Cambridge Nationals

CAMBRIDGE OCR

Sample assessment material

Cambridge National in

Engineering Manufacture

Cambridge OCR Level 1/Level 2 Cambridge National in Engineering Manufacture

J823

R016: Manufacturing in quantity

Version 5.0

ocr.org.uk/cambridgenationals

Introduction

This is sample assessment material (SAM). It is an example Cambridge OCR-set assignment that we publish alongside a new specification to help illustrate the intended style and tasks of our set assignments.

We also produce two further specific resources to support you with using this SAM:

- An assessment story where we explain the research we have undertaken during the development of the qualification and how consultation with teachers, students and schools has helped shape our assessment approach.
- A student guide to NEA assignments in which we provide a summary for your students of key points about their Cambridge OCR-set assignments, including the importance of avoiding plagiarism.

Summary of updates

Section	Change	Version	Date
Tasks 1-5 You must/Advice sections	Updated to clarify what students are required to do and what is advisory for each task in the sample assignment.	5.0	June 2026

Cambridge OCR-set Assignment

Sample Assessment Material

Cambridge OCR Level 1/Level 2 Cambridge National in Engineering Manufacture Sample Set Assignments

Unit R016: Manufacturing in quantity

This is a sample set assignment which should only be used for practice.

This assignment **must not** be used for live assessment of students.

The live assignments will be available on our secure website, 'Teach Cambridge'.

The Cambridge OCR administrative codes associated with this unit are:

- unit entry code R016
- certification code J823

The regulated qualification number associated with this unit is:

603/7087/7

Duration: Approximately 10 - 12 hours

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Information for teachers
Using this assignment

You **must**:

- familiarise yourself with the Assessment Guidance relating to the tasks. This is with the unit content in Section 4 of the Specification.
- read and understand **all** the rules and guidance provided in Section 6 of the Specification **before** your students complete and you assess the set assignment.
- make sure that completion and assessment fully adhere to the rules and guidance provided in Section 6 of the Specification.
- give students the Engineering Manufacture Student guide to NEA assignments before they start the assignment.
- allow students approximately 10-12 guided learning hours (GLH) to complete all tasks.
- complete the Teacher Observation Record provided on page 15 for Task 4. You must adhere to the guidance given on page 16 when completing it.

You **must not**:

