
Welcome to the T Level
Engineering & Manufacturing
The webinar will begin shortly
May 2023

Engineering and Manufacturing

T Level Core Component Support Session for the Theory Exam

Using the webinar platform

Our action plan supports the planning and delivery stages to prepare for the TQ launch

Send any questions in the question area throughout the webinar

All attendees will be set to mute

Webinar resources will be shared on our website shortly after

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Agenda

Agenda	
1	Overview of the core theory exams
2	Assessment objectives
3	Command verbs
4	Question types
5	Hints and tips
6	Q&A

- Overview of the core theory exams
- Assessment objectives-relating to question types
- Use of command verbs in questions
- Question types using sample assessments
- Deconstructing an exam question
- Hints and tips

- Occupational specialism assessments
- ESP
- Delivery and curriculum planning outside of the Technical Qualification

Technical Qualification – Core Examination (all pathways)

Overview of the Core Assessment for Engineering & Manufacturing

Learners must complete:

- **Two** externally set exams covering knowledge from the Engineering core (component 680)
- **One** employer-set project covering knowledge and skills from either pathway. **Note:** ESP is different for each pathway (component 680)

Technical Qualification scheme of assessment overview– Design & Development Pathway **(page 20 specification)**

Core component – Learners must complete all assessment components						
Assessment component	**Method**	**Duration**	**Marks**	**Weighting**	**Marking**	**Grading**
Exam paper 1	**Externally set exam**	**2.5 hours**	**100**	**35%**	**Externally marked**	This component will be awarded on the grade scale A* -E
Exam paper 2	**Externally set exam**	**2.5 hours**	**100**	**35%**	**Externally marked**	
Employer-set project	Externally set project	18.5 hours	90	30%	Externally marked	

Technical Qualification scheme of assessment overview – Maintenance, Installation and Repair Pathway (page 20 specification)

Core component – Learners must complete all assessment components						
Assessment component	**Method**	**Duration**	**Marks**	**Weighting**	**Marking**	**Grading**
Exam paper 1	Externally set exam	2.5 hours	100	35%	Externally marked	This component will be awarded on the grade scale A* -E
Exam paper 2	Externally set exam	2.5 hours	100	35%	Externally marked	
Employer-set project	Externally set project	12.5 hours	90	30%	Externally marked	

Technical Qualification scheme of assessment components – Manufacturing, Processing & Control Pathway

Core component – Learners must complete all assessment components						
Assessment component	**Method**	**Duration**	**Marks**	**Weighting**	**Marking**	**Grading**
Exam paper 1	Externally set exam	2.5 hours	100	35%	Externally marked	This component will be awarded on the grade scale A* -E
Exam paper 2	Externally set exam	2.5 hours	100	35%	Externally marked	
Employer-set project	Externally set project	15 hours	90	30%	Externally marked	

Timelines for Core Exam assessments windows (inc. retake/resit)

Core Assessments Summer 2023 assessment dates/windows	
Employer-Set Project (ESP) materials release	6 March 2023
Employer-Set Project (ESP) delivery window	13 March 2023 to 31 March 2023
Employer-Set Project (ESP) evidence upload deadline	31 March 2023
Exam Paper 1	6 June 2023 9:30-12:00*
Exam Paper 2	13 June 2023 9:30-12:00*
Special consideration requests deadline	Five working days after the exam/submission date

*Provisional until after General Qualifications (GQs) exam dates confirmed

Core Assessments Autumn 2023 assessment dates/windows	
Employer-Set Project (ESP) materials release	30 October 2023
Employer-Set Project (ESP) delivery window	6 November 2023 to 24 November 2023
Employer-Set Project (ESP) evidence upload deadline	24 November 2023
Exam Paper 1	28 November 2023 9:30-12:00*
Exam Paper 2	5 December 2023 9:30-12:00*
Special consideration requests deadline	5 working days after the exam/submission date

Engineering Core Theory Papers

The two exam papers have each been split into two sections which will be made up of different question types including short answer questions, structured questions, and extended response questions.

Both core exams will follow the same structure but each core exam covers different technical content. In both papers the level of difficulty will increase through the papers with lower demand questions at the beginning of the question paper to higher demand questions at the end of the question paper.

Paper 1 - Maths and Science Principles for Engineering (6 Elements) (2hrs 30mins)

Part A (70%) made up of 67 marks with 18 short and medium questions of a low tariff and medium tariff value. These short answer questions which target recall of knowledge, demonstration of understanding and application of knowledge and understanding.

Part B (30%) made up of 33 marks and includes 3 extended response questions which target application of knowledge and understanding and analysis and evaluation of information and issues.

	Element – Paper 1
4	Essential mathematics for engineering and manufacturing
5	Essential science for engineering and manufacturing
6	Materials and their properties
7	Mechanical principles
8	Electrical and electronic principles
9	Mechatronics

Engineering Core Theory Papers

The two exam papers have each been split into two sections which will be made up of different question types including short answer questions, structured questions, and extended response questions.

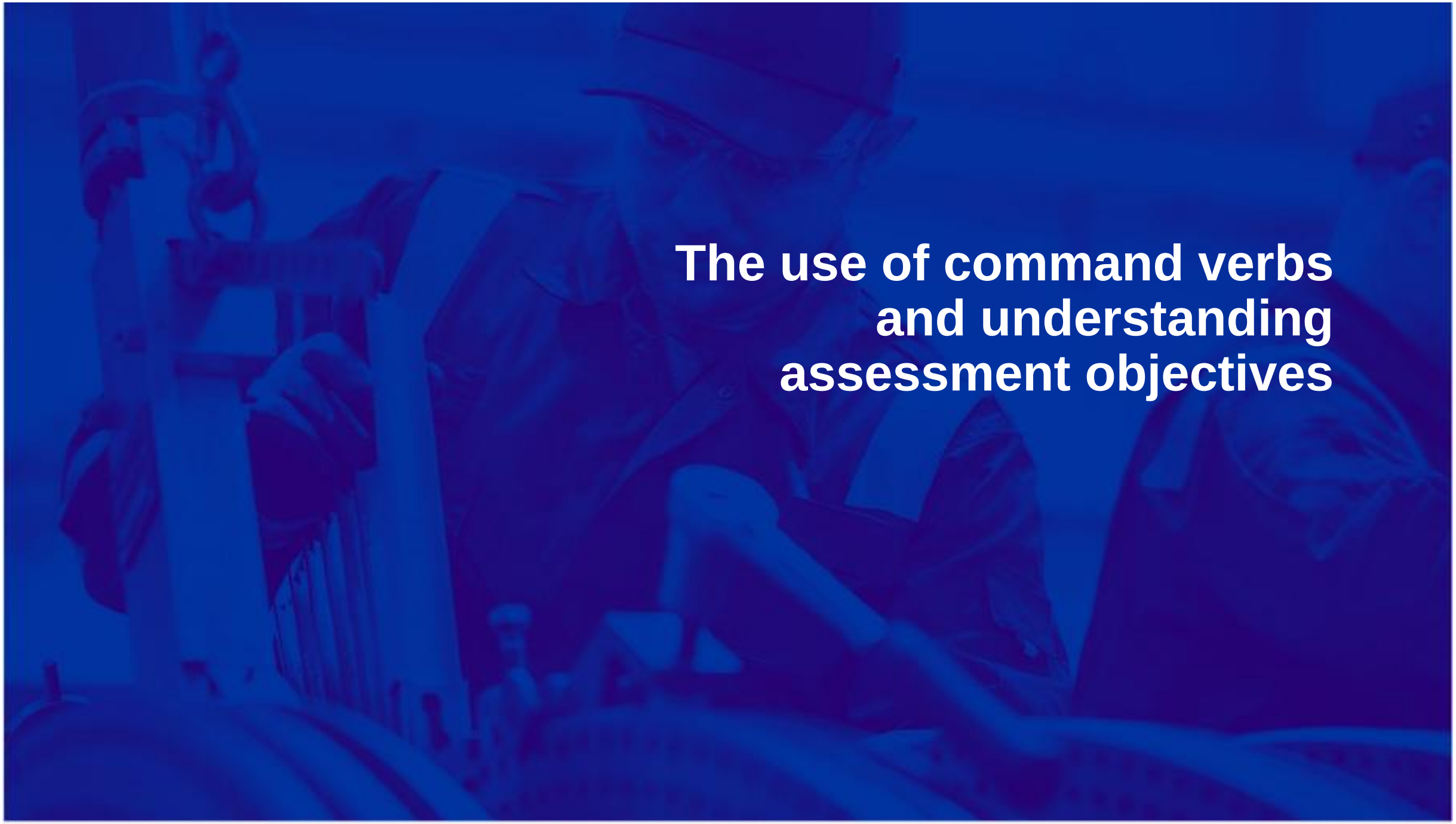
Both core exams will follow the same structure but each core exam covers different technical content. In both papers the level of difficulty will increase through the papers with lower demand questions at the beginning of the question paper to higher demand questions at the end of the question paper.

