

Level 3 Advanced Technical Certificate in the Automotive Industry 4292-30

June 2019 Version 2.1

Guide to the examination

| Version and date | Change detail | Section |
|------------------|---|------------------------|
| V2.1 June 2019 | Level 3 third retake opportunity guidance added | 1. Details of the exam |

Who is this document for?

This document has been produced for centres who offer **City & Guilds Level 3 Advanced Technical Certificate in the Automotive Industry**. It gives all of the essential details of the qualification's external assessment (exam) arrangements and has been produced to support the preparation of candidates to take the exam/s.

The document comprises four sections:

1. **Details of the exam.** This section gives details of the structure, length and timing of the exam.
2. **Content assessed by the exam.** This section gives a summary of the content that will be covered in each exam and information of how marks are allocated to the content.
3. **Guidance.** This section gives guidance on the language of the exam, the types of questions included and examples of these, and links to further resources to support teaching and exam preparation.
4. **Further information.** This section lists other sources of information about this qualification and City & Guilds Technical Qualifications.

1. Details of the exam

External assessment

City & Guilds Technical qualifications have been developed to meet national policy changes designed to raise the rigour and robustness of vocational qualifications. These changes are being made to ensure our qualifications can meet the needs of employers and Higher Education. One of these changes is for the qualifications to have an increased emphasis on external assessment. This is why you will see an external exam in each of our Technical qualifications.

An external assessment is an assessment that is set and/or marked by the awarding organisation (ie externally). All City and Guilds Technical qualifications include an externally set and marked exam. This must be taken at the same time by all candidates who are registered on a particular qualification. We produce an exam timetable each year. This specifies the date and time of the exam so you can plan your delivery, revision and room bookings/PC allocation in plenty of time.

The purpose of this exam is to provide assurance that all candidates achieving the qualification have gained sufficient knowledge and understanding from their programme of study and that they can independently recall and draw their knowledge and understanding together in an integrated way. Whilst this may not be new to you, it is essential that your learners are well prepared and that they have time to revise, reflect and prepare for these exams. We have produced a Teaching, Learning, and Assessment guide that is you should refer to alongside the present document ([Teaching, Learning and Assessment Guide](#)). If a learner does not pass the exam at their first attempt, there is only one opportunity to resit the exam, so preparation is essential.

Exam requirements of this qualification

Level 3 Automotive Industry – Theory exam (2 hours 30 minutes)

The exam is graded and a candidate must achieve at least a Pass grade in order to be awarded the qualification. (In addition to the exam, a synoptic assignment must also be completed and passed. You can find full details of the synoptic assignment in the *Qualification Handbook* and the *Synoptic Assessment Guide* -please see the links at the end of this document).

When does the exam take place?

The exam is offered on two fixed dates in March and June. The exact dates will be published at the start of the academic year in the *Assessments and Exam Timetable* (<http://www.cityandguilds.com/delivering-our-qualifications/exams-and-admin>).

At the start of the programme of study, in order to effectively plan teaching and exam preparation, centres should know when the exam will be taking place and allocate teaching time accordingly. Section 2 of this document gives a summary of the content that needs to be covered in order to prepare learners for the exam and full details of this are given in the *Qualification Handbook*.

Form of exam

The exam for this qualification can be taken either on paper or online.

Can candidates resit the exam?

Candidates who have failed an exam or wish to retake it in an attempt to improve their grade, can do so twice. The third and final retake opportunity applies to Level 3 only. The best result will count towards the final qualification. If the candidate fails the exam three times then they will fail the qualification.

How the exam is structured

Each exam has a total of 80 marks available.

Each exam is made up of approximately:

- 11-12 short answer questions;
- 1 extended response question.

Short answer questions are used to confirm **breadth of knowledge and understanding**.

The extended response question is to allow candidates to demonstrate **higher level and integrated understanding** through written discussion, analysis and evaluation. This question also ensures the exam can differentiate between those learners who are 'just able' and those who are higher achieving.

More details about and examples of question types are given in Section 3 of this document.

Assessment Objectives

The exams are based on the following set of assessment objectives (AOs). These are designed to allow the candidate's responses to be assessed across the following three categories of performance:

- **Recollection** of knowledge.
- **Understanding** of concepts, theories and processes.
- **Integrated application** of knowledge and understanding.

