T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Science

Employer-set project (ESP)

Metrology Sciences

Mark scheme

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NCFE CACHE

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Contents

Document security

Please do not distribute this document to students; this is for provider and tutor use only. All tutors must be familiar with the information in this document. This document should be kept secure at all times.

This document should be read along with the regulations for conduct of external assessment. Assessment conditions and resources are defined in the qualification specific instructions for delivery (QSID). These documents can be found at www.qualhub.co.uk under policies & documents.

About the employer-set project

The purpose of the employer-set project (ESP) is to ensure that students have the opportunity to apply core knowledge and skills to develop a substantial piece of work in response to an employer-set brief. The brief and tasks are contextualised around an occupational area, requiring students to plan a scientific project.

To achieve the assessment objectives and meet the brief, students must demonstrate the following core skills (CS):

CS1: Project management to include independently producing a high-level project plan taking into account: timing of activities, resource and financial considerations, ethical considerations, adherence to health and safety and the maintenance of quality outcomes

CS2: Researching from independently identified sources including scientific literature and other appropriate sources, prior to the project commencement and referencing these sources appropriately

CS3: Working with others for example, to ensure that any scientific techniques meet all safety, health and environmental requirements

CS4: Creativity and innovation within a science context to improve practice, processes and outcomes

CS5: Problem solving within a scientific context and, where appropriate, making use of new technologies to solve problems

CS6: Communication, for example, providing results and recommendations in appropriate formats to clients and/or wider stakeholders which take into consideration 'business benefits', or show commercial awareness in a variety of formats including written reports and verbal presentations

CS7: Reflective evaluation to be able to make improvements to own practice for example, having completed a task, reviewing and suggesting improvements, and consideration of lessons learnt for own professional development

The knowledge requirements will be taken from the core knowledge relevant to the brief; the briefs will change for each assessment window.

Administering the external assessment

The maximum overall time allowed for the external assessment is 18 hours under supervised conditions.

NCFE sets the start date and the submission date of the assessment window for the external assessment task. External assessment material should not be given to students until the first supervised assessment session.

The assessment window will consist of provider-arranged supervised sessions of the external assessment. Sessions can be undertaken in the normal classroom environment, so long as each student has access to, or the option to, use a computer system. Providers can decide how to arrange supervised sessions. Providers must submit student's completed assessment work by the published submission date.

When preparing to start a supervised session, the time taken to provide work from previous sessions (where required), print work from previous sessions (where required) and upload work (where required), is not included as part of the permitted external assessment time.

At any time, NCFE may request the timetable that providers have set for the supervised sessions:

- the permitted time must not be increased, unless a reasonable adjustment has been agreed for a student in accordance with the reasonable adjustments and special considerations policy which can be found at www.qualhub.co.uk
- the permitted time must not be decreased - students must be given the opportunity to complete the full amount of time for the external assessment task - providers must take this into account when timetabling the session

Marking the external assessment task

With the exception of task 4(b), the external assessment tasks are set and marked by NCFE. This means that providers must not assess, internally quality assure or provide any feedback to the student about their performance in the external assessment task. The supervised external assessment tasks must be treated independently of the teaching of the outline content.

In order to achieve a grade for the core component, the student must attempt both of the external examinations and the employer-set project (ESP). The combined grades from these assessments will be aggregated to form the overall core component grade (A* to E and U). If students do not attempt one of the assessments, or fail to reach the minimum standard across all assessments, they will receive a U grade until the student resits the relevant components.

Instructions for tutors

Assessment conditions

Students must complete the employer-set project (ESP) independently and under supervised conditions, following the specific guidance for each task outlined below.

Students and tutors are required to sign declarations of authenticity to confirm that the work is their/the student's own. The declaration forms can be found at www.qualhub.co.uk. This is to ensure authenticity and to prevent potential malpractice and maladministration. Students must be made aware of the importance of this declaration and the impact this could have on their overall grade if the evidence was found not to be the student's own work.

At the end of each session, tutors must retain all materials and/or evidence produced by students within the supervised assessment.

At various times during the whole process students will be accessing a database and laboratory information management system (LIMs) spreadsheet via a computer system, therefore there must be sufficient monitoring and checks to ensure that students have not made materials available to themselves, or anyone else, electronically via the intranet or internet.