Paper 2 – Engineering in Context (11 Elements) (2hrs 30mins)

Part A (70%) made up of 67 marks with 11 short and medium questions of a low tariff and medium tariff value. These short answer questions which target recall of knowledge, demonstration of understanding and application of knowledge and understanding.

Part B (30%) made up of 33 marks and includes 3 extended response questions which target application of knowledge and understanding and analysis and evaluation of information and issues.

	Element – Paper 2
1	Working within the engineering and manufacturing sectors
2	Engineering and manufacturing past, present, and future
3	Engineering representations
10	Engineering and manufacturing control systems
11	Quality management
12	Health and safety principles and coverage
13	Business, commercial and financial awareness
14	Professional responsibilities, attitudes, and behaviours
15	Stock and asset management
16	Continuous improvement
17	Project and programme management

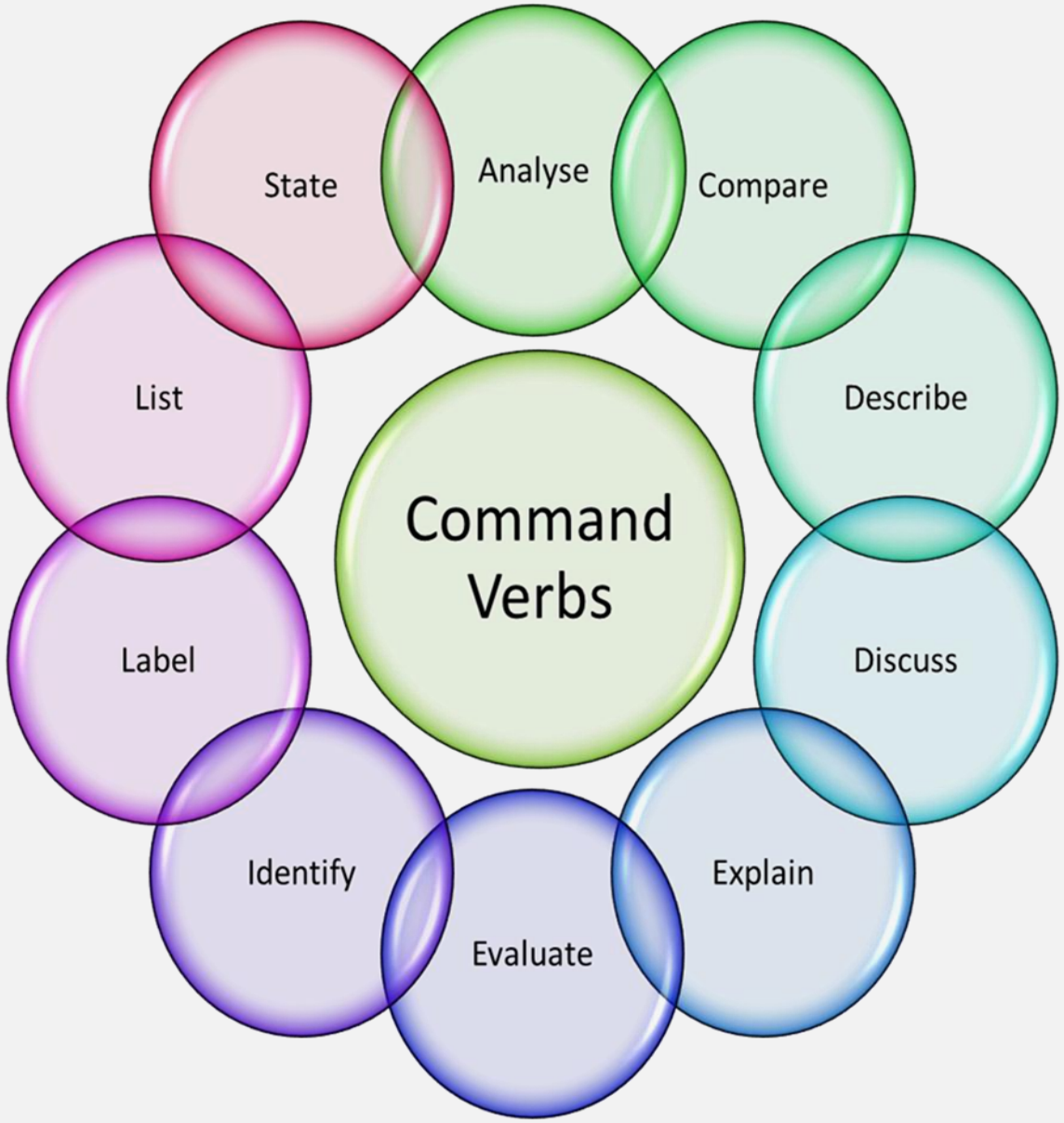


The use of command verbs and understanding assessment objectives

Exam Preparation

In examinations, certain words, often called command words, are used as prompts to give an indication to learners of the type of response that is expected by the question. These words include ‘state’, ‘describe’, ‘explain’ and ‘discuss’.

Command verbs in exam papers are the words your learners need to understand. They tell you what level of /depth of response the examiner is looking for.



