

T Level Technical Qualification in Science

Employer set project (ESP)

Lab Sciences

Mark scheme

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Document security

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Past Paper

Mark scheme

Task 1: research a strategy

AO2: Apply core knowledge and skills to the development of a scientific project

Band	Mark	Descriptor The student has:
4	10–12	Produced a literature review that includes a balanced and well-justified rationale for the selection, prioritisation, and rejection of wide range of sources with detailed reference to all the following factors: • relevance to the required investigation • reliability (such as from recognised and trusted scientific publications) and whether there is any potential research bias associated with the source • availability of quantitative data • the strategies used in the literature in relation to what could be used in the setting
3	7–9	Produced a literature review that includes a credible explanation for the selection and rejection of a range of sources with reference to all the following factors: • relevance to the required investigation • reliability (such as from recognised and trusted scientific publications) • availability of quantitative data • the strategies used in the literature in relation to what could be used in the setting
2	4–6	Produced a literature review that describes some of the following factors: • relevance to the required investigation • reliability (such as from recognised and trusted scientific publications) • the strategies used in the literature in relation to what could be used in the setting
1	1–3	Produced a literature review that identifies some of the following factors: • relevance to the required investigation • reliability (such as from recognised and trusted scientific publications) • references to the availability of quantitative data or the strategies used in the literature in relation to what could be used in the setting will be limited or absent

Band	Mark	Descriptor The student has:
0	0	No creditworthy material as described in bands 4 to 1.

AO2: Apply core knowledge and skills to the development of a scientific project

Band	Mark	Descriptor The student has:
3	5–6	Correctly referenced all quotes and articles in their literature review using a recognised academic referencing technique (for example Harvard referencing), with consistent use of the referencing technique used. A wide range of sources are referenced.
2	3–4	Referenced most quotes and articles in their literature review using a recognised academic referencing technique (for example Harvard referencing) with consistent use of the referencing technique used. A range of sources are referenced.
1	1–2	Referenced some quotes and articles in their literature review without using a clearly recognised academic referencing technique.
0	0	No creditworthy material as described in bands 3 to 1.

AO4: Use English, mathematics, and digital skills as appropriate

Band	Mark	Descriptor The student has:
4	4	Communicated all aspects of the literature review with excellent use of level 2 English spelling, punctuation, and grammar, conveying meaning clearly and effectively throughout, using appropriate professional tone as expected for a literature review. Use of scientific/technical terminology and language is excellent with no errors.
3	3	Communicated most aspects of the literature review with a well-developed use of level 2 English spelling, punctuation, and grammar, conveying meaning clearly and coherently throughout the review, using appropriate professional tone as expected for a literature review. There is a good use of scientific/technical terminology and language with minimal errors.
2	2	Communicated most aspects of the literature review with inconsistent use of level 2 English spelling, punctuation, and grammar throughout the review, conveying the required meanings overall, although may lack some clarity and conciseness. Use of scientific/technical terminology and language is sound but contains some errors.
1	1	Communicated most aspects of the literature review with simplistic use of English at level 1 or below throughout the review. There may be some errors which do not affect meaning or coherence. The use of scientific/technical terminology and language is minimal and includes some errors.
0	0	No creditworthy material, spelling, punctuation, and grammar, or structure, makes most or all the literature review difficult to understand for the reader.

Task 2: plan a project

AO1: Plan their approach to meeting the project brief

Band	Mark	Descriptor
		The student has:
4	10–12	Produced a plan with clear aims that are entirely relevant to the project brief and used a wide range of sources selected in the literature review to determine the style and nature of the investigation. Set out the plan in logical, sequential steps which: • are complete and sufficient to investigate the most economic use of methods and process • are achievable in the timeframe • address resource issues and monitoring • are entirely relevant to its stated aims
3	7–9	Produced a plan with aims that are relevant to the brief and based on a range of sources selected in the literature review. Set out a plan that can be followed to investigate the most economic use of methods and processes, with details of timeframes, resources, and requirements for each step.
2	4–6	Produced a plan with aims, using information from the literature review. Described several steps that are appropriate for the investigation. Described timescales and resources.
1	1–3	Produced a plan with some general aims unsupported by the literature review. Identifies some steps that are appropriate for the investigation. Listed timescales and/or resources without giving relevant detail.
0	0	No creditworthy material as described in bands 4 to 1.

