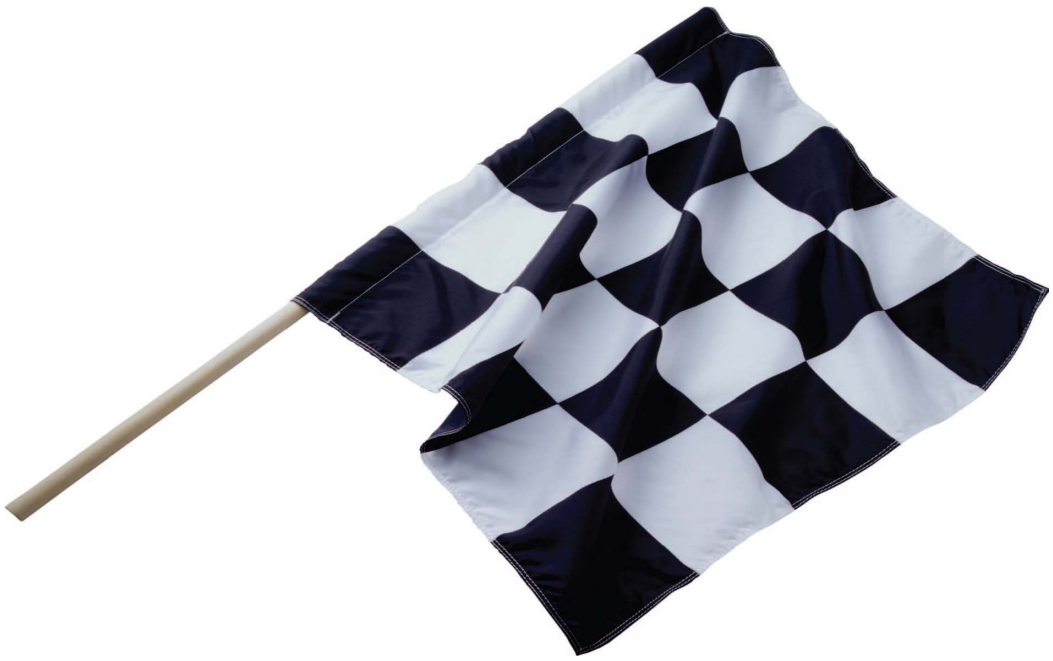
QUALIFICATION HANDBOOK

SCQF Level 3 Diploma in Introduction to General Vehicle Maintenance (3902-73)

August 2011 Version 1.0



City & Guilds

Qualification at a glance

Subject area	General Vehicle Maintenance
City & Guilds number	3902-73
Age group approved	All
Entry requirements	None
Assessment and grading	Practical Tasks and questions
Fast track	Not available
Support materials	Qualification handbook Practical Tasks and questions Recording forms
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	City & Guilds number
SCQF Level 3 Diploma in Introduction to General Vehicle Maintenance	3902-73

Contents

1 Introduction

This document tells you what you need to do to deliver the qualification:

Area	Description
Who is the qualification for?	Candidates wanting to develop some of the key skills and understanding in motor vehicle systems. Successful candidates will have the basic skills needed to apply for an automotive apprenticeship or similar engineering pathway. This qualification could also be used as an 'interest' course for a wide range of learners.
What does the qualification cover?	These qualifications cover a variety of automotive related areas including: • vehicle engine systems • lubrication systems • fuel systems • vehicle electrical systems • braking systems • steering • suspension systems.
What opportunities for progression are there?	The qualifications allow candidates to progress into employment or to the following City & Guilds qualification: • City & Guilds SCQF Level 4 Diploma/Certificate/Award in Introduction to Vehicle systems Maintenance (3902-74)

Structure

The aims of this qualification are to:

- meet the needs of customers for a modern, up-to-date and flexible qualification. It has been written to enable assessment to be carried out on a variety of vehicle types
- meet the needs of candidates who want to work in the automotive sector but are lacking experience or knowledge, and is particularly appropriate for young learners
- allow candidates to progress towards the minimum qualifications or skills levels required for entry into the automotive sector.