Core exam

Assessment objective	Description
AO1 Demonstrate knowledge and understanding	All AOs require the ability to recall knowledge. AO1 refers to instances where the learner is required to demonstrate basic recall. In the test, this helps to give confidence in sufficiency of coverage of the content, and recognises that not all knowledge requires further understanding e.g. terminology, number facts etc. AO1 also covers the ability to explain principles and concepts beyond recall of definitions in order to be able to transfer these principles and concepts between contexts. Learners have built connections between related pieces of knowledge. AO1 therefore also covers the ability of the learners to show understanding by summarising or explaining concepts in their own words, exemplifying, or comparing and making inferences in general terms that show e.g. cause and effect.
AO2 Apply knowledge and understanding to different situations and context	Using and applying knowledge and understanding, of processes, procedures, generalisations, principles and theories to specified, concrete situations. AO2 is about being able to take the understanding of generalities and apply them to specific novel situations. It is more granular than the more extended synthesis/creation that may respond to an analysis of a more holistic complex situation/brief.
AO3 Analyse and evaluate information and issues	Learners will be provided with information e.g. in the form of a detailed / complex scenario, problem or data set. Learners analyse the interrelated issues arising, and where appropriate evaluate the approaches or decisions they may take (for example, the strengths and weaknesses or advantages and disadvantages) to achieve a good solution or outcome. Marks will be given for the quality of analysis and evaluation and the range of factors considered.

(page 22 specification)

Assessment objective	Description	Weighting for theory exam
AO1 a Demonstrate knowledge	The ability to demonstrate basic recall of relevant knowledge in response to straightforward questioning e.g. material properties.	10%
AO1 b Demonstrate understanding	The ability to explain principles and concepts beyond recall of definitions, but in a general way – i.e. out of a particular context in response to straight forward questioning e.g. simple concepts and terms of description in engineering contexts.	22%
AO2 Apply knowledge and understanding to different situations and contexts	Using and applying knowledge and understanding, taking the understanding of generalities and applying them to specific situations. Questions are likely to ask for application in relation to a straightforward situation – e.g. assessing the application of a single concept and the application of essential mathematical concepts.	46%
AO3 Analyse and evaluate information and issues	The ability to analyse the interrelated issues arising from a complex scenario and to evaluate these to propose a best solution or predict impacts etc e.g. – evaluating materials properties and requirements for engineered products.	22%

Assessment Weightings (more detailed explanations available in QHB)

Assessment Objective (AO)	Description The learner is required to..	Weightings	Typical Tariffs (marks)	Questions/ examination tasks that might prompt this sort of evidence	Typical command words used
Note: All AOs require the ability to recall knowledge.					
AO1 a Demonstrate knowledge	demonstrate basic recall	10%	Short, lower-tariff (marks) question types, typically require a separate point per mark	Simple questions that require knowledge that could be learned by rote (facts) with no requirement to go beyond recall & statement of fact: Labelling a diagram with names/locations definitions, facts, recall of purpose of something description of physical appearance of something.	• List • Label • Identify • State • Name • Select • Define • Describe a • Describe the process
AO1 b Demonstrate understanding	explain principles and concepts beyond recall	22%	Low to Medium-tariff (marks), may require a point or limited explanation for 1 mark with a further mark available for more depth or explanation	Straightforward questions requiring demonstration, beyond recall, of understanding about something. Response is in general terms, why is what does … mean? explain the use of… explanation of how something works explanation of the benefits/weaknesses of..	• Compare (and contrast) • Differentiate between • Give examples • Summarise • Explain

Assessment Weightings (more detailed explanations available in QHB)					
Assessment Objective (AO)	**Description** The learner is required to..	**OSC Weightings)**	**Typical Tariffs (marks)**	**Questions/ examination tasks that might prompt this sort of evidence**	**Typical command words used**
AO2 Apply knowledge and understanding to different situations and contexts	Using and applying knowledge and understanding , taking the understanding of generalities and applying them to specific situations	46%	Medium to high tariff (marks), will require the candidate to take their knowledge and understanding and apply it to the context/scenario given within the question	Given a clear, straightforward/narrow situation, the question requires selection and application of relevant principles and procedures in a way that is specific to the situation (rather than in general terms): what is the best approach to… in this situation? explain the process/ procedure to take when… what are the implications of …(specific rather than general situation).	Given information/ a narrow situation: • What is the best… • Explain the process when**…** • Use • Apply • Calculate • Work out • Estimate

Assessment Weightings (more detailed explanations available in QHB)

Assessment Objective (AO)	Description The learner is required to..	Weightings	Typical Tariffs (marks)	Questions/ examination tasks that might prompt this sort of evidence	Typical command words used
AO3 Analyse and evaluate information and issues	Use information they have been provided with e.g. in the form of a detailed scenario requiring them to analyse the interrelated issues arising and evaluate, e.g., the strengths and weaknesses or advantages and disadvantages of approaches they may take to achieve a good outcome	22%	Higher tariff (9-12 mark question types, 'discuss'-type questions expect a higher quality of response for higher marks, and these are usually marked using level of response marking (bands).	**Analyse** Given a relatively complex, realistic occupationally relevant scenario, analyse the situation recommending an approach to be taken to… analyse how the situation can be managed in order to… analyse the consequences of… **Evaluate information and issues related to the content** justify your decisions/approach evaluate how well … meets …standards evaluate how effective/ /efficient…	• Determine • Analyse • Discuss • Evaluate • Justify

Command word	Definition	Likely AO(s)
Identify	recognise something, usually from an image, and state what it is	AO1a
Label	add names or descriptions, indicating their positions, on e.g. an image/ drawing	AO1a
List	give as many answers/ examples as the question indicates	AO1a
State	give the answer, clearly and carefully	AO1a
Name	give the (technical) name of something	AO1a
Select	choose (e.g. the correct material/tool for the job) by making careful decisions	AO1a
Define	give the meaning of something, usually of a technical term	AO1a
Describe a…	write what something is like – usually what it looks, tastes, feels, sounds like etc,	AO1a
Describe the process for…	give the steps in a process	AO1a
Compare (…and contrast) (or ***describe*** the similarities/differences)	look for and describe the similarities (and differences) between two or more things/ circumstances	AO1b
Differentiate between	show or find the characteristic differences between two or more similar things/ concepts	AO1b
Distinguish between	describe the characteristic differences between two things, or make one thing seem different from another	AO1b
Annotate	add explanatory notes and comments	AO1b
Give example(s) **Illustrate/**	use examples or images to support, clarify or demonstrate e.g. an explanation	AO1b
Calculate	work out the answer to a problem using mathematical operators and concepts	AO1b
Summarise	give the main/ key points, which give a broad overview of something	AO1b
Explain the…	make clear or easy to understand by giving details and linked reasoning	AO1b

Command word	Definition	Likely AO(s)
Explain why /consequences of/ reasons for…	give the causes of/ rational for something	AO1b, AO2
Explain how…	Give the steps in e.g. a process, clarifying causal relationships	AO2/AO3
Discuss	talk/write about a topic in detail, considering the different issues, ideas, opinions related to it	AO3
Analyse	study or examine usually a complex issue in detail to identify essential elements, causes, characteristics etc	AO3
Give a rationale	Explain why you have taken particular actions/ decisions	AO3
Justify your decisions	Make a case for the decisions/ actions taken explaining why they particularly meet the particular circumstances/ context	AO3
Describe the effect of (e.g. an event)…. **Describe** the effect on …..…	write about what has changed/happened because of the e.g. event	AO2/AO3
Evaluate	Make an analysis about the success/ quality of e.g. end product/outcome – usually systematic, proposing improvements	AO3

Assessment objectives in relation to command Verbs and question types

Examples of question types

Core exam

Paper 1

Paper 2

Extended response questions

Question Layout

Quality of extended responses will be assessed in questions marked with an asterisk (*).

