Who is this document for?

This document has been produced for centres who offer City & Guilds Level 3 Advanced Technical Extended Diploma 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
The exam is graded and a candidate must achieve at least a Pass grade in order to be 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 may resit the exam once only. If a candidate fails the exam both on the first attempt and when resitting it, that candidate has failed the qualification and cannot achieve it in that academic year.

How the exam is structured
Each exam has a total of 60 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.

Some questions will require learners to perform calculations. Although the online system offers a simple calculator, it is advisable for candidates to bring their own **scientific calculators** to the exam.

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:

<table>
<thead>
<tr>
<th>Assessment objective</th>
<th>Mark allocation (approx %)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AO1</strong> Recalls knowledge from across the breadth of the qualification</td>
<td>30%</td>
</tr>
<tr>
<td><strong>AO2</strong> Demonstrates understanding of concepts, theories and processes from a range of learning outcomes.</td>
<td>50%</td>
</tr>
<tr>
<td><strong>AO4</strong> Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.</td>
<td>20%</td>
</tr>
</tbody>
</table>
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.
<table>
<thead>
<tr>
<th>Unit</th>
<th>Learning outcome</th>
<th>Topics</th>
<th>Number of marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>308 Vehicle design and manufacturing processes</td>
<td>LO1 Understand planning requirements for vehicle design.</td>
<td>1.1 Market research methods 1.2 Legislation requirements 1.3 Design processes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LO2 Know the design process for a new vehicle.</td>
<td>2.1 Design activities involved in a new vehicle concept 2.2 Development processes related to implementing a new vehicle 2.3 Design team structure and hierarchy</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>LO3 Know vehicle manufacturing processes and techniques.</td>
<td>3.1 Production methods 3.2 Assembly and build methods</td>
<td></td>
</tr>
<tr>
<td>309 Automotive systems, diagnostics and repair</td>
<td>LO1 Test vehicle components.</td>
<td>1.1 Chassis components 1.2 Engine components 1.3 Carrying out testing on components</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>LO3 Analyse wave forms</td>
<td>3.1 Wave forms in vehicle systems 3.2 Analyzing and interpreting the meaning of wave forms</td>
<td></td>
</tr>
<tr>
<td>310 Science and maths in automotive industry systems</td>
<td>LO1 Analyse vehicle technical data.</td>
<td>1.1 obtaining and comparing vehicle related data 1.2 using mathematical processes 1.3 presenting statistical results visually</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LO2 Apply scientific and mathematical principles to solve vehicle related problems.</td>
<td>2.1 forces and laws of friction 2.2 gas laws 2.3 machines - the use of ratios and levers 2.4 simple workshop experiments</td>
<td>22</td>
</tr>
</tbody>
</table>
LO3 Understand engine performance testing.

<table>
<thead>
<tr>
<th>3.1 engine performance characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2 engine dynamometers</td>
</tr>
<tr>
<td>3.3 presenting engine test result graphically</td>
</tr>
</tbody>
</table>

Total marks for sections: **48 marks**

Integration across units*: **12 marks**

Total marks for exam: **60 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 paper 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.
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.

<table>
<thead>
<tr>
<th>Command verb</th>
<th>Explanation and guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyse</td>
<td>Study or examine a complex issue, subject, event, etc in detail to explain and interpret, elements, causes, characteristics etc</td>
</tr>
<tr>
<td>Calculate</td>
<td>Work out the answer to a problem using mathematical operations</td>
</tr>
<tr>
<td>Compare</td>
<td>Consider and describe the similarities (and differences) between two or more features, systems, ideas, etc</td>
</tr>
<tr>
<td>Define</td>
<td>Give the meaning of, technical vocabulary, terms, etc.</td>
</tr>
</tbody>
</table>
| 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,
<p>|              | <em>(..how..)</em> Give the stages or steps, etc in a process, including relationships, connections, etc between these and causes and effects. |</p>
<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give example(s)</td>
<td>Use examples or images to support, clarify or demonstrate, an explanation, argument, theory, etc</td>
</tr>
<tr>
<td>illustrate/</td>
<td></td>
</tr>
<tr>
<td>Give a rationale</td>
<td>Provide a reason/reasons/basis for actions, decisions, beliefs, etc</td>
</tr>
<tr>
<td>Identify</td>
<td>Recognise a feature, usually from a document, image, etc and state what it is</td>
</tr>
<tr>
<td>Justify</td>
<td>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</td>
</tr>
<tr>
<td>Label</td>
<td>Add names or descriptions, indicating their positions, on an image, drawing, diagram, etc</td>
</tr>
<tr>
<td>List</td>
<td>Give as many answers, examples, etc as the question indicates (candidates are not required to write in full sentences)</td>
</tr>
<tr>
<td>Name</td>
<td>Give the (technical) name of something</td>
</tr>
<tr>
<td>Propose</td>
<td>Present a plan, strategy, etc (for consideration, discussion, acceptance, action, etc).</td>
</tr>
<tr>
<td>Select</td>
<td>choose the best, most suitable, etc, by making careful decisions</td>
</tr>
<tr>
<td>State</td>
<td>Give the answer, clearly and definitely</td>
</tr>
<tr>
<td>Summarise</td>
<td>Give a brief statement of the main points (of something)</td>
</tr>
</tbody>
</table>
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:

State what is meant by the term ‘Vehicle Type Approval’. (2 marks)

Mark scheme/responses:

The confirmation that production samples of a design (1 mark) will meet specified performance standards (1 mark).
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:

Manufacturers must conform to a number of legal global requirements.

a) List three countries that have established green-house gas legislations for vehicles.  (3 marks)

b) State two external factors that need to be taken into account regarding vehicle production.  (2 marks)

Mark scheme/responses:

a) 1 mark each for any of the following:
   - Japan
   - United States
   - Canada
   - China
   - South Korea
   - Mexico
   - Brazil
   - India
   - EU countries

b) 1 mark each for any of the following:
   - Technological.
   - Brand competition.
   - Environmental considerations.
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:

In order to bring a vehicle fitted with an ABS system to rest, friction is used and energy conversions take place. During use, a number of faults may reduce this friction and have a resultant effect on the energy conversion.

Discuss the various energy conversions that take place during braking and the faults that can cause a reduction of friction.

(12 marks)

Mark scheme/responses:

Indicative content

Learners are asked to explain the various energy conversions that take place during the braking process and to explain a number of faults that can cause a reduction of friction.
Learners also need to explain a practical method of calculating the co-efficient of friction.
**Band descriptors**

**Band 1 (9 – 12 marks)**

The learner has correctly identified and produced explanations of the various forms of energy conversion that take place during braking. They have listed a number of faults with full explanations.

The three main energy conversions are mentioned and explained:
- Driver operation to operate calipers – mechanical
- Brake pads to disc – heat
- Vehicle slowing – kinetic

The main faults are given with details, examples are:
- Brake fluid leaking onto surfaces
- Oil/grease leaking onto linings due to faulty seals
- Heat build-up due to low friction linings
- Excessively worn tyres reducing friction on wet road surfaces

Other suitable faults are acceptable with details given.

The learner has discussed in a logical and holistic manner.

**Example Band 1 response**

Three types of energy conversion are mechanical, heat and kinetic. Mechanical is where the drivers effort is converted when the brake pedal is pressed, this is achieved by level action and hydraulic fluid. Heat is produced because of the friction between the pads and disc. When the vehicle slows down this is kinetic energy as this is created by motion, either when speed reduces or increases.

If brake fluid leaks from the calipers, or grease from the hub bearings gets onto the disc, this will reduce the friction. The grease or fluid will create a slippery surface which reduces the friction. The brakes can also become overheated, due to a lot of braking which will cause brake fade because the co-efficient of friction gets less. Surface temperature will effect friction usually the higher the temperature the less the friction, although this may not always be the case.

In addition, it is also worth taking the condition of the tyres into consideration. If the tyres are worn, it can cause a loss of grip which could potentially reduce braking. This would be particularly noticeable if the surface is wet, due to rain or possibly snow.
**Band 2 (5 – 8 marks)**

The learner has identified the three forms of energy conversion but not where they occur. Has identified the faults (eg faulty seal) but not clear regarding what the effect is on braking.

The learner has been able to demonstrate some knowledge but with apparent gaps.

Example Band 2 response

Types of energy conversion are heat from the brakes, mechanical produced by the driver and kinetic also from the brakes. When the brake pedal is pushed the discs and pads create friction which then changes into heat which slows the vehicle down without locking the wheels. If the brake caliper seals wear or hub seals are damaged the fluid gets onto the brakes and the abs might not work so the front wheel could lock.

If the surfaces become wet, from the grease, then the friction is not always so good and the wheels might lock. If the brakes become very hot they might not work as well. Badly worn tyres can also reduce braking probably at high speeds.

**Band 3 – (4-1 marks)**

The learner has given less than three forms of energy conversion without any explanation. Some faults mentioned but no explanation given on the link between faults and friction.

They have made an attempt but clearly lacks knowledge.

Example Band 3 response

Some conversion takes place due to heat and mechanical force. The brake cylinder raises the pressure of the fluid and the wheels will not lock. Braking can be reduced when the seals, pads and tyres wear. This is because of brake fluid and friction which gets less. The tyres can also get hot at high speeds.

**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 (i.e., 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 be 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-technicals-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