Qualification title	City & Guilds qualification number	Units required (inclusive)
SCQF Level 3 Diploma in Introduction to General Vehicle Maintenance	3902-73	Overall minimum of 45 credits from (301-318, 320-323) and (401-409, 412) of which a minimum of 24 credits from (301-323)

City & Guilds unit	Unit title	SCQF credit
301	Introduction to vehicle engine lubrication systems	5
302	Introduction to vehicle engine cooling systems	4
303	Introduction to vehicle fuel and exhaust systems	5
304	Introduction to vehicle spark ignition systems	5
305	Introduction to vehicle electrical systems	5
306	Introduction to vehicle braking systems	5
307	Introduction to vehicle transmission systems	5
308	Introduction to vehicle steering and suspension systems	5
309	Introduction to vehicle wheels and tyre systems	4
310	Introduction to principles of vehicle body and interior cleaning	4
311	Introduction to vehicle engine operating principles	4
312	Introduction to vehicle workshop bench skills	4
401	Vehicle engine lubrication systems	5
402	Vehicle engine cooling systems	4
403	Vehicle fuel and exhaust systems	5
404	Vehicle spark ignition systems	5
405	Vehicle electrical systems	5
406	Vehicle braking systems	5
407	Vehicle transmission systems	5
408	Vehicle steering and suspension systems	5
409	Vehicle wheels and tyre systems	4
412	Vehicle hand skills and manufacturing techniques	4

The following certificates will be awarded to successful candidates on completion of the required combinations of units. Candidates completing one or more units, rather than the full qualification(s), will receive a Certificate of Unit Credit (CUC).

City & Guilds also provides the following documents specifically for this qualification:

Publication	Available from
SCQF Level 3 recording documents	**www.cityandguilds.com**
SCQF Level 3 practical assignments	**www.cityandguilds.com**

See Appendix 2 for sources of general information on City & Guilds qualifications.

2 Centre requirements

Approval

Centres already approved to offer the qualification SCQF Level 3 Automotive Vehicle Maintenance (3901) will be automatically approved to register and certificate candidates on the 3902-73 complex (unless the centre is already subject to sanctions).

To offer this qualification, new centres will need to gain both centre and qualification approval. Please refer to the *Centre Manual - Supporting Customer Excellence* for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

Internal quality assurance

Approved centres must have effective quality assurance systems to ensure optimum delivery and assessment of qualifications.

Quality assurance includes: initial centre approval, qualification approval and the centre's own internal procedures for monitoring quality. Centres are responsible for internal quality assurance, and City & Guilds is responsible for external quality assurance.

National standards and rigorous quality assurance are maintained by the use of:

- City & Guilds practical tasks, marked by the centre according to externally set marking criteria
- internal (centre) quality assurance
- City & Guilds external verification.

To meet the quality assurance criteria for this qualification, the centre must ensure that the following internal roles are undertaken:

- quality assurance co-ordinator
- assessor
- internal verifier/moderator
- examinations secretary.

Full details and guidance on the internal and external quality assurance requirements and procedures are provided in *Centre Manual - Supporting Customer Excellence,* together with full details of the tasks, activities and responsibilities of quality assurance staff.

In order to fully support candidates, centres are required to retain copies of candidates' assessment records for three years after certification.

External quality assurance

External verifiers are appointed by City & Guilds to approve centres, and to monitor the assessment and internal quality assurance carried out by centres. External verification is carried out to ensure that assessment is valid and reliable, and that there is good assessment practice in centres.

To carry out their quality assurance role, external verifiers/moderators must have appropriate occupational and verifying knowledge and expertise. City & Guilds external verifiers attend training and development designed to keep them up-to-date, to facilitate standardisation between verifiers and to share good practice.

External verifiers

The role of the external verifier is to:

- provide advice and support to centre staff
- ensure the quality and consistency of assessments within and between centres by the use of systematic sampling
- regularly visit centres to ensure they continue to meet the centre and qualification approval criteria
- provide feedback to centres and to City & Guilds

External quality assurance for the qualification will be provided by the usual City & Guilds external verification process. This includes the use of an electronically scannable report form which is designed to provide an objective risk analysis of individual centre assessment and verification practice. Further details of the role of external verifiers are given in *Centre Manual - Supporting Customer Excellence*.

Resource requirements

Physical resources and site agreements

Centres must have access to sufficient equipment in the centre or workplace to ensure candidates have the opportunity to cover all of the practical activities. The equipment, systems and machinery must meet industry standards and be capable of being used under normal working conditions.