AO2: Apply core knowledge and skills to the development of a scientific project

Band	Mark	Descriptor The student has:
3	9–12	Completed a risk assessment, sufficient to cover and prioritise all risks which can reasonably be anticipated and describes their effective mitigation or management. Clearly explained risks involving others and does so correctly within the risk hierarchy (prioritisation).
2	5–8	Completed a risk assessment sufficient to cover most risks, including some detail on their mitigation or management. Described key risk involving others with some understanding of risk hierarchy (prioritisation).
1	1–4	Completed a risk assessment sufficient to cover some risks, including some detail on their mitigation or management. Described key risk involving others with some understanding of risk hierarchy (prioritisation).
0	0	No creditworthy material as described in bands 3 to 1.

AO4: Use English, mathematics, and digital skills as appropriate

Band	Mark	Descriptor The student has:
4	4	Communicated all aspects of the risk assessment with excellent use of level 2 English spelling, punctuation, and grammar, conveying meaning clearly and effectively throughout, in a logical structure using appropriate professional tone as expected for a risk assessment. Use of scientific/technical terminology and language is excellent with no errors.
3	3	Communicated most aspects of the risk assessment effectively with a well-developed use of level 2 English spelling, punctuation, and grammar, conveying meaning clearly throughout, with a clear attempt at using a logical structure, using appropriate professional tone as expected for a risk assessment. There is a good use of scientific/technical terminology and language with minimal errors.
2	2	Communicated most aspects of the risk assessment with inconsistent use of level 2 English spelling, punctuation, and grammar throughout, conveying the required meanings overall, although lacking some clarity and conciseness. Use of scientific/technical terminology and language is sound but contains some errors.
1	1	Communicated most aspects of the risk assessment with simplistic use of English at level 2 throughout. There may be some errors which do not affect meaning or coherence. The use of scientific/technical terminology and language is minimal and includes some errors.
0	0	No creditworthy material, spelling, punctuation, and grammar, or structure, makes most or all the risk assessment difficult to understand for the reader.

AO5: Realise a project outcome and review how well the outcome meets the brief

Band	Mark	Descriptor The student has:
3	6–8	Described the types of data to be collected and the mechanisms of collection. The description clearly addressed how the data and its collection mechanism will meet the needs of the targeted practical investigation, the constraints of the setting, and the timeframes. Data is sufficient in breadth, quantity, and relevance to realise the stated project aims. Guidance types of data: qualitative/quantitative, numerical/verbal, primary/secondary
2	3–5	Described the types of data to be collected and the mechanisms of collection, which meet the needs of the targeted practical investigation. Data is adequate in breadth, quantity, and relevance to realise the stated project aims. Guidance types of data: qualitative/quantitative, numerical/verbal, primary/secondary
1	1–2	Identified some of the data to be collected and its mechanism of collection, with some but limited consideration of practicability for the setting, or realistic timeframes. Data is adequate for some elements (breadth, quantity, and relevance to realise the stated project aims). There is little differentiation of types of data. Guidance types of data: qualitative/quantitative, numerical/verbal, primary/secondary
0	0	No creditworthy material as described in bands 3 to 1.

Task 3: analysis of data

AO2: Apply core knowledge and skills to the development of a scientific project

Band	Mark	Descriptor
		The student has:
4	13–16	Demonstrated accurately all relevant and required data analysis, demonstrating an excellent balance of data and information selected for presentation, and including the outputs of their statistical analysis, with valid and relevant use of tables, charts and graphs. Chosen visualisation techniques that are appropriate and realistic for the data and the project aims, and which add value to the analysis, enhancing readability and understanding.
3	9–12	Demonstrated accurately most of the relevant and required data analysis, selecting sufficient data and information for presentation, and including the outputs of their statistical analysis, with valid use of tables, charts and graphs. Chosen visualisation techniques that are realistic for the data and the project aims, some add value to the analysis, enhancing readability and/or understanding.
2	5–8	Demonstrated most of the relevant and required data analysis, including the outputs of their statistical analysis, with some valid use of tables, charts and/or graphs. Chosen visualisation techniques that support the project aims and add some value to the analysis, and that are readable.
1	1–4	Demonstrated some of the required data analysis with limited use of tables, charts, or graphs, and where tables, charts and graphs are used, the choice of visualisation techniques only tentatively support the project aims or add limited value to the analysis.
0	0	No creditworthy material as described in bands 4 to 1.