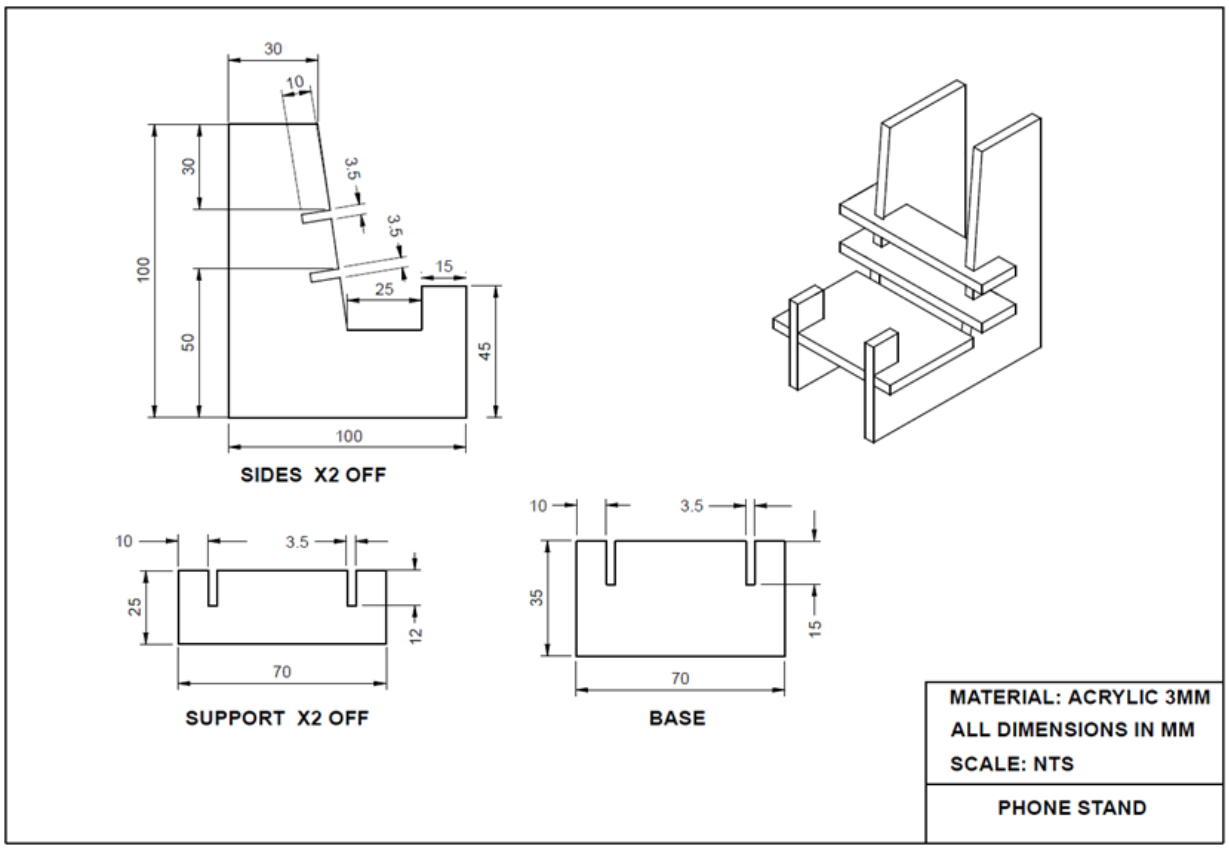
- change or modify this assignment in any way.

Scenario for the assignment

Mobile phone holder

You are a production engineer in an engineering company. A client has ordered 10,000 mobile phone holders of the design shown in Appendix 1. You have been asked to plan the manufacture using CAD/CAM and confirm that it is effective.

A working drawing of the mobile phone holder is shown below and enlarged in Appendix 1.



Read through all of the tasks carefully, so that you know what you will need to do to complete this assignment.

Important:

- You will need to refer to the marking criteria grid. Your teacher can explain the marking criteria if you need further clarification.
- You will need to draw upon relevant skills/knowledge/understanding from other units you have studied in this qualification.

Your tasks and marking grids

Task 1 – Manufacture templates

Topic Area 1.1 is assessed in this task.

A working drawing for the mobile phone holder is provided in Appendix 1. You must use this to make templates that can be used in production to check that parts are correct.

You must:

- measure, mark out and cut out templates for the parts using a manual process or CNC.
- use annotated photos or a video to show the measuring and marking out of the different parts.

Total marks for Task 1: 6 marks

Advice

- Use the working drawing to measure and mark out accurately.

Topic Area 1.1: Manufacture and use templates

MB1: 1–2 marks	MB2: 3-4 marks	MB3: 5-6 marks
Basic application of understanding and skills to partly achieve the intended result, but it would not be useable without further input/work. **Dependent** upon assistance or help from other sources to measure, mark out and cut out templates for the parts accurately.	**Adequate** application of understanding and skills to produce the intended result in a way that would be useable for its purpose. Accurate templates are measured, marked out and cut out with **some** assistance or help from other sources.	**Effectively** applies understanding and skills to successfully produce the intended result in a way that would be fit-for-purpose. Able to accurately measure, mark out and cut out templates for the parts **independently.**

If your work does not meet any Mark Band 1 criteria, you will be awarded zero marks for this task.

Task 2 – Produce a standard operating procedure

Topic Areas 1.2, 1.3 and 1.4 are assessed in this task.

You must prepare a standard operating procedure (SOP) which will be used in production to guide the manufacture of the phone holder using computer numerical control (CNC) equipment.

You must prepare a SOP which includes:

- the CNC process or processes to be used.
- the sequence of operations required.
- appropriate operating parameters for the CNC operation.
- any other required instructions.