Centre staffing

Centre staff must satisfy the requirements for occupational expertise for this qualification. These requirements are as follows:

- Staff should be technically competent in the areas for which they are delivering training and/or should also have experience of providing training.
- Assessors and tutors should have at least two years' recent relevant experience in the specific area they will be assessing. If this experience is part-time it should be over a period of five years.

Centre staff may undertake more than one role, e.g. tutor and assessor or internal verifier, but cannot internally verify their own assessments.

Assessors and internal verifiers

Assessor and verifier requirements

While the Assessor/Verifier (A/V) units are valued as qualifications for centre staff, they are not currently a requirement for this qualification.

Continuing professional development (CPD)

Centres must support their staff to ensure that they have current knowledge of the occupational area, that delivery, mentoring, training, assessment and verification is in line with best practice, and that it takes account of any national or legislative developments.

Candidate entry requirements

There are no formal entry requirements for candidates undertaking this qualification. However, centres must ensure that candidates have the potential and opportunity to be successful in gaining their qualification.

Please note that for funding purposes, candidates should not be entered for a qualification of the same type, content and level as that of a qualification they already hold.

Age restrictions

There are no age limits attached to candidates undertaking the qualification.

3 Delivering the qualification

Initial assessment and induction

Centres will need to make an initial assessment of each candidate prior to the start of their programme to ensure they are entered for an appropriate type and level of qualification.

The initial assessment should identify any specific training needs the candidate may have, and the support and guidance they may require when working towards their qualification.

City & Guilds recommends that centres provide an induction programme to ensure the candidate fully understands the requirements of the qualification they will work towards, their responsibilities as a candidate, and the responsibilities of the centre. It may be helpful to record the information on a learning contract.

Further guidance about initial assessment and induction, as well as a learning contract that centres may use, are available in the *Centre Manual - Supporting Customer Excellence*.

Support materials

For further information to assist with the planning and development of the programme, please refer to the following:

- Practical training tasks
- Recording forms
- Useful material is available on SmartScreen.

Recording documents

Candidates and centres may decide to use a paper-based or electronic method of recording evidence.

To support the delivery of vocational qualifications we offer our own e-portfolio, Learning Assistant, an easy-to-use and secure online tool to support and evidence learners' progress towards achieving qualifications. Further details are available at: **www.cityandguilds.com/eportfolios**.

City & Guilds has developed a set of recording forms specifically for this qualification. Recording forms and practical training tasks are available on the City & Guilds website. Although new centres are expected to use these forms, centres may devise or customise alternative forms, which must be approved for use by the external verifier, before they are used by candidates and assessors at the centre. Amendable (MS Word) versions of the forms are available on the City & Guilds website.

Recommended delivery strategies

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

Provided that the requirements for the qualification are met, centres may design course programmes of study in any way that they feel best meets the needs and capabilities of their candidates. Centres may wish to include topics as part of the course programme, which will not be assessed through the qualification.

Relationship to other qualifications and the wider curriculum

City & Guilds recommends centres to address the wider curriculum, where appropriate, when designing and delivering the course. Opportunities to address social, moral, spiritual and cultural issues, and environmental education and Health and Safety issues during the delivery of the qualification have been identified, and can be found in Appendix 2.

Health and safety

The requirement to follow safe working practices is an integral part of all City & Guilds qualifications and assessments, and it is the responsibility of centres to ensure that all relevant health and safety requirements are in place before candidates start practical assessments.

Should a candidate fail to follow health and safety practice and procedures during an assessment, the assessment must be stopped. The candidate should be informed that they have not reached the standard required to successfully pass the assessment and told the reason why. Candidates may retake the assessment at a later date, at the discretion of the centre. In case of any doubt, guidance should be sought from the external verifier.

Guidance on risk management of pre 16 candidates

Centres offering the SCQF Level 3 and SCQF Level 4 Award, Certificate and Diploma in Introduction to Vehicle Systems Maintenance (3902) to candidates under the age of 16 must assume responsibility for the safe delivery of the qualification. This will include those units that require using and working with power tools and machinery and using and working under lifts and hoists.

In order to ensure that the risk related to the delivery and assessment of this qualification is managed appropriately, City & Guilds requires the Head of Centre to provide a satisfactory risk assessment. The risk assessment should outline those activities within the units which, specific to the centre, may pose a risk or hazard to the safety of the candidate and identify how these risks/hazards will be managed to reduce or alleviate risk.