AO3: Select relevant techniques and resources to meet the brief

Band	Mark	Descriptor The student has:
3	5–6	Selected an appropriate statistical technique and used it correctly to produce valid outcomes that inform clearly expressed conclusions relevant to the project aims.
2	3–4	Selected a relevant statistical technique and used it to produce results that aided the student's conclusions.
1	1–2	Selected and used a statistical technique to produce results with a basic description of the analytical outcome that does not contribute to the student's conclusions.
0	0	No creditworthy material as described in bands 3 to 1.

AO4: Use English, mathematics, and digital skills as appropriate

Band	Mark	Descriptor
		The student has:
3	5–6	Communicated all aspects of the report clearly and effectively throughout, in a logical structure and with excellent use of level 2 English spelling, punctuation and grammar, which also supports the use of accurate technical and scientific language.
2	3–4	Communicated most aspects of the report effectively, with some attempt at a logical structure. Use of English spelling, punctuation and grammar and use of technical /scientific language supports understanding for the reader although is likely to have several minor errors, which do not impact on reader understanding.
1	1–2	Communicated some aspects of the report with little evidence of a structure. Use of level 1 English spelling, punctuation and grammar and use of technical/scientific language supports understanding of some parts of the report for the reader.
0	0	No creditworthy material, spelling, punctuation and grammar, or structure, makes most or all of the report difficult to understand for the reader.

AO5: Realise a project outcome and review how well the outcome meets the brief

Band	Mark	Descriptor
		The student has:
3	5–6	Provided balanced and well-justified conclusions that explicitly link to: - the trends and patterns shown in the data - the implications of any outliers and/or potential anomalies - the project aims Given a well-thought through explanation of the limitations of the data or the strategy with reference to the conclusions, addressing all elements (bulleted above) in a balanced way, such as with relevant and sufficient weight.
2	3–4	Provided conclusions relevant to the trends and patterns shown in the data. Referred to the project aims with descriptions of limitations in data or strategy.
1	1–2	Provided a conclusion with some reference to the trends and patterns shown in the data, and with limited reference to the project aims.
0	0	No creditworthy material as described in bands 3 to 1.

Task 4: presentation of outcomes and conclusions

AO2: Apply core knowledge and skills to the development of a scientific project

Band	Mark	Descriptor
		The student has:
4	10–12	Included on the A2 poster a concise explanation of: - the investigation aims - the investigation plan - the results and their analysis - the conclusions of the investigation All the important trends and patterns in the data are highlighted with tables, charts and graphs which are accurate, accessible, relevant, and drawn from the student's analysis. Indicative content - tables, charts, and graphs will include only a concise explanation of key trends and data and are not just be copied over from their analysis report, unless these are effective summaries for the purpose of this presentation task - existing or new tables, graphs and charts may be printed and physically pasted onto their poster, or software may be used to create part or all the poster
3	7–9	Included on the A2 poster an explanation of: - the investigation aims - the investigation plan - the results and their analysis - the conclusions of the investigation All the important trends and patterns in the data are highlighted with tables, charts and graphs which are accurate, accessible, relevant, and drawn from the student's analysis. Indicative content - tables, charts and graphs on the poster will include accurate and relevant information, but may not always be in the form of a concise explanation, for example, there may be some cluttered and/or long-winded elements - existing or new tables, graphs and charts may be printed and physically pasted onto their poster, or software may be used to create part or all the poster

Band	Mark	Descriptor
		The student has:
2	4-6	Included on the A2 poster a description of: - the investigation aims - the investigation plan - the results and their analysis - the conclusions of the investigation Most of the important trends and patterns in the data are highlighted with tables, charts and graphs which are reasonably accurate, accessible, and drawn from the student's analysis. Indicative content - tables, charts, and graphs on the poster will include mostly accurate and accessible information, but may not always be in relevant, for example, it may have areas where it is unclear what conclusions are supported, or what points are being made - existing or new tables, graphs and charts may be printed and physically pasted onto their poster, or software may be used to create part or all the poster
1	1-3	Listed on the A2 poster some detail in the following areas: - the investigation aims - the investigation plan - the results and their analysis - the conclusions of the investigation The detail is limited with some key points missing, and where detail is provided, this may repeat or contradict already made points, descriptions, or conclusions. Indicative content Tables and graphs, if used, may lack clarity, important material may be missing and superfluous material may be included which does not contribute to the key points of the investigation or analysis. The student may fail to highlight key trends and patterns in the data.
0	0	No creditworthy material as described in bands 4 to 1.