Total marks for Task 2: 14 marks

Advice

- Your SOP should be clear and make it easy for someone else to follow your instructions.
- You should include any instructions that you think are needed to manufacture the phone holder.

Topic Areas 1.2, 1.3 and 1.4: Determine the sequence of operations, appropriate operating parameters for CNC equipment and produce standard operating procedures

MB1: 1–5 marks	MB2: 6-10 marks	MB3: 11-14 marks
The SOP includes **basic** information, however additional content would be required.	The SOP includes **adequate** information to make the product.	The SOP produced includes **all** the information required to manufacture the product.
Few of the operations required are identified but additions may be needed and the sequence may need adjustment to be workable.	**Some** of the operations required are identified. The sequence of operations may need minor adjustment to be a workable sequence.	**All** of the operations required are identified in a logical and workable sequence.
Few of the operating parameters for the CNC equipment are identified, however would not provide a satisfactory outcome without further input/work.	**Some** of the operating parameters for the CNC equipment are identified and should provide a satisfactory outcome with minimal adjustment.	**All** of the operating parameters for the CNC equipment are identified and appropriate and should provide a satisfactory outcome without adjustment.

If your work does not meet any Mark Band 1 criteria, you will be awarded zero marks for this task.

Task 3 – Use CAD software

Topic Areas 2.1 and 2.2 are assessed in this task.

You must use CAD software to generate the instructions required to operate the CNC equipment.

You must:

- use the provided drawings of the phone holder in Appendix 1 to create working drawings suitable for use by the CNC equipment.
- use CAD software to generate instructions to operate the CNC equipment. This **may include** setting datums, specifying the sequence of operations, setting tool changes and specifying tool offsets, as required by the equipment.
- carry out on-screen simulation/animation of the CNC operation, providing screen shots for evidence.
- export information from the CAD software to the CNC equipment, providing screen shots for evidence.

Total marks for Task 3: 14 marks

Advice

- Use annotated screen shots to show how you have used the CAD software to generate instructions to operate the CNC equipment.
- Use annotated screen shots to show how you have carried out on-screen simulation of the CNC operation.
- Use annotated screen shots to show that you have exported information from the CAD software to the CNC equipment.
- On-screen simulation can be carried out using a separate CAD software package or an animation of the operation. If an on-screen simulation is not available, you can evidence this task with a video of a practice operation.

Topic Areas 2.1 and 2.2: Use CAD software and program CNC machine operations

MB1: 1–5 marks	MB2: 6-10 marks	MB3: 11-14 marks
Produces **basic** CAD drawings that include some relevant information however some additional features would be required to create instructions for the CNC operation.	Produces **adequate** CAD drawings that include most of the information required to create instructions for the CNC operation.	Produces **comprehensive** CAD drawings that are accurate and include all of the information required to create instructions for the CNC operation.
Carries out on-screen simulation of **few** aspects of the CNC operation.	Carries out on-screen simulation of **most** aspects of the CNC operation.	Carries out an **effective** on-screen simulation of the CNC operation, making adjustments if required.
Limited application of understanding and skills to partly achieve the intended result, but information is not exported from the CAD software to the CNC equipment.	Understanding and skills are used to **partially** export the information from CAD software to CNC equipment that does not fully meet the requirements.	Understanding and skills are used to **fully** export the information from CAD software to CNC equipment in a way that would be fit-for-purpose.

If your work does not meet any Mark Band 1 criteria, you will be awarded zero marks for this task.

Task 4 – Set up and operate CNC equipment

Topic Areas 3.1 and 3.2 are assessed in this task.

You must set up and operate the CNC equipment to manufacture the parts for one phone holder.

You must:

- set up the CNC equipment, including tooling, work holding, setting datum points and meeting any safety requirements.
- operate the CNC equipment to produce the parts.
- use annotated images to show safe use of the machining process and the completed product.
- ask your teacher to complete a teacher observation record for this task.

Total marks for Task 4: 14 marks

Advice

- Use annotated photos or a video to show safe use of the machining process.
- Provide photos of the completed product.