21* A company has been asked to develop a wheelchair that will be used by an athlete in the Paralympics. The wheelchair needs to be manually powered and will be used for long distance racing on roads and track, and must be manufactured as a one-off.
Discuss the factors that are most important when selecting the materials to make the wheelchair and recommend a suitable main material for the frame, justifying your choice. (12 marks)

Many questions cover various:-
Assessment objectives

Many questions cover various:-

- learning outcomes
- This is cross referenced to the course handbook.

Total marks	12
AO	AO2 = 4 AO3 = 8
Qual spec reference	Synoptic 5.6, 6.1, 6.2, 6.3, 6.4, 6.5, 7.2 Could also draw from 5.1, 5.4, 6.6, 7.1. 8.1

Section A – Paper 1

3 Define the following terms used in engineering:

(a) Reliability (1 mark)

(b) Accuracy (1 mark)

(c) Precision (1 mark)

Command verb is **Define**-give the meaning of something, usually of a technical term. (AO1a)

Mark Scheme	a) The degree of consistency of measurement / the ability to get similar results when an activity is repeated [1] b) How close a measurement is to the accepted or true value [1] c) How close measurements of the same feature are to each other [1]	**Marking guidance** 1 mark for each correct definition, up to a maximum of 3 marks.
Total marks	3	
AO	AO1a = 3	
Qual spec reference	5.3 – scientific methods and approaches to scientific inquiry and research	

Section A – Paper 1

7 The shape in Figure 1 must be accurately measured before manufacturing.
Calculate the length of side KL. (3 marks)

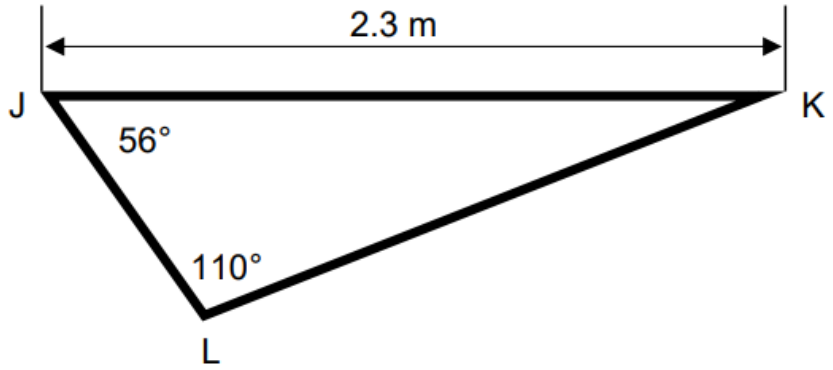


Figure 1 – Not to scale

Command verb is **Calculate**-work out the answer to a problem using mathematical operators and concepts. (AO1b)

Mark Scheme	Rearranging the sine rule $KL = \frac{KJ \sin J}{\sin L}$ [1] $= \frac{2.3 \sin 56°}{\sin 110°}$ [1] $= 2.03\ m$ [1]
Total marks	3
AO	AO1b = 3
Qual spec reference	4.1.5.5 – sine and cosine rules

Section A – Paper 2 – four-part question

5 A company manufactures parts for car engines on a production line.

(a) Explain **two** reasons why the company may use condition-based monitoring rather than preventative maintenance for the machines on the production line. (4 marks)

(b) State **two** legal responsibilities for health and safety that apply to the employees operating the machining processes on the production line. (2 marks)

5(a) - Command verb is **Explain -** make clear or easy to understand by giving details and linked reasoning (AO1b)

Key word learners need to understand are **two**

5(b) - Command verb is **State -** give the answer, clearly and carefully (AO1a)

Key word learners need to understand are **two**

Section A – Paper 2 – four-part question

(c) The company currently inspects every machined part to ensure that it meets the requirements. Explain **two** ways in which changing from 100% inspection of every machined part to statistical process control could affect the company. (4 marks)

(d) During an inspection, the company found crack defects in the manufactured parts. Explain how a cause and effect diagram could be used when investigating this defect. (3 marks)

5(c) - Command verb is **Explain -** make clear or easy to understand by giving details and linked reasoning (AO1b)

Key word learners need to understand are **two**

5(b) - Command verb is **Explain -** make clear or easy to understand by giving details and linked reasoning (AO1b)

Section A – Paper 2 – four-part answers

Q5	A company manufactures parts for car engines on a production line.	
Q5 a)	Explain **two** reasons why the company may use condition-based monitoring rather than preventative maintenance for the machines on the production line. (4 marks)	
Mark Scheme	• Maintaining output of the production line / continuity of production / performance standards / reduced risk of unplanned downtime [1] due to premature failure of parts between service intervals [1]. • Reduced cost of parts / saving the company money [1] as parts are only replaced when necessary rather than at fixed intervals [1]. • Increased reliability / efficiency of equipment / quality standard of components [1] due to reduced deterioration in machine performance [1].	**Marking guidance** 1 mark for a reason, with a second mark for the supporting explanation, up to a maximum of 4 marks. Credit other suitable responses
Total marks	4	
AO	AO1b = 4	
Qual spec reference	1.2.1.4 – condition-based monitoring	

Q5 b)	State **two** legal responsibilities for health and safety that apply to the employees operating the machining processes on the production line. (2 marks)	
Mark Scheme	• Behave and work safely so as not to harm self or anyone on the production line [1]. • Not to attempt any work unless sufficiently trained and authorised to do so [1]. • Not to interfere with safety devices put in place such as removing machine guards [1]. • Wear appropriate PPE [1]. • Follow workplace practices such as safe working policies [1].	**Marking guidance** 1 mark per correct legal responsibility up to a maximum of 2 marks.
Total marks	2	
AO	AO1a = 2	
Qual spec reference	12.3.2 – employee and employer obligations	