External assessment materials should be securely stored between supervised sessions. Students must not have access to this area between the supervised sessions, including electronic files. Where students require evidence from a previous task, this must be a duplicate to ensure no amendments are made to original work.

Work, such as, formative assessment and/or work done with sample assessment materials, must not be used as part of the external assessment task submission to NCFE; student work must be summative, and produced during the arranged supervised assessment window.

It is a requirement of the delivery of this assessment that all student performances are audio-visually recorded for the purpose of moderation. It is the responsibility of provider to check that the appropriate audio-visual (AV) equipment is set up and fully operational at each station. The AV recording must clearly identify the students, capture all relevant actions and words from the student, and be of a clear and sufficient quality to be adequately reviewed by the moderator. Provider staff should be equipped to be able to operate the equipment sufficiently to capture all evidence. To ensure authenticity of the performance, the student's face must be clearly visible at the start of the recording.

Appendices should not be included and will not be marked unless specifically required from the task instructions.

Plagiarism may result in the external assessment task being awarded a U grade. For further guidance, refer to the student handbook - plagiarism in external assessment and the maladministration and malpractice policy located at www.qualhub.co.uk.

Resources

Each student must have access to the appropriate resources required to complete the ESP. These include the following:

- a computer, including a printer
- individual access to the NCFE CACHE provided source database
- individual access to LIMs spreadsheet
- A2 paper and a variety of coloured markers, glue and scissors and/or IT software/applications to create poster (or parts of) for printing, and printing facilities - for task 4 only

This list is not exhaustive, and you need to refer to the qualification for subject specific details.

Accessibility and fairness

To promote accessibility and fairness for all students and to ensure diversity and equality, we expect providers to be aware of and meet the requirements of relevant NCFE policies and government legislation. You must ensure that:

- all of your processes concerned with assessment are carried out in a fair and objective manner
- you continue to adhere to current equal opportunities legislation
- you continue to operate an effective diversity and equality policy, with which students are familiar and which applies to all students using our products and services

Assessment and task specific instructions

For each assessment window, there will be 3 versions of the employer-set project (ESP) available for booking; each version is contextualised against the occupational specialisms relevant to the pathway. These 3 briefs will be set by employers in conjunction with NCFE CACHE and will be different for each assessment window. The briefs are designed to ensure a motivating starting point for students and will be based on, for example, a real world problem.

Selection of brief

Students are required to discuss and agree with their tutor which of the following occupational-based briefs they would like to take forward for their ESP:

- Laboratory Sciences
- Food Sciences
- Metrology Sciences

The provider must book students onto the appropriate version of the ESP by the deadline for that specific assessment series as indicated below:

Assessment series	Student booking deadline
TBC	TBC
TBC	TBC
TBC	TBC
TBC	TBC

Bookings will be made on the NCFE portal, and guidance can be found in the portal handbook.

The selection and registration of the student to the appropriate brief must be agreed ahead of the deadline outlined in the tutor guidance document. Whilst it is recommended that a student selects the brief that is relevant to their intended occupational specialism, it is not a requirement that the student makes a selection decision based on this, or any other specific given criteria.

Task 1

Task 1 requires students to access an NCFE provided database containing a variety of sources in order to produce a literature review, which will enable them to produce a plan during task 2.

Students are required to work independently, under supervised conditions.

Students must complete this task within 3 hours and manage how they will spend their time, using the task 1 guidance.

Students will be given an additional 30 minutes to complete their project diary which will facilitate the completion of task 6. The project diary will not be assessed.

Note: The literature review the student produces will be externally assessed by NCFE.

Student resources required

- ESP brief and task 1 student guidance
- computer access
- access to NCFE CACHE provided database
- their project diary

Task 2

Task 2 requires students to use their literature review from task 1, to develop a project plan to measure each key feature in the technical drawing. They must use 2 different methods for each feature in order to later compare the methods selected, in order to determine the most suitable method.

Students are required to work independently under supervised conditions.

Students must complete this task within 3 hours and manage how they will spend their time, using the task 2 guidance.

They will be given an additional 30 minutes to complete their project diary which will facilitate the completion of task 6.

Note: The plan the student produces will be externally assessed by NCFE.

Student resources required

- ESP brief and task 2 student guidance
- access to NCFE CACHE provided database
- their literature review from task 1
- their project diary
- risk assessment template
- risk matrix

Task 3

Task 3 requires students to access an NCFE CACHE provided LIMs spreadsheet providing data from organisations which have carried out similar research.