Topic Areas 3.1 and 3.2: Setting up and operating CNC equipment

MB1: 1–5 marks	MB2: 6-10 marks	MB3: 11-14 marks
Dependent upon reminders of safety requirements in order to work safely.	Worked safely with **some** reminders of safety requirements.	Worked safely at **all** times without additional instruction.
Basic application of understanding and skills to partly achieve the intended result, but it would not be useable without further input/work.	**Adequate** application of understanding and skills to produce the intended result in a way that would be useable.	**Effectively** applies understanding and skills to successfully produce the intended result in a way that would be fully fit-for-purpose.
Dependent upon assistance or help from other sources to set up and operate CNC equipment to successfully manufacture the part(s).	**Some** assistance or help from other sources is required to set up and operate CNC equipment to successfully manufacture the part(s).	Able to set up and operate CNC equipment **independently** to successfully manufacture the part(s).

If your work does not meet any Mark Band 1 criteria, you will be awarded zero marks for this task.

Task 5 – Quality control

Topic Area 3.3 is assessed in this task.

You must apply quality control methods and assemble the finished item.

You must:

- take images of the parts of your phone holder compared to the templates.
- compare the dimensions of the parts to the engineering drawing in Appendix 1 and record the results.
- assemble your finished product.
- take images of the assembled phone holder. You should add labels pointing out important features.

Total marks for Task 5: 12 marks

Advice

- Use annotated photos or a video to compare your parts with the templates
- Use annotated photos or a video to show your assembled product

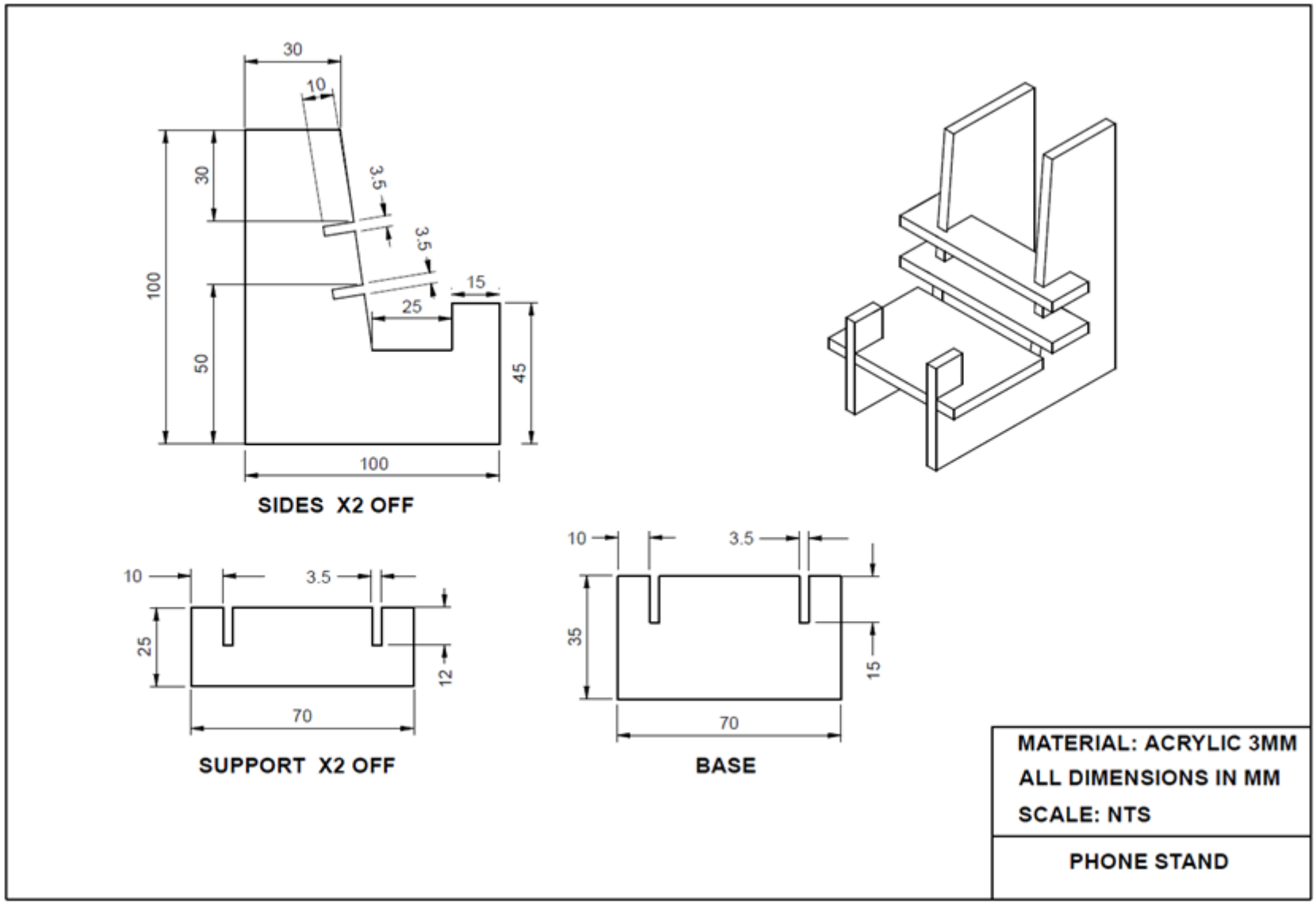
Topic Area 3.3: Apply quality control methods