Q5 c)	The company currently inspects every machined part to ensure that it meets the requirements. Explain **two** ways in which changing from 100% inspection of every machined part to statistical process control could affect the company. (4 marks)	
Mark Scheme	• Statistical Process Control takes less time and money to carry out [1]; this could increase the profitability of the production for the company [1]. • SPC could allow for immediate process adjustments to identified issues by operators [1]; this would result in fewer parts being produced and scrapped for faults reducing the cost per machine part [1]. • There is a statistical risk that defects would not be detected without 100% inspection compounding quality issues through the manufacturing stages [1]; this could result in reputational damage and reduce sales where quality is important [1].	**Marking guidance** 1 mark per way and 1 further mark per linked explanation, up to a maximum of 4 marks. Credit other suitable responses
Total marks	4	
AO	AO1b = 4	
Qual spec reference	11.1.2.8 – statistical process control (SPC)	

Q5 d)	During an inspection, the company found crack defects in the manufactured parts. Explain how a cause and effect diagram could be used when investigating this defect. (3 marks)	
Mark Scheme	It provides a visual representation of all possible causes of the problem [1] which means that the root cause of the cracking can be identified [1], by allowing the causal relationships between different potential causes to be considered separately from the overall process [1].	**Marking guidance** Award one mark per relevant point, up to a maximum of 3 marks. Credit other suitable responses
Total marks	3	
AO	AO1b = 3	
Qual spec reference	11.1.3.3 – cause and effect diagrams	

Section A – Paper 2

9 A pressure vessel is used for manufacturing chemicals. It has a single access hatch. The vessel is 1 metre in diameter. A modification is required to the interior of the vessel, which is classed as a confined space.

Explain **two** health and safety considerations required to carry out this activity. (4 marks)

Mark Scheme	• Breathing apparatus may be required [1] due to the limited supply of oxygen in confined spaces which would lead to asphyxiation hazards [1]. • Lock out tag out (LOTO) would be required [1] to ensure that the vessel is not in use during the activity, as there a high risk of fatality due to the pressure in the vessel [1]. • Permit to work required [1] to ensure that staff carrying out the activity are appropriately trained in working in confined spaces are [1]. • Use of a buddy system to intervene [1] if monitored oxygen levels have diminished / there are physical signs of oxygen deprivation [1].	**Marking guidance** 1 mark per consideration and 1 further mark for a linked explanation, up to a maximum of 4 marks. Credit other suitable responses.
Total marks	4	
AO	AO2 = 4	
Qual spec reference	12.5.1 – considerations [for health and safety]	

Command verb is **Explain -** make clear or easy to understand by giving details and linked reasoning (AO2)

Key word learners need to understand are **two**

Section B – Paper 2 - Extended response questions

13* Evaluate how emerging trends in augmented reality (AR) could change engineering and manufacturing activities in the following sectors:

- design
- maintenance
- manufacturing.

(12 marks)

What is the key information?

Evaluate how emerging trends in augmented reality (AR) could change engineering and manufacturing activities in the following sectors:

- design
- maintenance
- manufacturing.

These type of questions are designed for stretch and challenge and provide opportunity for differentiation of learners. **(AO2 & AO3)**

Section B – Paper 1- Extended response questions

21* A company has been asked to develop a wheelchair that will be used by an athlete in the Paralympics. The wheelchair needs to be manually powered and will be used for long distance racing on roads and track, and must be manufactured as a one-off.
Discuss the factors that are most important when selecting the materials to make the wheelchair and recommend a suitable main material for the frame, justifying your choice. (12 marks)

What is the key information?

A company has been asked to **develop a wheelchair** that will be used by an **athlete in the Paralympics**.
The wheelchair needs to be **manually powered** and will be **used for long distance racing on roads and track**, and must be **manufactured as a one-off**.
Discuss the factors that are **most important** when **selecting the materials** to make the wheelchair and **recommend** a **suitable main material for the frame**, **justifying** your choice

For less able learners you may need to break these types of questions down during formative assessments to support learners in accessing marks

These type of questions are designed for stretch and challenge and provide opportunity for differentiation of learners.

Deconstructing the question.

Question with key words highlighted in black.

Discuss the factors that are most important when selecting the materials to make the wheelchair and **recommend** a suitable main material for the frame, **justifying** your choice

Deconstruction.

- **Discuss** the factors that are most important when selecting the materials to make the wheelchair…

Consider the most important factors (eg: material characteristics, material properties) relating to different types of materials when designing and making a wheelchair frame for a Paralympian.

- **recommend** a suitable main material for the frame, **justifying** your choice.

Suggest a suitable material for the wheelchair frame and justify in detail why the material selected is the most appropriate one to use.

If the question is broken down so learners can have a clear understanding of all of the instructions within an ERQ it may help them to focus their answers in more detail.

Key point: ERQ questions are worded in a certain way to differentiate between learners.

Mark scheme.

Mark Scheme

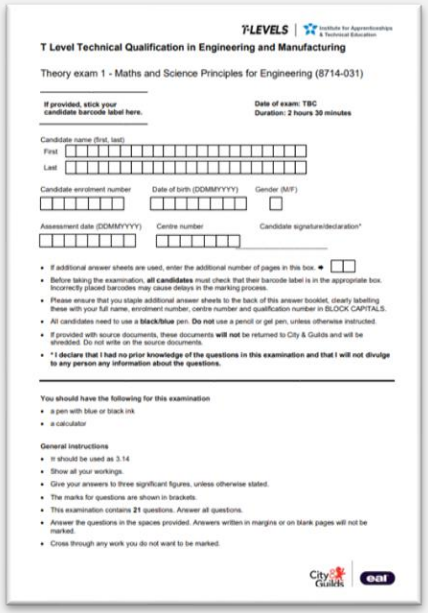
Band	Marks	Descriptor
4	10-12	Demonstrates comprehensive understanding of a wide variety of considerations for selecting the material. Demonstrates comprehensive application of knowledge and understanding of a wide variety of materials suitable for the wheelchair and their properties. Demonstrates comprehensive evaluative skills, comprehensive reasoning and justifications to which material would be most suitable. The response is fully coherent and is articulated using a logical structure that maximises understanding.
3	7-9	Demonstrates a thorough understanding of a wide variety of considerations for selecting the material. Demonstrates thorough application of knowledge and understanding of a variety of materials suitable for the wheelchair and their properties. Demonstrates thorough evaluative skills with thorough reasoning and justifications to which material would be most suitable. The response is clearly expressed and is well-structured.
2	4-6	Demonstrates a good use of analysis of some considerations for selecting the material. Demonstrates good application of knowledge and understanding of materials suitable for the wheelchair and their properties. Demonstrates good evaluative skills with clear reasoning to which material would be most suitable. The response is generally clearly expressed, with some consideration given to how it is structured.
1	1-3	Explains a few considerations for selecting the material. Demonstrates basic application of knowledge and understanding of materials and their properties. Demonstrates basic evaluative skills with limited reasoning to which power source would be most suitable. A material is recommended which may not be fully appropriate. The response lacks some clarity and is generally poorly structured.
	0	**No relevant material**

Indicative Content.

