T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Science

Occupational specialism assessment (OSA)

Metrology Sciences

Assignment 1 - Pass

Guide standard exemplification materials

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T Level Technical Qualification in Science
Occupational specialism assessment

Guide standard exemplification materials

Metrology Sciences

Assignment 1

Contents

Introduction

The material within this document relates to the Metrology Sciences occupational specialism sample assessment. These exemplification materials are designed to give providers and students an indication of what would be expected for the lowest level of attainment required to achieve a pass or distinction grade.

The examiner commentary is provided to detail the judgements examiners will undertake when examining the student work. This is not intended to replace the information within the qualification specification and providers must refer to this for the content.

In assignment 1, the student must perform an equipment inspection, an equipment check, and a report on the findings.

After each live assessment series, authentic student evidence will be published with examiner commentary across the range of achievement.

Task 1 – visual inspection

Scenario

You have been hired by a national kitchen design and installation company to work in their quality control department.

Your company has asked you to review length measuring equipment for suitability, accuracy and fitness for purpose.

You will need to report back to the director that equipment is suitable and fit for use. In the event that further equipment is required, you will need to recommend suitable equipment, based upon the benefit of investment.

The business is split into 3 areas:

- the design team who visit customers' homes to design and plan the new kitchen
- the manufacturing team who make the kitchen units in the factory
- the installation team who install the kitchens in customers' homes

Task

Complete an inspection of 2 pieces of measurement equipment from each department (6 in total) in the company and record the findings.

Complete a risk assessment for the use of these pieces of equipment using the template provided.

Student evidence

Criteria	**Essential criteria** (all essential criteria must be awarded to pass)	**Assessor check**	**Marks awarded**
Selected 2 suitable pieces of equipment from each department Guidance: suitable means suitable for the task	Yes	6 suitable pieces of equipment selected as required, some equipment not suitable for each department.	1 mark for selecting 6 pieces. 1 mark for 2 suitable pieces from each department. (**maximum 2 marks**) 1 awarded
Inspected each piece of equipment in respect of overall condition Results recorded for later reporting	Yes	Only 4 pieces inspected and results recorded.	1 mark for 2 items inspected and result of overall condition recorded. (**maximum 3 marks)** 2 awarded

Criteria	**Essential criteria** (all essential criteria must be awarded to pass)	**Assessor check**	**Marks awarded**
Inspected each piece of equipment in respect of units Results recorded for later reporting	No	Only 4 pieces inspected and results recorded.	1 mark for 2 items inspected and results recorded. **(maximum 3 marks)** 2 awarded
Inspected each piece of equipment in respect of markings and calibration marks Results recorded for later reporting	No	Only 4 pieces of equipment inspected and results recorded in the allotted time.	1 mark for 2 items inspected and results recorded. (**maximum 3 marks)** 2 awarded
Applied safe handling requirements for equipment, including the use of personal protective equipment if required	Yes	Safe handling of all equipment throughout – no PPE required for the equipment selected.	1 mark 1 awarded
Maintained health and safety of the workstation throughout, for example, maintained organisation of all equipment being used, safe use of any chemicals or electrical equipment, appropriate handling of all equipment and tools	Yes	Correctly maintained the safety of the workstation throughout the task and safely used electrical equipment.	1 mark 1 awarded
Completed all required preparation tasks on the equipment, such as cleaning, fixturing or clamping	No	All 4 pieces of equipment were cleaned before inspection – no other preparation tasks were completed.	1 mark for preparation of equipment. 1 mark for cleaning equipment. 1 mark for clamping/securing equipment. (**maximum 3 marks)** 1 awarded

Criteria	**Essential criteria** (all essential criteria must be awarded to pass)	**Assessor check**	**Marks awarded**
Cleaned up the workstation and appropriate surfaces following the completion of the inspection, returned all equipment to storage location, disposed of any waste product appropriately	No	Equipment was returned to its original location, surfaces were not cleaned down, but all waste was disposed of suitably.	1 mark for cleaning workstation and surfaces. 1 mark for return/storage of equipment used and/or any disposal of waste. (**maximum 2 marks)** 1 awarded
Total marks			18 marks 11 awarded