MB1: 1–4 marks	MB2: 5-8 marks	MB3: 9-12 marks
Measured **few** of the features on the drawing although some methods may have not been the most appropriate. **Basic** application of understanding and skills to partly achieve the intended result, but it would not be useable without further input/work.	Measured **some** of the features on the drawing using appropriate methods. **Adequate** application of understanding and skills to produce the intended result in a way that would be useable.	Provided accurate and repeatable measurements of **all** of the features on the drawing using appropriate methods. **Effectively** applies understanding and skills to successfully produce the intended result in a way that would be fully fit-for-purpose.

If your work does not meet any Mark Band 1 criteria, you will be awarded zero marks for this task.

Appendix 1

Working Drawing of the Mobile Phone Holder



Marking criteria words

The tables below show the descriptor words that will be used in the NEA Marking Criteria grids. They explain the type of evidence that you should expect to see to meet each descriptor word.

Mark Band (MB1) Words:

Word	Meaning
Basic	• Work includes the minimum required. It is a starting point but is simplistic and not developed. • Understanding and skills are applied in a way that partly achieves the wanted or intended result, but it would not be useable without further input or work.
Brief/Briefly	• Work includes a small number of relevant facts or concepts but lacks detail, contextualisation or examples.
Dependent	• The student can perform a task when given regular assistance or help
Few	• Work produced is restricted or narrow. It includes less than half of the information or examples expected for a full response.
Inefficient	• Outputs are produced but with great expense or effort because of poor organisation or design and not making the best use of available resources.
Limited	• Work produced is restricted in range or scope and includes only some of the information required. It evidences partial rather than full understanding. • Work produced is a starting point rather than a developed process, concept or output.
Minimal	• Includes very little in amount or quantity required.
Simple	• Includes a small number of relevant parts, which are not related to each other.
Superficial	• Work completed lacks depth and detail.

Mark Band (MB2) Words:

Word	Meaning
Adequate(ly)	• Work includes the appropriate number of relevant facts or concepts but does not include the full detail, contextualisation or examples.
Assisted	• The student can perform a task with occasional assistance or help.
Part(ly)/Partial	• To some extent but not completely. • Work produced is inclusive in range and scope. It evidences a mainly developed application of understanding, performance or output needed. • Work produced results in a process, concept or output that would be useable for its purpose.
Some	• Work produced is inclusive but not fully comprehensive. It includes over half the information or examples expected for a full response.
Sound	• Valid, logical, shows the student has secured most of the relevant understanding, but points or performance are not fully developed. • Applies understanding and skills to produce the wanted or intended result in a way that would be useable.