The students will need to visualise and analyse the data, applying any statistical techniques they feel are appropriate in order to produce and justify conclusions for the scientific investigation, taking into account any limitations of the data.

Students are required to work independently, under supervised conditions.

Students must complete this task within 3 hours and manage how they will spend their time using the task 3 guidance.

They will be given an additional 30 minutes to complete their project diary which will facilitate the completion of task 6.

Note: The analysis the student produces will be externally assessed by NCFE.

Student resources required

- ESP brief and task 3 student guidance
- computer access
- access to NCFE CACHE provided LIMs spreadsheet
- their project diary

Task 4(a)

Task 4(a) requires students to use their plan from task 2 and their analysis from task 3 in order to produce an A2 scientific poster, which they will use as the basis of a presentation to their tutor in task 4(b).

Students are required to work independently under supervised conditions.

Students are free to use ICT based methods to produce their poster, hand write/draw it or a combination.

Students must complete this task within 3 hours and manage how they will spend their time using the task 4 guidance.

Note: the A2 scientific poster the student produces will be externally assessed by NCFE.

Student resources required

- ESP brief and task 4 student guidance
- computer and printer access
- access to NCFE CACHE provided LIMs spreadsheet
- their analysis from task 3
- A2 paper, various coloured markers, scissors and glue and/or IT software/applications to create poster (or parts of) for printing, and printing facilities
- their project diary

Task 4(b)

Task 4(b) requires the student to present their poster to their tutor. The tutor may ask questions to clarify any aspect of the presentation, or to fill in any gaps in the student presentation. It is essential that the tutor reads the guidance and completes the assessment sheet for tutor questions on page 15 of the appendices, before the presentation.

Each student has up to 1 hour to complete this task. It is likely that the presentation and any tutor questions will take a much shorter time, however, the hour provides time for the student to rehearse if they wish. If the student chooses to rehearse their presentation, this must be done independently without anyone else present.

The student must complete the presentation, respond to any tutor questioning and optional rehearsal within 1 hour, and manage their time using the task 4 guidance.

They will be given an additional 30 minutes to complete their project diary which will facilitate the completion of task 6.

Note: The presentation of the scientific poster by the student will be assessed by the tutor using the task 4(b) tutor assessment sheet.

Student resources required

- ESP brief and task 4 instructions
- their A2 scientific poster
- their project diary

Tutor resources required

Assessment sheet for tutor questions.

Task 5

Task 5 requires students to have a discussion with their peers about an issue raised, via email, from the concerns of a consumer group regarding alternative resources.

The student is required to work with their research team to discuss the concerns the consumer group have raised and how it would be best to respond to these concerns. They will need to refer to their research notes to contribute effectively to the discussion and take notes during the team discussion of the points and suggestions made. It is suggested 10 minutes are given to this at the start of the discussion.

Each group member will then take it in turns to make suggestions and to agree an approach. It is suggested that groups consist of 5 or 6 individuals to allow sufficient time for discussion in 40 minutes; this will allow ample time for individuals to give their opinion and respond to others.

Following the discussion, students will need to (individually) draft an email to the consumer group to respond to the concerns raised. The email is to be hand-written on paper provided by the assessment centre, and the name and student reference number need to be included for submitting as evidence. Usual exam conditions apply during this part of the task (max 10 minutes).

There is an overall time limit of 1 hour for this task. In this time, students will:

- be asked to read the email from the consumer group in their groups
- be given 10 minutes to familiarise themselves with their literature review, their plan, their data analysis and scientific poster
- discuss their suggestions for responding to the consumer group
- draft an email to the consumer group to respond to the concerns raised

Note: The group discussion and email the student produces will be externally assessed by NCFE.

Student resources required

- their literature review (task 1)
- their plan (task 2)
- their data analysis and report (task 3)
- their A2 scientific poster and its presentation (task 4)

Tutor resources required

Assessment sheet for tutor commentary.

Video recording equipment.

Task 6

Task 6 requires the student to produce a written reflective evaluation of the scientific project carried out during the previous tasks.

Students are required to work independently, under supervised conditions.

Students must complete this task within 2 hours and manage how they will spend their time using the task 6 guidance.

Note: The reflective evaluation the student produces will be externally assessed by NCFE.