In full, the assessment objectives covered by the exam for this qualification are:

| Assessment objective | Mark allocation (approx %) |
|--|----------------------------|
| AO1 Recalls knowledge from across the breadth of the qualification | 46% |
| AO2 Demonstrates understanding of concepts, theories and processes from a range of learning outcomes. | 39% |
| AO4 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes. | 15% |

Booking and taking the exam

All assessments for City & Guilds Technical Exams must be booked through Walled Garden. There is a deadline for booking exams, synoptic assessments and any other centre marked assessments, please refer to the time line to check these dates.

The exam must be taken under the supervision of an invigilator who is responsible for ensuring that it is conducted under controlled conditions. Full details of the conditions under which the exam must be taken can be found in the Joint Council for Qualifications (JCQ) document, [Instructions for Conducting Examinations \(ICE\)](#).

Special consideration

Candidates who are unable to sit the exam owing to temporary injury, illness or other indisposition at the scheduled time may qualify for special consideration. This is a post-examination adjustment that can, in certain circumstances, be made to a candidate's final grade. The Joint Council for Qualifications' guide to the special consideration process can be found at www.jcq.org.uk .

To make a request for special consideration, please contact: policy@cityandguilds.com

Access arrangements

Access arrangements are arrangements that allow candidates with particular requirements, disabilities or temporary illness to take assessments, where appropriate, using their normal way of working. The Joint Council for Qualifications document, *Access Arrangements and Reasonable Adjustments* gives full details and can be downloaded [here](#).

For further information and to apply for access arrangements please see:

[Access arrangements - When and how applications need to be made to City & Guilds](#)
[Applying for access arrangements on the Walled Garden](#)

2. Content assessed by the exam

Each exam assesses a sample of the content of these units. This means that a single exam will **not** cover 100% of the unit content. The full range of content will be assessed over a number of examination series. Details of the coverage of a particular exam paper will **not** be released in advance of the exam itself. Centres should **not** make assumptions about what will be assessed by a particular exam based on what has been covered on previous occasions. In order to be fully prepared for the exam, learners **must** be ready to answer questions on **any** of the content outlined below.

The table below provides an overview of how the qualification's Learning Outcomes are covered by each exam and the number of **marks** available per Learning Outcome (ie **not** the number of *questions* per Learning Outcome). In preparing candidates for the exam, we recommend that centres take note of the number of marks allocated to Learning Outcomes and to assign teaching and preparation time accordingly.

In preparing candidates for the exam, centres should refer to the Qualification Handbook which gives full details of each Learning Outcome.

The following is a summary of only that qualification content which is assessed by the exam and **not** a summary of the full content of the qualification.

| Unit | Learning outcome | Topics | Number of marks |
|---|---|--|-----------------|
| 301 Properties and applications of materials in the automotive industry | LO1 Understand the structure, classification and application of materials used in vehicle construction. | 1.1: Types of materials and their characteristics 1.2: Application of materials used in vehicle construction | 14 |
| | LO2 Understand properties of materials used in vehicle construction. | 2.1: Mechanical properties of materials 2.2: Physical properties of materials 2.3: Thermal properties of materials 2.4: Electrical and magnetic properties of materials | |
| | LO3 Know effects of processing on the structure and behaviour of materials. | 3.1: Impact of processing on the structure on metals 3.2: Impact of processing on the structure on non-metals | |
| | LO4 Compare methods used to join materials during vehicle construction. | 4.1: Welding methods used in vehicle construction 4.2: Mechanical fixings used in vehicle construction 4.3: Adhesives used in vehicle construction | |
| 302 Automotive servicing and inspection operations | LO1 Know types of vehicle inspection and service | 1.1: Types of vehicle inspections and servicing 1.2: Tools for conducting inspections and servicing 1.3: Procedures for carrying out systematic inspection on vehicles | |
| | LO2 Understand current legislation covering vehicle inspection and servicing | 2.1: Health and safety legislation relevant to vehicle inspection and servicing 2.2: Legislation relevant to vehicle inspection and servicing | |

| | | | |
|-----------------------------------|---|--|-----------|
| | LO3 Interpret information required to inspect and service vehicles | 3.1: Sources of information for the inspection and servicing of vehicles 3.2: Comparing information required for completing inspection and servicing activities | 14 |
| | LO4 Carry out inspections on vehicles using prescribed methods | 4.1: Carrying out vehicle inspections 4.2 Recording information and making recommendations following inspections | |
| | LO5 Carry out routine vehicle maintenance using prescribed methods. | 5.1: Carrying out vehicle services | |
| 304 Automotive mechanical systems | LO1 Know engine layouts and components and understand the operating principles. | 1.1: Engine layouts and types 1.2: Engine terminology 1.3: Engine construction and operation 1.4: Ancillary engine systems | |
| | LO2 Understand the purpose, operation and construction of transmission systems. | 2.1: Purpose of the transmission system 2.2: Construction and operation of transmission system components and units 2.3: Mathematical skills for clutch, gearbox and drive-line calculations | 20 |
| | LO3 Understand the purpose, operation and construction of chassis systems. | 3.1: Braking systems 3.2: Steering systems 3.3: Suspension systems | |