Risk assessment form

Person carrying out risk assessment:	**P. Student**
Persons responsible on-site:	A. Manager
Venue:	Metrology workshop
Work activity:	Safe use of inspection equipment
Date of assessment:	20/11/2020

THOSE AT RISK	KEY
Own staff	OWN
Venue staff	VEN
Organisers	ORG
Visitors	VIS
Public	PUB
Contractors	CON
All persons on-site	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	Resultant risk level
Tripping – tape measure	OWN	Likely	3	9	Tape measure to be coiled up when not in use	Extremely improbable	1	1
Splinter – Wooden 1m ruler	OWN	Likely	2	6	Wooden ruler surface to be checked to see if it is rough	Unlikely	1	2
Flooring – trip or slip hazards	OWN	Likely	1	3	Move anything that is in the way and clean up any slips or anything	Probable	1	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	Resultant risk level
Desk area	OWN	unlikely	1	1	Some things may be laid on the desk that could break or damage the equipment or cut or hurt the operator	Unlikely	1	1

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 area are controlled.

Signed	**P. Student**
Print name	P. Student
Review date	20/11/2020

Task 2 – completing metrology measurement equipment checks

Scenario

You have examined 6 pieces of length measuring equipment from 3 different departments and recorded your findings. You are now preparing to compare the equipment to the suitable standard.

The director of the company has asked you to collect all your results and measurements in order to monitor which company equipment is accurate.

This will help to evaluate the effectiveness of the current equipment pool and allow you to recommend where changes should be made in the future.

Task

Measure one piece of equipment against a suitable standard and record the results.

Use the piece of equipment to measure the unit template provided and record the results.

Student evidence

Criteria	**Essential criteria** (all essential criteria must be awarded to pass)	**Assessor check**	**Marks awarded**
Applied safe handling requirements for equipment, including the use of personal protective equipment if required	Yes	Safe handling and practices were adhered to throughout the task with appropriate use of equipment – no PPE required.	1 mark 1 awarded
Maintained health and safety of the workstation throughout, for example, maintained organisation of all equipment being used, safe use of any chemicals or electrical equipment, appropriate handling of all equipment and tools	Yes	Correctly maintained the safety of the workstation throughout the task.	1 mark 1 awarded

Criteria	**Essential criteria** (all essential criteria must be awarded to pass)	**Assessor check**	**Marks awarded**
Completed all required preparation tasks on the equipment, such as cleaning, fixturing or clamping	No	No further preparation tasks conducted on the equipment or template.	1 mark for preparation of equipment. 1 mark for cleaning equipment. 1 mark for clamping/securing equipment. (**maximum 3 marks)** 0 awarded
Selected a suitable standard to check the selected piece of equipment	Yes	Correct standard used for comparison – 1m metal rule.	1 mark 1 awarded
Taken measurement of the equipment under test from a minimum of 2 points, including minimum or maximum, and one other	Yes	Measurement was taken across multiple points to ensure accuracy – minimum, maximum and midpoint were used.	1 mark for measurement from minimum or maximum **and** from one other point. (**maximum 1 mark**) 1 awarded
Selected suitable piece of equipment to measure the template	Yes	Suitable piece of equipment used to measure the template – 1m wooden rule.	1 mark 1 awarded
Taken measurements of equipment following the correct standard procedure consistently and accurately, with no errors for calibration and measurement	No	A standard procedure was accurately followed to allow for a comparison; however, there was some evidence of calibration error which led to some measurement error.	1 mark for following standard procedure consistently and accurately. 1 mark for no calibration errors. 1 mark for no measurement errors. (**maximum 3 marks**) 1 awarded

Criteria	**Essential criteria** (all essential criteria must be awarded to pass)	**Assessor check**	**Marks awarded**
Taken measurement of template following the correct standard procedure consistently and accurately, with no errors for calibration and measurement	No	The correct procedure was used consistently throughout the measurement task; however, some calibration error was evident due to the piece of equipment selected, which led to some measurement error. Although the equipment selected was suitable, there were better alternatives available.	1 mark for following standard procedure consistently and accurately. 1 mark for no calibration errors. 1 mark for no measurement errors. (**maximum 3 marks**) 1 awarded
Cleaned up the workstation and appropriate surfaces following the completion of the inspection, returned all equipment to storage location, disposed of any waste product appropriately	No	Equipment was returned to its original location, surfaces were not cleaned down, but all waste was disposed of suitably.	1 mark for cleaning workstation and surfaces. 1 mark for return/storage of equipment used and/or any disposal of waste. (**maximum 2 marks)** 1 awarded
Total marks			16 marks 8 awarded

Task 3 – assessing the results of metrology measurements

Scenario

You have completed your inspection and measurement of the equipment used in different departments of the company.