The risk assessment should be forwarded to your local City & Guilds regional office to be held on file. A copy should be retained by the centre and made available to a City & Guilds external verifier or representative on request.

Data protection and confidentiality

Centres offering this qualification may need to provide City & Guilds with personal data for staff and candidates. Guidance on data protection and the obligations of City & Guilds and centres are explained in *Centre Manual - Supporting Customer Excellence*.

Equal opportunities

It is a requirement of centre approval that centres have an equal opportunities policy (see *Centre Manual - Supporting Customer Excellence)*. The regulatory authorities require City & Guilds to monitor centres to ensure that equal opportunity policies are being followed.

The City & Guilds equal opportunities policy is set out on the City & Guilds website, in *Centre Manual - Supporting Customer Excellence*, and is also available from the City & Guilds Customer Relations department.

Access to qualifications on the National Qualifications Framework is open to all, irrespective of gender, race, creed, age or special needs. The centre co-ordinator should ensure that no candidate is subject to unfair discrimination on any ground in relation to access to assessment and the fairness of the assessment.

Access to assessment

City & Guilds' guidance and regulations on access to assessment are designed to facilitate access to assessments and qualifications for candidates who are eligible for adjustments to assessment arrangements. Access arrangements are designed to allow attainment to be demonstrated. For further information, please see *Access to assessment and qualifications*, available on the City & Guilds website.

Appeals

Centres must have their own, auditable, appeals procedure that must be explained to candidates during their induction. Appeals must be fully documented by the quality assurance co-ordinator and made available to the external verifier or City & Guilds.

Further information on appeals is given in *Centre Manual - Supporting Customer Excellence*. There is also information on appeals for centres and learners on the City & Guilds website or available from the Customer Relations department.

4 Assessment

For this qualification, candidates will be required to complete a specified number of assessment tasks for each unit, as defined within each unit. The assessment tasks may be completed in any order. Assessors/tutors will decide when each candidate should complete a task and will be expected to organise the tasks in a logical order according to the requirements of the candidates and the course. The assessment tasks are graded Pass or Fail. The Practical training tasks and Recording forms can be downloaded from the City & Guilds website.

Time constraints

There are no time constraints applied to the assessment of this qualification. If centres have queries regarding the length of time required to complete a particular task, they should contact their external verifier in the first instance who will advise accordingly and feed this information back to City & Guilds where appropriate.

Assessment strategy

The units within this qualification must assess the candidate's practical skills and understanding for each unit.

This should be done by carrying out practical tasks with oral questioning. Centres can choose to use the example oral questions as a written exam as long as all of the necessary knowledge is covered.

Recognition of prior learning (RPL)

Recognition of prior learning means using a person's previous experience or qualifications which have already been achieved to contribute to a new qualification. RPL is allowed and is also sector specific.

Registration and certification

Full details of City & Guilds' administrative procedures for this qualification are provided in the *Directory of qualifications*, provided online to City & Guilds registered centres via the Walled Garden. This information includes details on:

- registration procedures
- enrolment numbers
- fees
- entry for examinations
- claiming certification.

These details are also available in the *Directory of qualifications.*Centres should be aware of time constraints regarding the registration and certification periods for the qualification, as specified in the City & Guilds *Directory of qualifications*. Centres should follow all guidance carefully, particularly noting that fees, registration and certification end dates for the qualification are subject to change.

5 Units

Below is a list of the learning outcomes for all the units.

Structure of units

These units each have the following:

- City & Guilds reference number
- title
- level
- credit value
- unit aim
- information on assessment
- learning outcomes which are comprised of a number of assessment criteria
- notes for guidance.