AO3: Select relevant techniques and resources to meet the brief

Band	Mark	Descriptor The student has:
3	5–6	Designed the A2 poster to enable all content to be easily accessible to an audience (with scientific literacy), making maximum use of the available space and arranging the content logically. All artwork and colouring aids the accessibility and understanding of the information presented (is not merely decorative) and key points (relating to the investigation aim, the results analysis or conclusions, or the investigation conclusions) are prominent and easily recognised.
2	3–4	Designed the A2 poster to enable most of the content to be easily accessible to an audience, arranging the content in a logical way to make reasonable use of the available space. Overall, the artwork and colouring aids improve the accessibility and understanding of the information presented (is not merely decorative), although one or two key points (relating to the investigation aim, the results analysis, or conclusions) may lack relevance, or only add decorative value.
1	1–2	Designed the A2 poster to display a limited amount of the content well, although organisation of content is cluttered and could make better use of the space available. Artwork and colouring are mainly decorative although may be appropriate to highlight 2 key points (relating to the investigation aim, the results analysis, or conclusions) for the audience.
0	0	No creditworthy material as described in bands 3 to 1.

AO4: Use English, mathematics, and digital skills as appropriate

Band	Mark	Descriptor
		The student has:
4	4	Utilised IT software and/or applications or used mathematical processes or a combination of both digital and mathematical skills, in order to: - organise and assign importance to all the data required - conduct their analyses (including statistical analysis) - produce accurate tables, charts and/or graphs which are presented clearly and are accessible to the intended audience
3	3	Utilised IT software and/or applications or used mathematical processes or a combination of both digital and mathematical skills, in order to: - organise and assign importance to most of the required data - conduct their analyses (including statistical analysis) - produce relevant tables, charts and/or graphs
2	2	Utilised IT software and/or applications or used mathematical processes or a combination of both digital and mathematical skills, in order to: - organise and assign importance to some of the required data - conduct some analyses - produce some relevant tables, charts and/or graphs It is clear to the audience that the use of digital and/or mathematical skills could be strengthened to enhance accuracy.
1	1	Utilised IT software and/or applications or used mathematical processes or a combination of both digital and mathematical skills, in order to: - organise and assign importance to some of the required data - conduct some analyses - produce some but limited tables, charts and/or graphs It is clear to the audience that the use of digital and/or mathematical skills could be strengthened to enhance accuracy, accessibility, and presentation.
0	0	No creditworthy material, spelling, punctuation and grammar or structure makes most or all the literature review difficult to understand for the reader.

AO5: Realise a project outcome and review how well the outcome meets the brief

Band	Mark	Descriptor
		The student has:
3	5–6	Verbally presented the contents on the A2 poster clearly and without the need for tutor questions, using the detail as a stimulus for the presentation, expanding on each section to clearly articulate all the following: - the aims of the project - the results of the analysis - their conclusions
2	3–4	Verbally presented the contents on the A2 poster, broadly using the detail as a stimulus for the presentation, expanding on some of the sections to articulate most of the following: - the aims of the project - the results of the analysis - their conclusions
1	1–2	Verbally presented the contents of the A2 poster, almost entirely reading from each section of the poster, rather than expanding on the detail. If the student attempts to use the poster as a stimulus, their presentation covers a minority of key points, lacking in clarity, with some significant omissions of key points, or mention of points that are not relevant to the project aims.
0	0	No creditworthy material as described in bands 3 to 1.