| | | | |
|--|---|---|-----------------|
| 305 Automotive electrical and electronic systems | LO1 Understand electrical and electronic theory | 1.1: Electrical and electronic principles 1.2: Electrical circuits 1.3: Principles and practice of circuit measurements | 20 |
| | LO2 Know the principals of multiplex systems | 2.1: Principles of multiplexing 2.2: Reasons for using multiplex systems 2.3: Applications of multiplexing - protocols | |
| | LO3 Understand vehicle computer based processes and components. | 3.1: Principles of computing 3.2: Physical components of computerised vehicle systems | |
| | | Total marks for sections: | 68 marks |
| | | Integration across units*: | 12 marks |
| | | Total marks for exam: | 80 Marks |

* *Integration across units.* These marks relate to Assessment Objective 4). These marks are awarded to differentiate between levels of performance by candidates taking the exam. The marks are given for how well a candidate has applied their knowledge, understanding and skills from across the units that make up the qualification in an integrated way to meet the requirements of the exam questions.

Each exam assesses a sample of the content of these units. This means that a single exam will **not** cover 100% of the unit content. The full range of content will be assessed over a number of examination series. Details of the coverage of a particular exam paper will **not** be released in advance of the exam itself. Centres should **not** make assumptions about what will be assessed by a particular exam based on what has been covered on previous occasions. In order to be fully prepared for the exam, learners **must** be ready to answer questions on **any** of the content outlined below.

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The following is a summary of only that qualification content which is assessed by the exam and **not** a summary of the full content of the qualification.

3. Guidance

Vocabulary of the exam: use of 'command' verbs

The exam questions are written using 'command' verbs. These are used to communicate to the candidate the type of answer required. Candidates should be familiarised with these as part of their exam preparation.

The following guidance has been produced on the main command verbs used in City & Guilds Technicals exams.

A more detailed version of this table, which also includes the command verbs used in the assignments is published in *City & Guilds Technical Qualifications Teaching, Learning and Assessment* guide.

| Command verb | Explanation and guidance |
|--|---|
| Analyse | Study or examine a complex issue, subject, event, etc in detail to explain and interpret, elements, causes, characteristics etc |
| Calculate | Work out the answer to a problem using mathematical operations |
| Compare (... and contrast) (or describe the similarities/differences) | Consider and describe the similarities (and differences) between two or more features, systems, ideas, etc |
| Define | Give the meaning of, technical vocabulary, terms, etc. |
| Describe | Give a detailed written account of a system, feature, etc (..the effect of...on...) the impact, change that has resulted from a cause, event, etc (..the process..) give the steps, stages, etc |
| Differentiate between | Establish and relate the characteristic differences between two or more things, concepts, etc |
| Discuss | Talk/write about a topic in detail, considering the different issues, ideas, opinions related to it |
| Distinguish between | Recognise and describe the characteristic differences between two things, or make one thing seem different from another |
| Evaluate | Analyse and describe the success, quality, benefits, value, etc (of an end product, outcome, etc) |
| Explain | Make (a situation, idea, process, etc) clear or easier to understand by giving details, (..how..) Give the stages or steps, etc in a process, including relationships, connections, etc between these and causes and effects. |
| Give example(s) illustrate/ | Use examples or images to support, clarify or demonstrate, an explanation, argument, theory, etc |

| | |
|-------------------------|--|
| Give a rationale | Provide a reason/reasons/basis for actions, decisions, beliefs, etc |
| Identify | Recognise a feature, usually from a document, image, etc and state what it is |
| Justify | Give reasons for, make a case for, account for, etc decisions, actions, conclusions, etc, in order to demonstrate why they suitable for or correct or meet the particular circumstances, context |
| Label | Add names or descriptions, indicating their positions, on an image, drawing, diagram, etc |
| List | Give as many answers, examples, etc as the question indicates (candidates are not required to write in full sentences) |
| Name | Give the (technical) name of something |
| Propose | Present a plan, strategy, etc (for consideration, discussion, acceptance, action, etc). |
| Select | choose the best, most suitable, etc, by making careful decisions |
| State | Give the answer, clearly and definitely |
| Summarise | Give a brief statement of the main points (of something) |

Question types

The following explains, and gives examples of, types of questions used in City & Guilds Technical exams. In preparing candidates to take the exam, it is recommended that you familiarise them with the requirements of each question type so that they can be effective and make best use of the time available when sitting the exam.