The director has asked you:

- to complete a short report to summarise your findings and the issues you have identified
- to provide possible recommendations to improve the measurement systems, and justify them

Task

Produce a report that:

- presents all results and measurements from task 1 (inspection of 6 pieces of equipment) and task 2 (measurement of the provided template) in a suitable format
- summarises your findings from the inspection of selected pieces of equipment and measurement of the template
- provides recommendations for the future, based on the inspections, measurements and the equipment currently available

Student evidence

Task 1 – inspection of equipment

I have done a visual inspection of some different types of inspection equipment used in the different departments at a kitchen fitting company. The result of my visual inspection can be found in the tables below. I found from visual inspections that the equipment used by the fitting team was more broken and damaged and overall they were in a worse condition and they will need changing more than the other departments. This might cause some risk as there might be wrong measurements and might lead to more low level injury.

Equipment	Inspection
Metal tape measure	In overall good condition after cleaning. The end of the tape measure is a little bit loose and I can't tighten it so that might make the results wrong if I use that. All of the markings on it are clear apart from at one spot where there is a little bit of wear, but it should be okay to use.
1m wooden ruler	There is a little chip off the end of the ruler past the 1m mark so that won't affect how well it can be used. The back side of it is flat so it lays true to the bench still. All of the cm units can be read so I will just use that side if needed. The inches units are a little bit used.

1m metal ruler	The metal ruler is in good condition with no issues.
Digital vernier caliper	The digital caliper is in good condition apart from the screen is very dark in one corner. The measurement can just be rounded though. Everything else works as it should.

Task 2 – measuring the template

I used a 1m wooden ruler to measure the template. This is because the template looked to be a lot less than 1m, and the ruler is easy to handle and can give me reliable results as long as I line it up correctly. I compared it to a metal ruler as a standard and found that the units were suitable and that the markings were clear enough to use. I measured the length, width and height of the template 3 times to find the right measurement of each. The measurements are shown here. I don't think that there is any issue with the equipment that is being used within the departments, but there are some changes that can be made, but because of how cheap the product is, there is no need to spend a lot of money on improving the equipment, as the profit margin on each product will be reduced, and the equipment will be more expensive to repair if it gets broken on site, there are some replacements that could be done though which are listed below.

Piece	**Measurements**
Length	60.5cm, 60.4cm, 60.5cm
Width	61.2cm, 60.8cm, 60.8cm
Height	59.85cm, 59.9cm, 59.9cm

To improve the accuracy of the measurements taken, the director should buy new equipment as the old equipment was damaged as I saw from my visual inspection. Most of it could still be used, but none of it was perfect. The 4 bits of equipment I had would have been difficult to measure the equipment provided; this is because the tape measure was loose so it wouldn't have been accurate and the rulers were hard to use when I had to keep moving it around. I think the company should buy some new tape measures as they would have been the easiest tool to use and cheap.

Examiner commentary

The student has completed a basic inspection of some measuring equipment. The student has not completed all 6 inspections in the time given, but the inspection meets the minimum requirements of industry and meets all the minimum criteria outlined in the mark scheme, which display competent metrological skills and knowledge.

The student has completed all of the critical elements of the inspection and has satisfactorily assessed the major risks associated with carrying out the activity. They have made appropriate judgments on the risk ratings for each hazard and suggested reasonable countermeasures. Some consideration has been given to the hierarchy of control. The student has considered the impact of using incorrect or damaged equipment, but this will be basic at the pass level.

