the theme.
- Develop a research question that is related to the theme and which you would like to investigate in the context of the chosen enterprise.
- Carry out initial research on the topic as it relates to the theme.
- In the context of your chosen enterprise, investigate the topic by carrying out one or more experiments, supplemented, if appropriate, by other investigative activities. Carry out specific scientific investigation(s) of the topic. This will involve developing and testing specific hypothesis and drawing conclusions based on evidence gathered.
- At least one of the experiments you carry out must involve gathering and processing data.
- Document and present your work in the digital coursework booklet provided by the State Examinations Commission for marking.

Submit the final report to your teacher on or before **21 April 2023**. You are not allowed to make any changes to it after that date.

**Some references to get you started in your research – this list is not exhaustive.**

- *Water quality in 2020, an indicators report*, published by the Environmental Protection Agency (June 2021). <https://www.epa.ie/publications/monitoring-assessment/freshwater-marine/water-quality-in-2020.php>
- Shore, M. *Nutrient Delivery to Streams* (2017) -, published by Teagasc. <https://www.teagasc.ie/environment/water-quality/agricultural-catchments/research/nutrient-delivery-to-streams/>
- *Why is it important to protect our soil?* (2018), Agriland. <https://www.agriland.ie/farming-news/why-is-it-important-to-protect-our-soil/>
- Mockler *et.al.* *Sources of nitrogen and phosphorus emissions to Irish rivers and coastal waters: Estimates from a nutrient load apportionment framework*. Science of the Total Environment Vol 601–602, pages 326–339, (2017). <https://www.sciencedirect.com/science/article/pii/S0048969717312937>
- *Multi-species grassland swards* (2018), published by Teagasc. [https://www.teagasc.ie/media/website/publications/2018/6456\\_Multi-species\\_grassland\\_swards\\_POKiely\\_AGRIP.pdf](https://www.teagasc.ie/media/website/publications/2018/6456_Multi-species_grassland_swards_POKiely_AGRIP.pdf)
- *Reducing nutrient losses and fertiliser use* (2020), published by Teagasc. <https://www.teagasc.ie/news-events/daily/environment/reducing-nutrient-losses-and-fertiliser-use.php>
- *Timely Soil Quality Tips* (2020), published by Teagasc <https://www.teagasc.ie/publications/2020/timely-soil-quality-tips.php>
- *Major & micro nutrient advice for productive agricultural crops* (2020), published by Teagasc. <https://www.teagasc.ie/media/website/publications/2020/Major--Micro-Nutrient-Advice-for-Productive-Agricultural-Crops-2020.pdf>
- *Integrating animal and crop production can reduce nutrient leaching from agricultural fields* (2015), published by the European Commission. [https://ec.europa.eu/environment/integration/research/newsalert/pdf/integrating\\_animal\\_and\\_crop\\_production\\_can\\_reduce\\_nutrient\\_leaching\\_from\\_agricultural\\_fields\\_52si6\\_en.pdf](https://ec.europa.eu/environment/integration/research/newsalert/pdf/integrating_animal_and_crop_production_can_reduce_nutrient_leaching_from_agricultural_fields_52si6_en.pdf)

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<sup>1</sup> ‘Enterprise’ here can be considered at any scale. For instance, a specific individual family farm is an enterprise, but so too is a multinational company. However, ‘the beef industry’ is not a specific enterprise.

## Report structure and mark allocations

Section	Indicative content to be included	Marks
<p><b>Introduction and background research</b></p> <p>Suggested range between 300 and 500 words</p>	<ul style="list-style-type: none"> <li>▪ Give a title to your Individual Investigative Study.</li> <li>▪ Identify the agricultural enterprise chosen as the context for the study and state the topic selected for investigation.</li> <li>▪ State the research question, and make clear how it relates to the theme of the brief and the chosen enterprise.</li> <li>▪ Outline what the initial research you carried out tells you about the topic and the research question. Include references. (Use short in-line citations here, with full references at the end of the report.)</li> </ul>	<b>20</b>
<p><b>The investigative process</b></p> <p>Suggested range between 500 and 800 words</p>	<ul style="list-style-type: none"> <li>▪ Describe the specific experiments and other relevant investigative activities undertaken, stating clearly the purpose of each and describing how it was carried out.</li> <li>▪ Make clear what specific hypotheses were developed and tested.</li> <li>▪ Describe in detail how you gathered the data.</li> </ul>	<b>25</b>
<p><b>Results, analysis, and conclusions</b></p> <p>Suggested range between 600 and 1000 words</p>	<ul style="list-style-type: none"> <li>▪ Present the data and results from your investigation. Use tables, graphs, and photographs as appropriate.</li> <li>▪ Analyse and interpret the data, results, and other information.</li> <li>▪ Make judgements and draw conclusions from your analysis.</li> <li>▪ Take due account of any relevant limitations of your study.</li> <li>▪ Link the conclusions clearly to the research question.</li> </ul>	<b>35</b>
<p><b>Reflection on the study</b></p> <p>Suggested range between 150 and 200 words</p>	<ul style="list-style-type: none"> <li>▪ Reflect on the insights gained from engagement with the study and comment on:               <ul style="list-style-type: none"> <li>○ The degree to which the research question was answered</li> <li>○ Possible changes or alternative approaches that might have made the investigation better</li> <li>○ Future directions and possible areas of further investigation</li> <li>○ Significance of the outcomes of the study for the agri-food sector and/or the study of agricultural science.</li> </ul> </li> </ul>	<b>10</b>
<p><b>References</b></p>	<ul style="list-style-type: none"> <li>▪ Full references for all sources used during the study and/or referred to in the report.</li> </ul> <p>This section will not attract a separate mark. Any deficiencies in referencing will be taken account of when marking the relevant section of the report.</p>	-
<p><b>Communication and innovation</b></p>	<p><b>This is not a distinct section of the report.</b></p> <p>Marks will be awarded for evidence of taking an individual approach, for coherence and for innovative thinking.</p>	<b>10</b>