- An effective candidate will gauge the type and length of response required from the question and the number of marks available (which is given for each question on the exam paper).
- Short answer questions may not require candidates to write in complete sentences. Extended response questions will require a more developed response.
- Candidates should read the exam paper before attempting to answer the questions and should allocate time proportionate to the number of marks available for each question or section.

Short answer questions (restricted response)

These are questions which require candidates to give a brief and concise written response. The number of marks available will correspond to the number of pieces of information/examples and the length of response required by the question.

Example question:

Describe **four** advantages of the use of spot welding over other types of welding. (4 marks)

Mark scheme/responses:

1 mark for each of the following correct answers; maximum 4 marks.

- Quick.
- Low heat build-up.
- Suitable for 'long runs'.
- Reduces/prevents distortion.
- Consistency.
- Low corrosion.

Structured Response Questions

These are questions that have more than one part (eg a), b), etc.). The overall question is made up of linked, short answer questions which move the candidate through the topic in a structured way. For example, the question will usually start with a 'recall'/'state'/'describe' question followed by an 'explain' to draw out understanding of the topic. They usually have a shared introductory 'stem', and the number of marks may increase through the question.

Example question:

a) Explain the **basic** principles of the binary coding system. (3 Marks)

b) State **two** vehicle systems where **high speed data** transfer is used. (2 Marks)

Mark scheme/responses:

a) Three marks to be given where a full understanding is shown for example:

A computer language that uses two numbers 0 & 1 for all representations. 0 represents 'off' and 1 represents 'On'.

Marks awarded for explanation or reference to;

- system made up of 0 & 1
- 0 is off
- 1 is on.

Only one mark to be awarded if reference is only made to 0 & 1.

b) One mark for each correct safety related systems including;

- brakes
- steering.

Extended response questions

Extended response questions are those that require the candidate to write a longer written response using sentences and paragraphs. These usually require candidates to discuss, explain, etc. a topic in some detail. The question is often based on a short case study, scenario or other prompt. The level of detail should be gauged from the question and the number of marks available.

Example question:

A customer has brought a racing vehicle with a mild steel frame and a two-stroke spark ignition engine. The customer has asked you for recommendations on ways to improve the vehicle.

Produce a proposal on how to improve the vehicle for the customer.

(12 marks)

Mark scheme/responses:

Indicative content

Learners are asked to produce a proposal for ways to improve a racing vehicle. In their proposal, they are to consider the following:

- *Emissions implications on any recommended alterations*
- *Properties of materials to use and how they are suitable*
- *Use of modern technology to improve performance/efficiency*
- *Overall vehicle performance including fuel efficiency*

All alteration recommendations are justified.

Band descriptors

Band 1 (9-12 marks)

The candidate has produced a detailed proposal of how to update the vehicle as a whole.

They have suggested appropriate light weight/non corrosive materials to use.

Recognises the importance for a more efficient and environmentally friendly propulsion system.

Has explored potential relevant technology to install onto the vehicle.

All choices and recommendations have been fully justified with valid links between the recommended improvements.

Example band 1 response

On talking to the customer I would recommend them to think of using a lighter frame such as carbon fibre to reduce weight and give increased strength, this will also increase safety, speed and reduce emissions.

I would recommend removing the 2 stroke unit and replace it with a 4 stroke engine and fit a small turbocharger to increase the torque and power, but it will give less turbo lag as it will spool up quicker. On the engine, I would fit a programmable fuel injection system to fine tune the fuelling to the engine and type of racing being done, this will increase performance and reduce emissions.

I would also suggest they look at improving the suspension system for a more suitable one using adjustable rate dampers, and upgrading the braking system and friction lining to a racing compound.

I would also suggest looking into making the body more aerodynamic to improve air flow.

Band 2 (5-8 marks)

They have explored the potential for different materials and propulsion systems but have only made brief links with some justifications on their choices.

They have mentioned technology that could be installed but without reasoning.

Overall, there the candidate has demonstrated good basic knowledge on the task but their reasons for recommendations are not fully detailed.

Example band 2 response.