During task 2, the student has completed a basic measurement task and displayed competent metrological techniques to complete the task, with some minor error in technique or results evident. They have demonstrated an adequate understanding of the relative strengths and limitations of measuring equipment in order to determine the most effective piece of equipment for the task at hand. They have displayed metrological knowledge and skills to effectively compare the selected piece of equipment against the required standard and record the measurements within the provided template.

The student has demonstrated effective measurement skills to complete the set task, with correct procedures used and measurements carried out in a safe manner. The piece of equipment selected for measurement has been accurately compared to a suitable standard before the measurement takes place. The equipment selected was suitable for the measurements being taken, even if there may have been more efficient methods or more reliable equipment.

In the final task, the student makes minimal judgements of the suitability of the equipment, based upon the performance during the first 2 tasks, and demonstrates limited understanding of the industry and its needs with the recommendations provided.

The student has provided basic recommendations, however these are valid. Some of the recommendations provided have been justified, however not all recommendations have been justified and some are lacking in detail. The student demonstrated metrological knowledge by commenting on the outcomes of the continued use of old, inaccurate, or damaged equipment. The results of the inspection and measurement are presented in a clear format, that is suitable for the industry and a clear supporting commentary of the results and the activities undertaken to obtain the results has been completed.

Overall grade descriptors

The performance outcomes form the basis of the overall grading descriptors for pass and distinction grades.

These grading descriptors have been developed to reflect the appropriate level of demand for students of other level 3 qualifications and the threshold competence requirements of the role, and have been validated with employers within the sector to describe achievement appropriate to the role.

Occupational specialism overall grade descriptors

Grade	Demonstration of attainment
Pass	The evidence is logical but displays minimal knowledge of basic metrological content in response to the demands of the brief.
	The student makes some use of relevant knowledge and understanding of how metrology informs practices in many sectors and demonstrates a limited understanding of perspectives or approaches associated with basic measurement tasks and principles.
	The student makes adequate use of facts/theories/approaches/concepts and attempts to demonstrate breadth and depth of metrological knowledge and understanding.
	The student is able to identify some metrological information from appropriate sources and makes use of appropriate information/appraises relevancy of information and can combine information to make decisions.
	The student makes minimal judgements/takes appropriate action/seeks clarification with metrological sources of guidance and is able to make limited progress towards solving non-routine problems in real life measurement activities/situations.
	The student attempts to demonstrate metrological skills and knowledge of the relevant concepts and techniques reflected in a measurement services role and generally applies this across different contexts and measurement skill sets.
	The student shows adequate understanding of unstructured measurement-related problems that have not been seen before, using limited knowledge to find solutions to problems and make justification for strategies for solving problems, explaining their reasoning.
Distinction	The metrological evidence is precise, logical and provides a detailed and informative response to the measurement-related demands of the brief.
	The student makes extensive use of relevant knowledge and understanding of how metrology informs practices in many sectors and demonstrates an understanding of perspectives or approaches associated with basic measurement tasks and principles.

	The student makes decisive use of facts/theories/approaches, demonstrating extensive breadth and depth of metrological knowledge and understanding, and selects highly appropriate skills/techniques/methods.
	The student is able to comprehensively identify metrological information from a range of suitable sources and makes exceptional use of appropriate information/appraises relevancy of information and can combine information to make coherent measurement decisions.
	The student makes well founded judgements/takes appropriate action/seeks clarification with metrological sources of guidance and is able to use that to reflect on real life measurement activities/situations.
	The student demonstrates extensive metrological skills and knowledge of the relevant concepts and techniques reflected in a measurement services role and precisely applies this across a variety of contexts and tackles unstructured problems that have not been seen before, using their knowledge and measurement skill sets to analyse and find suitable solutions to the measurement problems.
	The student can thoroughly examine metrological data/information in context and apply appropriate analysis in confirming or refuting conclusions and carrying out further work to justify strategies for solving problems, giving concise explanations for their reasoning.

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				

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 on-site	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**	**Resultant 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**	**Resultant 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 area are controlled.

Signed	
Print name	
Review date	

Document information

The T Level Technical Qualification is a qualification approved and managed by the Institute for Apprenticeships and Technical Education.

Owner: Head of Assessment Design

Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Published final version.		June 2021
v1.1	NCFE rebrand		September 2021