



Level 2 Technical Award in Vehicle Technology 4292-20

May 2019 Version 2.1

Guide to the examination

Who is this document for?

This document has been produced for centres who offer **City & Guilds Level 2 Technical Award in Vehicle Technology**. 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 2 Vehicle Technology – Theory Exam (2 hours)

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 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:

- 9 to 10 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	27%
AO2 Demonstrates understanding of concepts, theories and processes from a range of learning outcomes.	53%
AO4 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	20%

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
220 Underpinning Principles in Vehicle Technology	LO1 Understand the mathematical and scientific principles of vehicle systems	1.1 Mathematical automotive applications 1.2 Principles of friction 1.3 Materials used in vehicles 1.4 Fluids in vehicle systems	11
	LO2 Understand vehicle electrical principles and components	2.1 Voltage, current and resistance 2.2 Vehicle electrical components	10
221 Vehicle Technology Systems	LO1 Understand typical power units, transmissions and drive train layouts	1.1 Power unit and transmission layouts 1.2 Characteristics and uses of drive train layouts	10
	LO2 Understand the use and operation of power units	2.1 Operating principles of power units 2.2 Uses of power units	4
	LO3 Understand the purpose and layout of chassis systems	3.1 Vehicle chassis system layouts 3.2 Vehicle chassis system components	6
	LO4 Use precision measurement and workshop tools	4.1 Identify measuring tools 4.2 Use of precision measuring tools	7
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.

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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:

Give **three** reasons why grey cast iron (ferrous) is used in the production of brake discs on light/heavy vehicles. (3 marks)

Mark scheme/responses

1 mark for each of the following, to a maximum of 3 marks.

- *Easy to mass produce*
- *Low production costs*
- *Will not shatter*
- *Ease of design*

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:

When working on vehicles, it is often necessary to take accurate measurements with different types of precision tools.

*a) State **two** measurements that are needed when replacing a broken exhaust manifold stud. (2 marks)*

*b) State **one** tool which would be used to measure the replacement stud to ensure correct fitting. (1 mark)*

c) Describe how to remove an exhaust stud that is broken flush in the cylinder head. (4 marks)

Mark scheme/responses:

a) 1 mark for any two from the following:

- *Diameter*
- *Length*
- *Pitch*
- *Thread depth*
- *Any other appropriate measurement.*

b) 1 mark for any one tool from the following:

- *Vernier gauge*
- *Rule*
- *Micrometer*
- *Pitch gauge*
- *Any other appropriate tool.*

c) 1 mark for each of the following steps suitably described:

- *Initially use a small size pilot drill bit to ensure centralisation*
- *Enlarge hole with appropriate size drill bit for stud extractor*
- *Use stud extractor to remove broken stud*
- *Re-tap thread using thread tap*

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:

You have been tasked to recommend an appropriate drive train system to fit into a go-kart to compete in a race.

Propose a drive train system to use for the go-kart justifying your answer. (12 marks)

Mark scheme/responses:

Indicative content

Learners should select a suitable drive train and transmission system. They are expected to explain the steps they would go through to decide on a suitable train and system – they should then justify this with appropriate reasoning.

Transmission type considerations	Drive train considerations
<ul style="list-style-type: none">▪ <i>Manual</i>▪ <i>Sequential</i>▪ <i>Automatic</i>▪ <i>CVT</i>▪ <i>Integrated with engine or separate</i>	<ul style="list-style-type: none">▪ <i>Belt</i>▪ <i>Chain</i>▪ <i>Direct drive</i>▪ <i>Drive shaft</i>▪ <i>Differential</i>

The learner must describe in a cohesive manner why the selected design(s) are appropriate.

Band descriptors

Band 1 (1-4 marks)

The learner shows a limited knowledge of the task or how to approach it. They have identified a very narrow range of factors to be considered. The approach to the task is unclear, lacking an understanding of following a correct logical order. They have provided limited detail of only one or two key areas (for example, have only focussed on the transmission unit to be used) but have not been able to link them as a whole to the other parts of the drive train system. They have not considered alternative options. The response is unstructured and is not supported by sufficient reasoning or justification.

Example band 1 response

To do this I would look at other go karts and use this information to decide what transmission and drive train I would use.

A small fast engine is needed to make it light and to go round corners well and it would need to have some gears.

I think I would use a chain because this is the most common type. It can transmit power easily and is easy to fix and fit and would make it go fast.

Band 2 (5-8 marks)

The learner shows a mostly accurate understanding of the requirements of the question. They have identified and correctly described the process of selecting the components for the drive train but they have not appropriately linked the vehicle drive line systems together to allow correct operation. They have an understanding of two or three key areas and have presented them in the correct logical order. They have considered alternative solutions to the one they have chosen. They have provided valid reasons for their build proposal but have not considered factors such as price, efficiency, noise or the impact of these factors on the end-user (driver).

Example band 2 response

I would look at all of the drive train and transmission options available. This could include a drive chain, drive belt, prop shaft, separate gearbox and built in gearbox depending on the engine type.

I would suggest an integral gearbox be fitted and then use a chain to drive the wheels. This is because a chain is easy to fit and can be adjusted as well as being light weight. A four stroke engine could be used with a separate gear box which would have a clutch for quick starts. The clutch could be a wet type clutch because it can transmit a lot of torque for a small size and makes gear changes quicker.

I would not use a synchromesh gearbox as when racing this is not needed and the chain would drive the back wheels. It is important that the go kart is light weight to be fast and to handle well.

Band 3 (9-12 marks)

The learner has shown a thorough understanding of the build design process and have covered these in the correct logical order, including reasons behind component selection, the factors that need to be considered and the impact these factors may have on build choice. They have clearly understood how the vehicle systems link to one another in terms of order and importance. They have provided valid reasons for their proposal and have considered factors such as price, efficiency, noise, suitability or the impact of these on the end-user (driver). Alternative solutions have been proposed including valid reasons behind why these were not chosen. The response is clear, coherent and all information has been presented in a logical order, including correct justifications behind proposals.

Example band 3 response

The go-kart must be light and offer low maintenance overall including the drive train system in order to win races and be reliable. Noise is not so important in a racing go kart.

This rules out using a driveshaft or prop shaft due to their weight and to keep the weight down a lightweight four stroke engine will be used with an integral constant mesh gearbox and a wet clutch. This gearbox arrangement is the most common type found in go karts and also allows for quicker engine/gearbox changes if they fail and the usual output for the transmission type is a sprocket which lends its self to a lightweight drive train to drive the rear wheels.

A CVT gearbox could be used but this is not so good for quick starts off the line. A centrifugal clutch does not give full control and a belt type clutch gives a lot of slip.

No differential is used as the go kart slides its back tyres to go round corners. This is to keep the weight down too and the chassis is set up to allow the back wheels to slide easier.

Therefore I would use a light weight chain to drive the rear wheels of the go kart. This is because the weight is low, it is easier to adjust. A sliding adjuster is used which is locked off with bolts. A drive train with O-rings needs little maintenance and the frictional losses are also low.

Another good reason for using a drive chain is that it would be quite easy to change the gear ratios for different race circuits by changing the sprocket sizes which would give an advantage to the driver.

A chain is relatively cheap to buy and maintain and easy to fit. It is quiet in operation. I would prefer a chain over a belt because of these reasons even though a belt runs almost silently.

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 instructions 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>