	Indicative content Quality of responses should be judged on engineering knowledge. Misunderstandings around the context of the Paralympics or disabilities should be disregarded. • The main consideration would be the performance requirements, such as speed, stability, overall weight of the chair.
	• Long distance racing would require the materials to be wear resistant for at least the duration of the race. • Road racing means that the surface could be uneven, so a more robust frame would be needed in order to handle things such as potholes or kerbs. • Road racing could result to minor knocks and bumps, so consideration should be given to the elasticity and toughness of the material and how minor damage can be repaired. • Considerations would be individual characteristics of the user, such as height, weight and specific physical limitations, which would affect the chair's structure, its maximum weight and influence the required density and strength to weight ratio. • Use in the Paralympics means that the chair has to be manually powered, without the use of motorised assistance, considering aspects such as the weight, density and potentially the conductivity of the frame. • Suitable types of material would include as composites, aluminium alloys, titanium alloys. • Form of available materials, such as fibre sheet, metal tubes, as appropriate to the material types, as this influences the required manufacturing processes, and hence the complexity of designs that can be achieved. • The potential effects of processing on the material (including heat treatment and surface finish such as painting, if applicable). The existence of Paralympics regulations and rules for specific sports should be taken into consideration.

How the Exams are marked and graded

The exam is externally marked by C&G.


T LEVELS

T Level Technical Qualification in Engineering and Manufacturing

Theory exam 1 - Maths and Science Principles for Engineering (8714-031)

If provided, stick your candidate barcode label here.

Date of exam: TBC
Duration: 2 hours 30 minutes

Candidate name (first, last)
First
Last

Candidate enrolment number | Date of birth (DDMMYYYY) | Gender (M/F)

Assessment date (DDMMYYYY) | Centre number | Candidate signature/declaration*

- If additional answer sheets are used, enter the additional number of pages in this box.
- Before taking the examination, **all candidates** must check that their barcode label is in the appropriate box. Incorrectly placed barcodes may cause delays in the marking process.
- Please ensure that you staple additional answer sheets to the back of this answer booklet, clearly labelling these with your full name, enrolment number, centre number and qualification number in BLOCK CAPITALS.
- All candidates need to use a **black/blue** pen. **Do not** use a pencil or gel pen, unless otherwise instructed.
- If provided with source documents, these documents **will not** be returned to City & Guilds and will be shredded. Do not write on the source documents.
- * **I declare that I had no prior knowledge of the questions in this examination and that I will not divulge to any person any information about the questions.**

You should have the following for this examination
- a pen with blue or black ink
- a calculator

General instructions
- π should be used as 3.14
- Show all your workings.
- Give your answers to three significant figures, unless otherwise stated.
- The marks for questions are shown in brackets.
- This examination contains **21** questions. Answer all questions.
- Answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Cross through any work you do not want to be marked.

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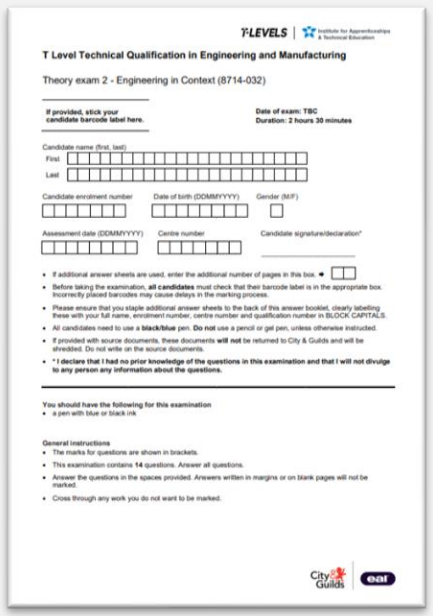
Exam paper 1

raw marks

(actual marks)

+


T LEVELS

T Level Technical Qualification in Engineering and Manufacturing

Theory exam 2 - Engineering in Context (8714-032)

If provided, stick your candidate barcode label here.

Date of exam: TBC
Duration: 2 hours 30 minutes

Candidate name (first, last)
First
Last

Candidate enrolment number | Date of birth (DDMMYYYY) | Gender (M/F)

Assessment date (DDMMYYYY) | Centre number | Candidate signature/declaration*

- If additional answer sheets are used, enter the additional number of pages in this box.
- Before taking the examination, **all candidates** must check that their barcode label is in the appropriate box. Incorrectly placed barcodes may cause delays in the marking process.
- Please ensure that you staple additional answer sheets to the back of this answer booklet, clearly labelling these with your full name, enrolment number, centre number and qualification number in BLOCK CAPITALS.
- All candidates need to use a **black/blue** pen. **Do not** use a pencil or gel pen, unless otherwise instructed.
- If provided with source documents, these documents **will not** be returned to City & Guilds and will be shredded. Do not write on the source documents.
- * **I declare that I had no prior knowledge of the questions in this examination and that I will not divulge to any person any information about the questions.**

You should have the following for this examination
- a pen with blue or black ink

General instructions
- The marks for questions are shown in brackets.
- This examination contains **14** questions. Answer all questions.
- Answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Cross through any work you do not want to be marked.

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Exam paper 2

raw marks

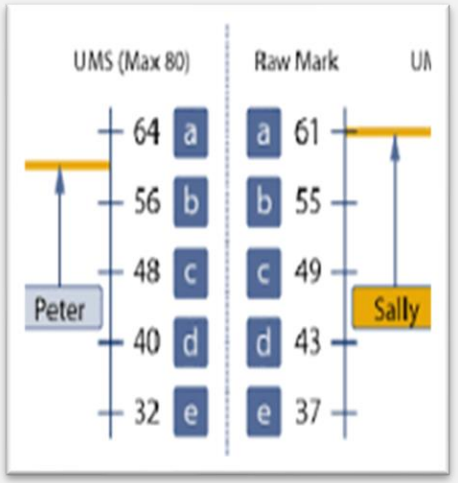
are combined and

Converted using a
uniform mark scale (UMS)

+

ESP raw mark is
converted to a UMS

=



Final core grade of A*-U generated

Overview of UMS Scale grade boundaries using BSE (example only)

Grade boundaries

The table below shows the grade mark ranges for the Exam, along with the notional boundaries for Paper 1 and Paper 2 – **for the summer 2022 series.**

Grade	Mark range	Notional boundaries	
		Paper 1 (8710-031)	Paper 2 (8710-032)
A*	135 - 220	69 - 110	65 - 110
A	120 - 134	62 - 68	58 - 64
B	105 - 119	54 - 61	50 - 57
C	90 - 104	46 - 53	42 - 49
D	75 - 89	39 - 45	35 - 41
E	60 - 74	32 - 38	28 - 34
Unclassified (U)	0 - 59	0 - 31	0 - 27

- Papers 1 and 2 had 110 marks each
- Notional boundaries applied to each paper
- Both papers added together to find total raw marks
- UMS applied for grade using mark range
- Generosity of grading was applied to these papers as 1st exams after Covid
- Grade boundaries are unlikely to be as low

Hints and Tips (lessons learnt)

From previous T Level results Principal Examiners commented on:

- In the lower mark questions AO1 (a) and AO1 (b) recall of knowledge and understanding of knowledge learners generally all performed well
- The majority of learners attempted every question
- Learners tended to perform better in one of the papers