Firstly, I would recommend a lighter frame either from carbon steel, carbon fibre or maybe even fibre glass. I would also propose that they get a 4 stroke engine with a turbo charger to get the increase in power to mass ratio. Probably get a smaller turbo charger as well to make up for the turbo lag. Tell them to get a wet sump for oil and place the sump near the centre of mass. Get a more aerodynamic body placed on the frame. Add a larger or add more vents at the front to increase cooling and air intake. Fuel injection system linked with variable valve timing so they can increase or decrease valve open, close and overlap times.

Excess weight light unused chairs could be removed or replaced with lighter variant. Finally, I'd tell them to get a better suspension system to account for the changes and to increase handling of the vehicle as a whole.

Band 3 (1-4 marks)

The candidate has demonstrated some understanding of the concept of alternative materials and propulsion systems. No real structure applied to answer. Ad hoc approach to points made with no links between the areas – more of a list produced.

No justification for recommendations.

Example band 3 response

I would tell the customer to get a different frame as steel is heavy and can rust. The 2 stroke engine is a good engine as 2 strokes rev well and go fast. I would tell them to put on bigger carburettors for more power and make the brakes better by changing the fluid so no air is present and fit new pads and vented discs. I would also fit lower springs on the suspension so it can go around corners faster.

Band 4 (0 marks)

No rewardable material.

Examination technique

Candidates with a good understanding of the subject being assessed can often lose marks in exams because they lack experience or confidence in exams or awareness of how to maximise the time available to get the most out of the exam. Here is some suggested guidance for areas that could be covered in advance to help learners improve exam performance.

Before the exam

Although candidates cannot plan the answers they will give in advance, exams for Technical qualifications do follow a common structure and format. In advance of taking the exam, candidates should:

- be familiar with the structure of the exam (ie number and type of questions).
- be aware of the amount of time they have in total to complete the exam.
- have a plan, based on the exam start and finish time for how long to spend on each question/section of the exam.
- be aware of how many marks are available for each question, how much they should expect to write for each question and allow most time for those questions which have the most marks available.

At the start of the exam session

At the start of the exam, candidates:

- should carefully read through the exam paper before answering any questions.
- may find it helpful, where possible, to mark or highlight key information such as command words and number of marks available on the question paper.
- identify questions which require an extended written answer and those questions where all or part of the question may be answered by giving bullets, lists etc rather than full sentences.

Answering the questions

Candidates do not have to answer exam questions in any particular order. They may find it helpful to consider, for example:

- tackling first those questions which they find easiest. This should help them get into the 'flow' of the exam and help confidence by building up marks quickly and at the start of the exam.
- tackling the extended answer question at an early stage of the exam to make sure they spend sufficient time on it and do not run out of time at the end of the exam.

Candidates should avoid wasting time by repeating the question either in full or in part in their answer.

Candidates should **always** attempt every question, even questions where they may be less confident about the answer they are giving. Candidates should be discouraged however, from spending too long on any answer they are less sure about and providing answers that are longer and give more detail than should be necessary in the hope of picking up marks. This may mean they have less time to answer questions that they are better prepared to answer.

Extended answer questions

Before writing out in full their answer to extended questions, candidates may find it helpful to identify the key requirements of the question and jot down a brief plan or outline of how they will answer it. This will help clarify their thinking and make sure that they don't get 'bogged down' or provide too much detail for one part of the question at the expense of others.

Towards the end of the exam

Candidates should always set aside time at the end of the exam to read back through and review what they have written in order to make sure this is legible, makes sense and answers the question in full.

If a candidate finds they are running out of time to finish an answer towards the end of the exam, they should attempt to complete the answer in abbreviated or note form. Provided the content is clear and relevant, examiners will consider such answers and award marks where merited.

Further guidance on preparing candidates to take the exam is given in the City & Guilds publication, [Technical Qualifications, Teaching, Learning and Assessment](#) which can be downloaded free of charge from City & Guilds website.

4. Further information

For further information to support delivery and exam preparation for this qualification, centres should see:

City & Guilds

Qualification homepage <http://www.cityandguilds.com/qualifications-and-apprenticeships/transport-maintenance/automotive/4292-technical-in-automotive#tab=information> which includes

- Qualification Handbook
- Synoptic Assessment
- Sample Assessments

Technical Qualifications, Resources and Support: cityandguilds.com/techbac/technical-qualifications/resources-and-support

Joint Council for Qualifications

Instructions for Conducting Examinations: <http://www.jcq.org.uk/exams-office/ice--instructions-for-conducting-examinations>