Unit 301 Introduction to vehicle engine lubrication systems

Level:	SCQF Level 3
Credit value:	5
GLH:	38
Aim	This unit is about the basic maintenance of engine lubrication systems for a range of vehicle types

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal and replacement activities on engine lubrication systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow approved workplace procedures 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out removal and replacement activities on engine lubrication systems
Assessment criteria	
The learner can: 2.1 identify the correct **tools and equipment** and check they are fit for purpose 2.2 correctly use **tools and equipment** 2.3 identify the major **components** of the engine lubrication system 2.4 describe the operation and purpose of the following: oil filter, lubricating oils, valve cover/casing and gasket, dip stick 2.5 **examine** vehicle engine lubrication systems 2.6 demonstrate basic removal and fitting techniques 2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.8 identify codes and grades of lubricants	

Unit 301 Introduction to vehicle engine lubrication systems

Supporting information

Unit range

Tools and equipment

Hand tools, torque wrench, oil drainer, sump plug spanner, oil filter, removal tool

Components

Petrol four stroke, diesel four stroke, two stroke

Examinations

Aural, visual, functional, measurements

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- replace oil with a suitable grade and specification
- change a filter (examples include: canister, element, gauze type)
- remove and refit an engine cover/casing gasket
- understand correct tightening procedures
- demonstrate the ability to check their own work for missing parts/components
- identify basic faults which include oil leaks to the areas worked upon

Some engines do not have valve covers (two stroke petrol) therefore the option of an engine casing removal and replacement demonstrates similar skills for this unit

Two stroke engines: you would be expected to change oil on a four stroke

Unit 302 Introduction to vehicle engine cooling systems

Level:	SCQF Level 3
Credit value:	4
GLH:	32
Aim	This unit is about the basic maintenance of cooling systems for a range of vehicle types.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal and replacement activities on engine lubrication systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow approved workplace procedures 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out removal and replacement activities on engine cooling systems
Assessment criteria	
The learner can: 2.1 identify the correct tools and equipment and check they are fit for purpose 2.2 correctly use tools and equipment 2.3 identify the major **components** relevant to the cooling system 2.4 state the basic operation and purpose of the following; thermostat, radiator, water pump, antifreeze 2.5 examine engine cooling systems 2.6 demonstrate basic removal and fitting techniques 2.7 make a gasket to fit components 2.8 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.9 identify codes and grades of coolant additives	

Unit 302 Introduction to vehicle engine cooling systems

Supporting information

Unit range

Components

Thermostat casing gasket, water pump

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- remove and refit cooling system components, make and fit a new gasket, and understand correct tightening procedures
- demonstrate/Show the ability to check their own work for missing parts/components
- identify basic faults which include coolant leaks to the areas worked upon.

Some engines may be of an air cooled type. What is important is that the learner is capable of removing two similar cooling system components using the skills needed for removal and refit, including correct tightening procedures.

An engine rig can be used for this unit.

Unit 303 Introduction to vehicle fuel and exhaust systems

Level:	SCQF Level 3
Credit value:	5
GLH:	39
Aim	This unit is about the basic maintenance of vehicle fuel and exhaust systems.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal and replacement activities on vehicle fuel and exhaust systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow approved workplace procedures 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out removal and replacement activities on vehicle fuel and exhaust systems
Assessment criteria	
The learner can: 2.1 identify the correct tools and equipment and check they are fit for purpose 2.2 correctly use **tools and equipment** 2.3 identify the major **components** of the vehicle fuel and exhaust systems 2.4 state the basic operation and purpose of the following: air filter, exhaust, fuel injector, fuel filter 2.5 **examine** vehicle fuel and exhaust systems 2.6 demonstrate basic removal and fitting techniques 2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.8 identify replacement component codes	

Unit 303 Introduction to vehicle fuel and exhaust systems

Supporting information

Unit range

Tools and equipment

Hand tools, torque wrench

Components

Spark ignition (si), compression ignition (ci)

Examinations

Aural, visual, functional, measurements

Removal and fitting techniques

- Change: air filter, fuel filter
- Remove and refit a section of the exhaust
- Check for: fuel leaks, exhaust leaks, exhaust security
- Dispose of waste components

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- remove and refit fuel, exhaust and air system components and understand correct tightening procedures
- demonstrate the ability to check their own work for missing parts/components.
- identify basic faults which include fuel and exhaust leaks to the areas worked upon.

Some engines may use a carburettor. What is important is that the learner is capable of removing this or a similar component. The skills needed for removal and refitting, including correct tightening procedures, would support this unit.

An engine rig can be used for this unit.