Student resources required

- ESP brief and task 6 student guidance
- their literature review
- their plan
- their analysis report
- their scientific poster
- their project diary
- access to the NCFE CACHE provided database and the NCFE CACHE provided LIMs spreadsheet
- reflective evaluation template

Timings

The timings below have been devised to support student and provider planning.

Task 1: 3 hours 30 minutes

Task 2: 3 hours 30 minutes

Task 3: 3 hours 30 minutes

Task 4(a): 3 hours 30 minutes

Task 4(b): 1 hour

Task 5: 1 hour

Task 6: 2 hours

Total: 16 hours and 2 hours for project diary

Instructions for completing and submitting the external assessment task

The external assessment tasks must be completed and uploaded as a whole and not in separate sections. The submission of students' assessment evidence must be done before the submission date specified for the assessment window. Tutors are encouraged to ensure that students follow the filename conventions specified in the external assessment tasks for each individual document. These files, per student, should be placed within a single folder before being zipped and submitted.

Students must respond to each task individually and follow the document structure when submitting their evidence, as per the evidence requirements section within each task. They must not combine responses for separate tasks.

Appendices

Tutor assessment sheet task 4(b)

The tutor will observe the presentation, and from their observations they will complete the assessment sheet for tutor questions form shown below. This form is used to record whether any questions needed to be asked, and the outcomes of these question if they are asked.

Note: This must be submitted along with the students' work.

Questions

It may be necessary for the tutor to ask the student questions at some point during the presentation. The need for questions will arise if:

- further clarification of any aspect of the presentation is required
- any aspect of the presentation is missing (for example, any aspect of the strategy or conclusions)

Any question should simply aim to clarify any area which is unclear from the presentation or to elicit from the student a missing piece of information. Questions which guide or lead the student to an answer are not permissible.

Examples of permissible questions

- when you were presenting your strategy, can you clarify what you meant by X, as I did not find this clear?
- you have presented a conclusion, but you have not explained what you based your conclusion on - can you explain the basis for your conclusion?

Examples of questions which are not permissible

- when you were presenting your strategy and you said X, did you mean Y?
- can you give me an example of a trend or pattern which you based your conclusion on?

Assessment sheet for tutor questions	
Mark X if the tutor does not need to ask questions.	For example: X
Record tutor questions when needing to clarify parts of the presentation, or to elicit information from the student that has not been provided.	For example: can you give me an example of the pattern on which you based your conclusion?
Record the outcome of any tutor questions, which can be a summary of the student's response, and whether they answered the question effectively.	For example: student (name) gave an example of pattern Y which made sense in respect of main conclusion. OR Student (name) wasn't able to provide a logical link between pattern and conclusion.

Template for task 1: research a strategy

State selected referencing technique:

Technique:	

Sources selected to inform planning

Title of source	Justification

Sources not selected to inform planning

Title of source	Justification

Additional information

Additional information you may wish to include

Template for task 2: risk matrix

Risk matrix- Evaluation of risks							**Action level**
Almost certain	**5**	**5**	**10**	**15**	**20**	**25**	**20–25 STOP**
Highly likely	**4**	**4**	**8**	**12**	**16**	**20**	
Likely	**3**	**3**	**6**	**9**	**12**	**15**	**12–16 URGENT**
Unlikely	**2**	**2**	**4**	**6**	**8**	**10**	**8–10 ACTION**
Extremely improbable	**1**	**1**	**2**	**3**	**4**	**5**	**4–6 MONITOR**
	X	**1**	**2**	**3**	**4**	**5**	**1–3 NO ACTION**
		Minimal	Minor injury	7 day + injury	Serious or major injury	Severe	
			Consequence				

Template for task 2: risk assessment form

Person carrying out risk assessment:	
Persons responsible on site:	
Venue:	
Work activity:	
Date of assessment:	

THOSE AT RISK	KEY
Own staff	OWN
Venue staff	VEN
Organisers	ORG
Visitors	VIS
Public	PUB
Contractors	CON
All persons onsite	AOS

Please read the guidelines prior to completing your risk assessment

Section 1

Hazard	**Who might be harmed?** (see those at risk, above)	**Likelihood**	**Severity**	**Total risk level**	**Control measures** (add any other control measures you will use)	**Likelihood**	**Severity**	**Res. risk level**

Hazard	**Who might be harmed?** (see those at risk, above)	**Likelihood**	**Severity**	**Total risk level**	**Control measures** (add any other control measures you will use)	**Likelihood**	**Severity**	**Res. risk level**

By signing the declaration below you have agreed that you will put the appropriate control measures in place to ensure that hazards are reduced and that the risks applicable to your stand are controlled.