Mark Band (MB3) Words:

Word	Meaning
Accurate(ly)	• Acting or performing with care and precision. • Correct in all details.
All	• Work produced is fully comprehensive and wide-ranging. It includes almost all, or all the information or examples expected for a full response.
Clear(ly)	• Focused and accurately expressed, without ambiguity.
Complex	• Includes many relevant parts, all of which relate to each other logically.
Comprehensive(ly)	• The work produced is complete and includes everything required to show depth and breadth of understanding. • Applies the understanding and skills needed to successfully produce the wanted or intended result in a way that would be fully fit-for-purpose.
Consistent(ly)	• A level of performance which does not vary in quality over time.
Critical	• Objective analysis and evaluation in order to form: a judgement, evaluation of the evidence or effective trouble shooting/fault finding.
Detailed	• Gives point by point consideration of all the key information.
Effective	• Applies the skills required to the task and is successful in producing the desired or intended result. • The work produced is effective in relation to a brief.
Efficient	• Able to produce results or outputs with the minimum expense or effort, because of good organisation or design and making the best use of available resources.
Full(y)	• Work produced is comprehensive in range and scope. It evidences a fully developed application of understanding, performance or output needed. • Work produced results in a process, concept or output that would be fully fit-for-purpose.
Independent(ly)	• The student can perform a task without assistance or reliance on others
Justify/Justified	• The reasons for doing something are explained in full.
Most(ly)	• Includes nearly all of what is expected to be included.
Wide (ranging)	• Includes many relevant details, examples or contexts; all of which are fully detailed, contextualised or exemplified.

Teacher Observation Record

Please read the **guidance notes** on the following page before completing this form.

Student name:	
Qualification:	Cambridge OCR Level 1/Level 2 Cambridge National in Engineering Manufacture
Unit number and title:	Unit number: R016
	Unit title: Manufacturing in quantity
Activity observed:	Task title: Set up and operate CNC equipment
	Task number: 4
Date activity completed:	
Additional evidence attached:	

TEACHER SECTION:			
How did the student complete the activity? **Your response must provide details of what the student did and how this relates to the relevant marking criteria.**			
STUDENT SECTION:			
I agree with my teacher's description of how I completed this activity.		Yes ☐	
Additional student comments:			
Student signature		**Date:** (DD/MM/YYYY)	
Teacher name:			
Teacher signature:		**Date:** (DD/MM/YYYY)	

Teacher observation record guidance notes

The class teacher and student being observed are responsible for completing this form.

The Teacher Observation Record is used by the teacher to detail their observation of a student completing an activity. In order to provide sufficient evidence, the completed form must give contextualised details of what the student did and how this relates to the marking criteria. Simply providing statements from the marking criteria is not acceptable. The evidence provided must be individual to the student.

The Teacher Observation Record is also used to show that the student agrees with the teacher's assessment of this activity.

The information given by the teacher must be shared with the student for the student to agree, or otherwise. If the student does not agree with the teacher's comments and links to the marking criteria, they must have the chance to talk about these further with the teacher to reach an agreed outcome **before** the work is submitted for moderation.

Both the teacher and student must sign and date the form to provide evidence of this agreement.

Additional evidence of the student completing the activity must also be provided with the form. The types of additional evidence that are acceptable are detailed in Task 4.

Teacher observation records must:

- describe what the teacher observed the student doing
- include how well the activity was completed and the reasons for this evaluation
- include confirmation from the student that they agree with the comments and reasons
- be accompanied by additional evidence as required in Task 4

Teacher observation records must not:

- be a simple repeat of the grading criteria
- be completed by anyone but the teacher observing the activity and the student completing the activity
- be written by the student for the teacher to sign
- contain just a list of skills
- be used to evidence the achievement of a whole unit or task in isolation

Tell us what you think

Your feedback plays an important role in how we develop, market, support and resource qualifications now and into the future. We want you and your students to enjoy and get the best out of our qualifications and resources, but to do that we need your honest opinions to tell us whether we're on the right track or not.

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