Unit 304 Introduction to vehicle spark ignition systems

Level:	SCQF Level 3
Credit value:	5
GLH:	43
Aim	This unit is about the basic maintenance of ignition systems on petrol engines, and has the option to cover either basic mechanically triggered or electronically managed systems.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal and replacement activities on vehicle spark ignition systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2 follow approved workplace procedures 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out removal and replacement activities on vehicle spark ignition systems
Assessment criteria	
The learner can: 2.1 identify the correct tools and equipment and check they are fit for purpose 2.2 correctly use **tools and equipment** 2.3 identify the major components of vehicle spark ignition systems 2.4 state the basic operation and purpose of the following: high tension lead, spark plugs, ignition coil 2.5 **examine** vehicle spark ignition systems 2.6 demonstrate basic **removal and fitting techniques** 2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.8 identify correct replacement component codes	

Unit 304 Introduction to vehicle spark ignition systems

Supporting information

Unit range

Tools and equipment

Hand tools, torque wrench, multimeter

Examinations

Aural, visual, functional, measurements, comparisons

Spark ignition system removal and fitting techniques

Remove high tension leads, test high tension lead resistance, remove and refit spark plugs, check and compare spark plugs fro running condition, adjust spark plug gaps, remove ignition coil, dispose of waste components

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- remove and refit ignition system components and understand correct tightening procedures
- demonstrate the ability to check their own work for missing parts/components.
- identify basic faults which include:
- worn spark plug electrodes
- comparing specification for correct running
- high tension lead resistance
- visual damage to ignition coil

An engine rig can be used for this unit.

Unit 305 Introduction to vehicle electrical systems

Level:	SCQF Level 3
Credit value:	5
GLH:	38
Aim	This unit is about the maintenance of light vehicle auto-electrical systems.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal and replacement activities on electrical systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2 follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out removal, repair and replacement activities on electrical systems
Assessment criteria	
The learner can: 2.1 identify the correct tools and equipment and check they are fit for purpose 2.2 correctly use **tools and equipment** 2.3 identify the major components of the electrical system 2.4 state the basic operation and purpose of the following: battery, brake lights, headlamps, fuse, relay 2.5 **examine** electrical systems 2.6 demonstrate basic removal, repair and fitting techniques 2.6 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.7 identify correct replacement component codes	

Unit 305 Introduction to vehicle electrical systems

Supporting information

Unit range

Approved workplace procedures

Safe handling and disposal of used electrical components, starting and running engines safely in a confined space

Tools and equipment

Hand tools, multi meter, soldering iron

Examinations

Aural, visual, functional, measurements, comparisons

Electrical system removal, repair and fitting techniques

Replace headlamp bulb, brake light bulb, replace fuse, replace relay

Remove and fit battery, check battery voltages, solder wire and terminal

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- remove and refit electrical system components and understand correct tightening procedures
- demonstrate the ability to check their own work for missing parts/components.
- identify basic faults which include:
- Blown heap lamp and brake light bulbs
- Use a multi-meter to check for continuity
- Solder wire and terminals

Unit 306 Introduction to vehicle braking systems

Level:	SCQF Level 3
Credit value:	5
GLH:	35
Aim	This unit is about basic maintenance of light vehicle braking systems.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal replacement activities on engine lubrication systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out braking system removal, comparison and replacement activities
Assessment criteria	
The learner can: 2.1 identify the correct **tools and equipment** and check they are fit for purpose 2.2 correctly use tools and equipment 2.3 identify the major components of the braking system 2.4 check condition of the brake cables and brake pipes 2.5 state the basic operation and purpose of the following: brake pads, brake disc, brake shoe, brake drum, brake fluid, brake cable, master cylinder 2.6 **examine** braking systems 2.7 demonstrate basic **removal, comparison and fitting techniques** 2.8 check and top up brake fluid 2.9 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.10 identify codes and grades of brake fluid	

Unit 306 Introduction to vehicle braking systems

Supporting information

Unit range

Approved workplace procedures

Safe handling and disposal of used and waste break fluids and components

Start and run engines safely in a confined space

Tools and equipment

Hand tools, torque wrench

Examination

Aural, visual, functional, measurements

Braking system removal, comparison and fitting techniques

Brake pads, brake shoes

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- remove and refit braking system components
- top up brake fluid levels
- check relevant brake pipe, cables.
- understand correct tightening procedures.
- demonstrate the ability to check their own work for missing parts/components
- identify basic faults which include worn and damaged brake components to the vehicles worked upon