What could be improved:

- In the ERQ learners didn’t contextualise their answers to the question and gave generic responses
- There was a lack of correct terminology when answering questions
- It was evident learners had not read questions properly
- Candidates also found it challenging when having to respond to and follow question command verbs
- In some cases handwriting was poor and illegible

Hints and Tips (take aways)

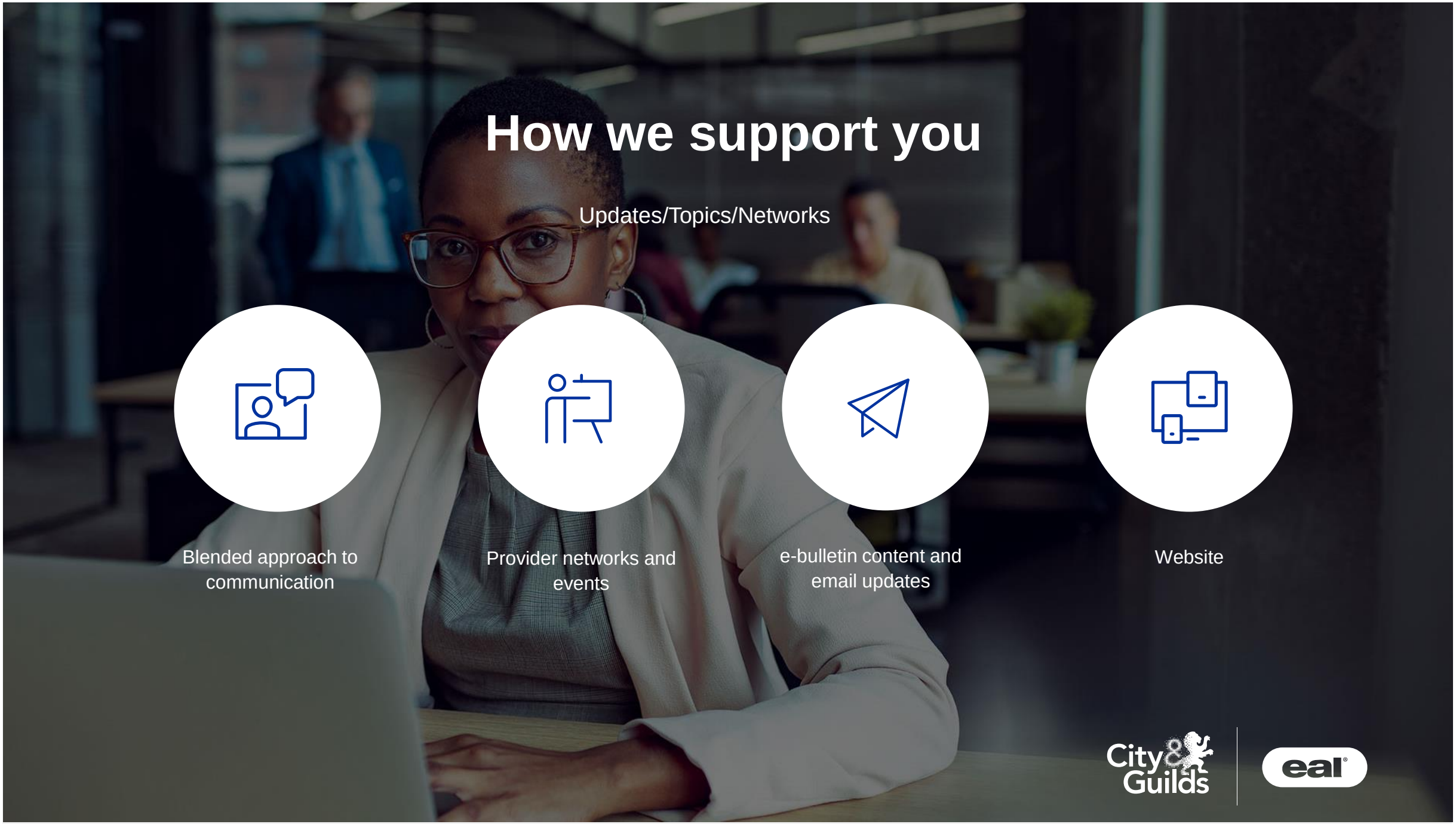
- Marks are given for acronyms and industry abbreviations including workings out even if end answer is incorrect
- Timings – it seems learners may have run out of time as in some cases papers weren't completed –reminder of timings during exam. Clock on wall.
- Delivery, consider first exam series to be in Autumn to allow full coverage of the core
- More understanding of AO2 as 46 % of questions are weighted against AO2
- Practice two-part questions and answers
- Look at learners handwriting/ can use block letters or print words –type of writing implement (not felt pen or pencil) black ball point only
- The amount of white space provided after the question is an indication of the length of response learners should provide
- The type of response required by an '**Explain'** question requires a higher level of response than a **'Describe**' question

Conclusion :

1. There was a clear differentiation of performance within the cohort when candidates were asked to demonstrate **understanding, application, analysis**, or **evaluation.**
2. Overall, it was evident that candidates would benefit from support in developing their **extended response answering techniques**, as candidates underperformed in **Section B** of these exams