Task 5: group discussion

AO2: Apply core skills and knowledge to the development of a scientific project

AO3: Select relevant techniques and resources to meet the brief

AO5: Realise a project outcome and review how well the outcome meets the brief

Band	Mark	Descriptor
		The student has:
3	7–9	Demonstrated engagement throughout, and a comprehensive breadth and depth of knowledge relevant to the discussion, both when asking questions and in answering those of others, raising well-informed points and arguments, articulating these in clear language for all students to understand, and may even check that others have understood accurately. Listened to other ideas and opinions respectfully, reflecting or building on these in their own responses, demonstrating collaboration with others to reach an appropriate and relevant solution. Written an email that responds clearly and fully to the initial concerns raised by the patient with valid explanations.
2	4–6	Demonstrated consistent engagement throughout, and a reasonable breadth of knowledge relevant to the discussion, both when asking questions and in answering those of others, raising some valid points and expressing these in clear language. Listened to other ideas and opinions without interruption, demonstrating an understanding of other opinions and consideration of these to reach an appropriate and relevant solution. Written an email that responds clearly to the initial concerns raised by the patient, including valid explanations, but may only partially address the concerns.

Band	Mark	Descriptor
1	1–3	The student has: Demonstrated some engagement with the discussion, and a basic knowledge relevant to the discussion, both when asking questions and in answering those of others, raising points and arguments that are tentative and largely unsupported by suitable evidence, articulating these in language that is sometimes understandable to the other students but is not always clear. Listened to other ideas and opinion but was not always respectful of the opinions of others or may be dismissive of their contribution. Did not consider other opinions to reach a solution, or they reached a solution that was not appropriate or suitable. Written an email that responds only tentatively to the initial concerns raised by the patient.
0	0	No creditworthy material as described in bands 3 to 1.

Task 6: reflective evaluation

AO2: Apply core knowledge and skills to the development of a scientific project

AO3: Select relevant techniques and resources to meet the brief

AO5: Realise a project outcome and review how well the outcome meets the brief

Band	Mark	Descriptor
		The student has:
4	11–14	Provided an evaluation of all the following tasks, including a comprehensive and balanced explanation of what worked well and what worked less well: • their literature review • their project plan • their analysis of given data, including their choice of statistical analysis technique • their A2 poster and its presentation Provided balanced and well-justified reasons for all the changes they would make (or not make) if repeating each task, with direct reference to the aims of the project and resource constraints or general constraints of the setting. Demonstrating a clear understanding of how changes in different tasks interact and impact on the quality of the other tasks.
3	7–10	Provided an evaluation of all the following tasks, including credible explanations of what worked well, what worked less well: • their literature review • their project plan • their analysis of given data, including their choice of statistical analysis technique • their A2 poster and its presentation Provided well-justified reasons for all the changes they would make (or not make) if repeating each task, with direct reference to the aims of the project and resource constraints/constraints of the setting.

Band	Mark	Descriptor
		The student has:
2	4–6	Provided an account of most of the following tasks, including some explanation of what worked well and what worked less well: • their literature review • their project plan • their analysis of given data, including their choice of statistical analysis technique • their A2 poster and its presentation Outlined some reasons for the changes they would make if repeating each task, with some reference to the aims of their project or any resource constraints/constraints of the setting.
1	1–3	Listed examples of what worked well, and what worked less well for some of the following tasks: • their literature review • their project plan • their analysis of given data, including their choice of statistical analysis technique • their A2 poster and its presentation Outlined basic changes they would make if repeating the tasks making little or no reference to the reasons why or how it relates to the aims of their project.
0	0	No creditworthy material as described in bands 4 to 1.

AO4: Use English, mathematics, and digital skills as appropriate

Band	Mark	Descriptor
		The student has:
4	4	Communicated all aspects of the reflective evaluation with excellent use of level 2 English spelling, punctuation, and grammar, conveying meaning clearly and effectively throughout, in a logical structure. Use of scientific/technical terminology and language is excellent with no errors.
3	3	Communicated most aspects of the reflective evaluation effectively with a well-developed use of level 2 English spelling, punctuation, and grammar, conveying meaning clearly throughout, with a clear attempt at using a logical structure. There is a good use of scientific/technical terminology and language with minimal errors.
2	2	Communicated most aspects of the reflective evaluation with inconsistent use of level 2 English spelling, punctuation, and grammar throughout, conveying the required meanings overall, although lacking some clarity and conciseness. Use of scientific /technical terminology and language is sound but contains some errors.
1	1	Communicated most aspects of the reflective evaluation with simplistic use of English at level 2 throughout. There may be some errors which do not affect meaning or coherence. The use of scientific/technical terminology and language is minimal and includes some errors.
0	0	No creditworthy material, spelling, punctuation, and grammar, or structure, makes most or all the reflective evaluation difficult for the reader to access or understand.

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