Unit 307 Introduction to vehicle transmission systems

Level:	SCQF Level 3
Credit value:	5
GLH:	38
Aim	This unit is about the basic maintenance of light vehicle transmission systems.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal replacement activities on vehicle transmission systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out removal replacement activities on vehicle transmission systems
Assessment criteria	
The learner can: 2.1 identify the correct **tools and equipment** and check they are fit for purpose 2.2 correctly use **tools and equipment** 2.3 identify the major components of the transmission system 2.4 state the basic operation and purpose of the following: clutch, torque converter, drive-line, gear train, final drive, wheel bearing 2.5 **examine** transmission systems 2.6 demonstrate basic **removal and fitting techniques** 2.7 check and top up transmission lubricants 2.8 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.9 identify codes and grades of transmission lubricants	

Unit 307 Introduction to vehicle transmission systems

Supporting information

Unit range

Approved workplace procedures

Safely dispose of used and waste transmission components and fluids
Safely start and run engines in a confined space

Tools and equipment

Hand tools, torque wrench

Transmission system, removal and fitting techniques

Clutch, drive-line, wheel bearing

Examination

Aural, visual, functional, measurements

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- remove and refit transmission system components
- top up transmission fluid levels
- understand correct tightening procedures.
- demonstrate the ability to check their own work for missing parts/components
- identify basic faults which include worn and damaged transmission components to the vehicles worked upon.

Unit 308 Introduction to vehicle steering and suspension systems

Level:	SCQF Level 3
Credit value:	5
GLH:	36
Aim	This unit is about the basic maintenance of vehicle suspension and steering systems.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal replacement activities on vehicle suspension and steering systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out removal replacement activities on vehicle suspension and steering systems
Assessment criteria	
The learner can: 2.1 identify the correct **tools and equipment** and check they are fit for purpose 2.2 correctly use **tools and equipment** 2.3 identify the major components of the suspension and steering systems 2.4 state the basic operation and purpose of the following: damper, spring, steering components 2.5 **examine** steering and suspension systems 2.6 demonstrate basic removal and fitting techniques 2.7 carry out **steering and suspension checks** 2.8 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.9 identify codes and grades of steering and suspension lubricants	

Unit 308 Introduction to vehicle steering and suspension systems

Supporting information

Unit range

Approved workplace procedures

Safely handle and dispose of used and waste steering and suspension fluids and components

Safely start and run engines in a confined space

Tools and equipment

Hand tools, alignment gauge, torque wrench

Examination

Aural, visual, functional, measurements

Steering and suspension, removal and fitting techniques

Damper, spring, steering joint or bearing

Steering and suspension checks

Front wheel alignment, front to rear wheel alignment, damper checks

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- remove and refit steering and suspension system components
- check alignment
- carry out basic damper inspections
- understand correct tightening procedures
- demonstrate the ability to check their own work for missing parts/components
- identify basic faults which include worn and damaged steering and suspension components to the vehicles worked upon

Unit 309 Introduction to vehicle wheels and tyre systems

Level:	SCQF Level 3
Credit value:	4
GLH:	32
Aim	This unit is about the basic maintenance of light vehicle wheel and tyre systems.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out removal replacement and checking activities on vehicle wheels and tyres
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out removal replacement and checking activities on vehicle wheels and tyres
Assessment criteria	
The learner can: 2.1 identify the correct **tools and equipment** and check they are fit for purpose 2.2 correctly use **tools and equipment** 2.3 identify the major components of the wheels and tyre system 2.4 state the basic operation and purpose of the following: tyres, valves, wheels balance, weights 2.5 **examine** wheel and tyres for: damage, balance, leaks, wear limits & characteristics, tyre types and side wall marking 2.6 demonstrate basic removal, checking and fitting activities on vehicle wheels and tyres 2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items 2.8 identify wheel and tyre types and markings	

Unit 309 Introduction to vehicle wheels and tyre systems

Supporting information

Unit range

Approved workplace procedures

Safely handle and dispose of used and waste tyres

Safely start and run engines in a confined space

Tools and equipment

Hand tools, wheel balance equipment, water bath, torque wrench, tyre depth gauge, air line, pressure test equipment