How we support you

Updates/Topics/Networks



Blended approach to communication

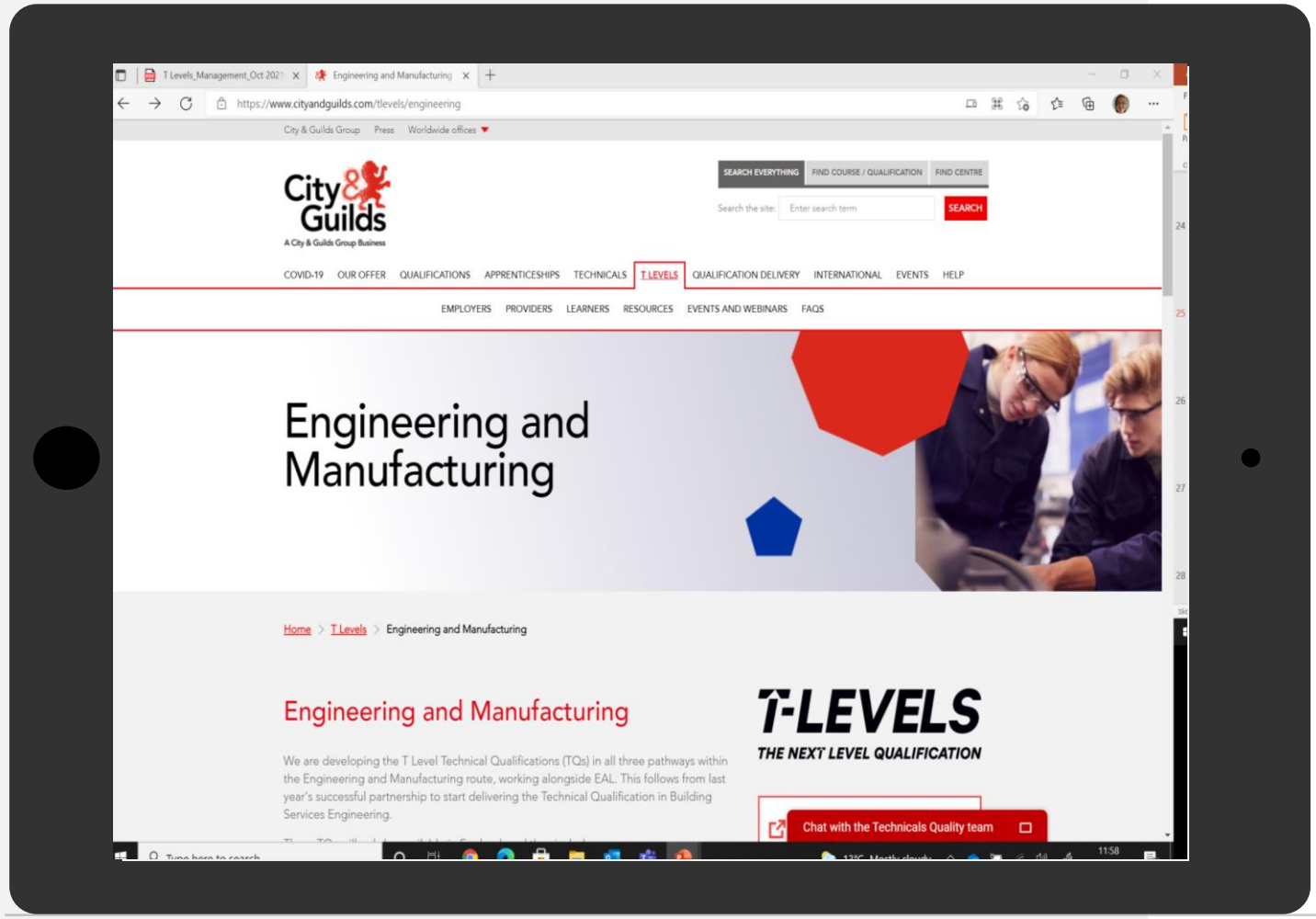
Provider networks and events

e-bulletin content and email updates

Website

Support and Guidance

Ready to support eligible providers and stakeholder engagement



- Timeline
- Provider focus groups
- Employer Industry Boards
- e-bulletins
- Specification
- Resource Hub https://www.cityandguilds.com/tlevels/resources
- Learner flyer t-levels-learner-flyer-engineering-and-manufacturing
- Dedicated Technical Advisors

https://www.cityandguilds.com/tlevels/providers

Events & Webinars

- Face-to-face events
- Events, networks and webinars are located on our T Level Home page here under the accordion Engineering & Manufacturing. Here you will also find copies of the slide decks presented in the events, networks and webinars.
- Recorded webinars on our dedicated Engineering Go To Webinar Channel here.
- For the most up to date information regarding future events please register for our T Level e-bulleting at the bottom of this webpage, here.

Websites to Support Providers

T Level Industry Placement Delivery Guidance
T Level industry placements delivery guidance - GOV.UK (www.gov.uk)

Introduction to T levels
T levels - GOV.UK (www.gov.uk)

How T Levels are funded
How T Levels are funded - GOV.UK (www.gov.uk)

T Levels capital fund
T Levels capital fund - GOV.UK (www.gov.uk)

T Levels resources for teachers and careers advisers
T Levels resources for teachers and careers advisers - GOV.UK (www.gov.uk)

T Levels: next steps for providers
T Levels: next steps for providers - GOV.UK (www.gov.uk)

Supporting with delivering T Levels
Support with delivering T Levels

T Level Transition Programme Framework for 2022 – 2023
T Level Transition Programme Framework for Delivery 2022 to 2023 - GOV.UK (www.gov.uk)

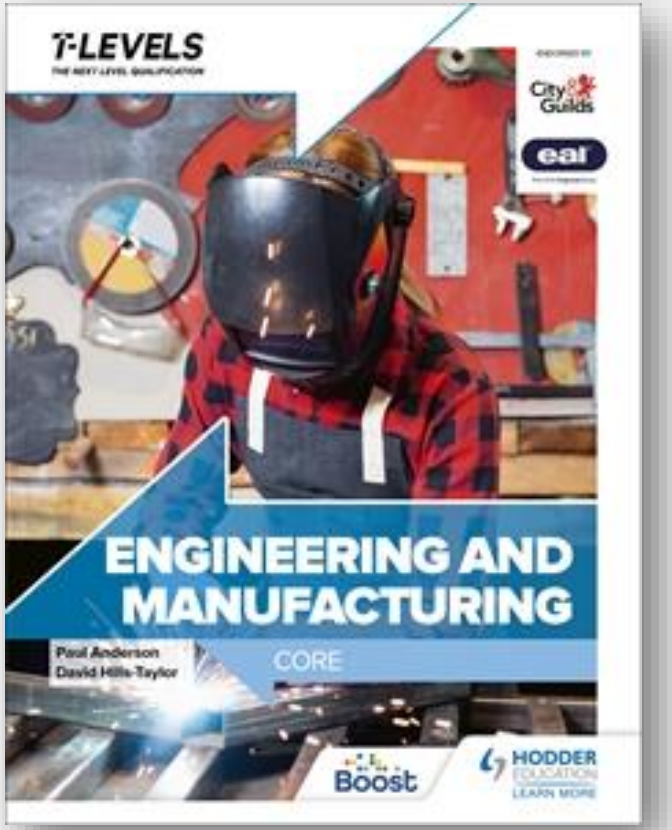
ETF Foundation – T Levels
T Level Professional Development - Education & Training Foundation (et-foundation.co.uk)

COMING SOON!

Engineering and Manufacturing T Level: Core Textbook

Tackle the core component of your Engineering and Manufacturing T-Level head on with this comprehensive textbook published in association with City & Guilds.

- Complete coverage of the T Level's core component
- Prepares students for core exams and ESP
- Publishing June 2023
- Available in print and digital formats
- Print: 9781398360921 // £34
- Boost eBook: 9781398361058// £11 per year
- From expert authors Paul Anderson and David Hills-Taylor



Contact Gemma Simpson to receive an advance sample chapter:
gemma.Simpson@hoddereducation.co.uk

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LEARN MORE

Visit www.hoddereducation.co.uk/t-levels

T Level Associate Vacancies

Would you like to be involved with supporting the delivery of T-Levels?

- **Principal Moderators / Moderators**

Ensure a standardised and consistent approach to quality assurance, moderation, feedback and processes

- **Technical Qualification Associates (TQAs)**

Review Eligible Provider approval applications, including supplementary evidence and carry out approval and support activities.

- **Chief/Principal Examiners**

Produce and submit assessment materials and participate in all stages of the production process until sign off.

- **Marking Examiners**

Mark candidates' scripts/evidence in accordance with the agreed marking scheme/criteria within the agreed timescale

For further information, please contact Samantha.Ashman@cityandguilds.com or visit our website on the attached link:
Associate Vacancies | City & Guilds Group Careers