Signed	
Print name	
Review date	

Template for task 6: reflective evaluation

Task 1

Brief summary of approach to task 1	Description of adaptations to task 1 with justification

Task 2

Brief summary of approach to task 2	Description of adaptations to task 2 with justification

Task 3

Brief summary of approach to task 3	Description of adaptations to task 3 with justification

Task 4

Brief summary of approach to task 4	Description of adaptations to task 4 with justification

Task 5

Brief summary of approach to task 5	Description of adaptations to task 5 with justification

Mark scheme

Task 1: literature review

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

Band	Marks	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 a 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) • 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 of 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 or the strategies used in the literature in relation to what could be used in the setting, will be limited or absent.
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), stating the referencing technique used. A wide range of source are referenced.
2	3–4	Referenced most quotes and articles in their literature review using a recognised academic referencing technique (for example Harvard referencing) stating the system 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 grammar, spelling, and punctuation, 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 grammar, spelling, and punctuation, 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 grammar, spelling, and punctuation 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.

Band	Mark	Descriptor The student has:
0	0	No creditworthy material, SPaG or structure makes most or all the literature review difficult to understand for the reader.

Task 2: producing a project plan

AO1: Plan their approach to meeting the scientific 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 suitable uses of methods and processes, is achievable in the timeframe, addresses resource issues and monitoring and is 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 suitable 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 risks involving others with some understanding of risk hierarchy (prioritisation).
1	1−4	Completed a risk assessment that identifies some risks and steps to take to manage these, but the management may not be entirely effective. Overall, the process is incomplete.
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 grammar, spelling, and punctuation, 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 grammar, spelling, and punctuation, 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 grammar, spelling, and punctuation 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, SPaG or structure makes most or all of 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	Evaluated the types of data to be collected and the mechanisms of collection. The evaluation 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.

Task 3: analysis of data

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

Band	Mark	Descriptor
4	13–16	With the scientific poster the student has presented accurately all relevant and required data, 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	With the scientific poster the student has presented accurately most of the relevant and required data, 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	With the scientific poster the student has presented most of the relevant and required data, 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	With the scientific poster the student has presented some of the required data 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		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	Marking descriptors 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 grammar, spelling, and punctuation 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 grammar, spelling, punctuation and use of technical/scientific language supports understanding for the reader although is likely to have a number of 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 grammar, spelling, punctuation and use of technical/scientific language supports understanding of some parts of the report for the reader.
0	0	No creditworthy material, SPaG 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, for example, 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: present 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 of 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 of the poster

Band	Mark	Descriptor The student has:
2	1−4	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 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 to the development of a scientific project

Band	Mark	Marking descriptors 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: • manage 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: • manage 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: • manage 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: • manage 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, IT use, mathematical process or a combination of both makes most or all the data management, analysis and presentation tools difficult to understand for the reader.

AO5: Realise a scientific 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 as 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 consumer group with valid solutions.
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 consumer group, including valid solutions, but may only partially address the concerns.
1	1−3	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 consumer group.
0	0	No creditworthy material as described in bands 3 to 1.

Task 6: reflective evaluation

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

AO3: Select relevant techniques and resources to meet the brief

AO5: Realise a scientific 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 (or wouldn't) make if repeating each task, with direct reference to the aims of the project and resource constraints or general constraints of the setting, and 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 (or wouldn't) make if repeating each task, with direct reference to the aims of the project and resource constraints/constraints of the setting.
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.

Band	Mark	Descriptor The student has:
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 to the development of a scientific project

Band	Mark	Descriptor The student has:
4	4	Communicated all aspects of the reflective evaluation with excellent use of level 2 English grammar, spelling, and punctuation, 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 grammar, spelling, and punctuation, 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 grammar, spelling, and punctuation 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, SPaG or structure makes most or all the reflective evaluation difficult for the reader to access or understand.

Document information

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Version	Description of change	Approval	Date of Issue
v1.0	Post approval, updated for publication.		January 2021
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