Examination

Visual, functional, measurements

Unit 310 Introduction to principles of vehicle body and interior cleaning

Level:	SCQF Level 3
Credit value:	4
GLH:	33
Aim	This unit is about the valeting of light vehicle interiors and exteriors.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when valeting light vehicle interiors and exteriors
The learner can: 1.1 correctly use required PPE 1.2 follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out body and cleaning activities
Assessment criteria	
The learner can: 2.1 identify the correct **equipment** and check it is fit for purpose 2.2 correctly use **equipment** 2.3 **examine** vehicle 2.4 demonstrate vehicle **cleaning activities** to include: internal, external, glass, wheels and tyres 2.4 state how to recognise and report cosmetic damage to vehicle components and units outside normal vehicle body and cleaning activities 2.5 identify wheel and tyre types and markings	

Unit 310 Introduction to principles of vehicle body and interior cleaning

Supporting information

Unit range

Approved workplace procedures

Safely handle and dispose of used and waste cleaning materials
Safely start and run engines in a confined space

Equipment

Pressure washer, cleaning cloths, sponges and brushes, vacuum cleaner

Examination

Visual, functional

Cleaning activities

Exterior, interior wheels, tyres, glass

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- work safely at all times
- protect the vehicle
- identify areas which need cleaning
- select the correct cleaning materials
- use the correct equipment
- show an ability to self assess their work
- report vehicle damage

Unit 311 Introduction to vehicle engine operating principles

Level:	SCQF Level 3
Credit value:	4
GLH:	31
Aim	This unit is about basic vehicle engine operating principles.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when working on engine systems
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Know the principles of vehicle engine operation
Assessment criteria	
The learner can: 2.1 identify the major **components** of engine operating principles and its systems 2.2 state the operation and purpose of the following: crankshaft and bearings, cylinder head gasket, lubricating oils, cylinder head, valves or ports, piston and rings	

Learning outcome	The learner will:
3. Be able to dismantle and reassemble engines	
Assessment criteria	
The learner can: 3.1 identify the correct tools and equipment and check they are fit for purpose 3.2 correctly use tools and equipment 3.3 carry out **examination methods** 3.4 identify the **main engine components** 3.5 demonstrate basic **engine component removal and fitting techniques** 3.6 state how to recognise and report damaged or missing parts and components 3.7 identify codes and grades of lubricants and coolant	

Unit 311 Introduction to vehicle engine operating principles

Supporting information

Unit range

Approved workplace procedures

Safely handle and dispose of used and waste components and fluids
Safely start and run engines in a confined space

Components

Petrol four stroke, diesel four stroke, two stroke

Tools and equipment

Hand tools, torque wrench, feeler blades, specialist

Main engine components

Crankshaft and bearings, cylinder head, lubricating oils, cylinder head, valves or ports, piston, con rod and rings, block and sump

Examination methods

Aural, visual, functional, measurements

Engine dismantle and reassembly procedures

Tightening bolt torque procedure, tightening procedures

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- how to dismantle and reassemble an engine
- how to identify the main engine components
- basic operating principles
- correct tightening procedures

It is important that candidates

- show ability to check their own work for missing parts /components
- adjust tappet clearances correctly; this could be on another engine.

A non-running engine rig can be used for this unit.

Unit 312 Introduction to vehicle workshop bench skills

Level:	SCQF Level 3
Credit value:	4
GLH:	26
Aim	This unit is an introduction to the vehicle workshop bench skills needed to work in the automotive maintenance and repair industry.

Learning outcome	**The learner will:**
1. Be able to follow approved and safe procedures when working on engine systems	
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2. Be able to carry out vehicle workshop bench skill techniques	
Assessment criteria	
The learner can: 2.1 identify the correct **equipment** and check it is fit for purpose 2.2 correctly use **equipment** 2.3 state why materials properties are important 2.4 draw **simple sketches** 2.5 carry out vehicle workshop **bench skills and manufacturing techniques**	

Unit 312 Introduction to vehicle workshop bench skills

Supporting information

Unit range

Approved workplace procedures

Safely handle and dispose of used and waste components, and fluids
Safely start and run engines in a confined space

Equipment

Hand tools, centre punch, measuring equipment, specialist, hammer, files, taps, dies, drills, vice

Bench skills and manufacturing techniques

Joining techniques, making threads, cutting metals, measuring, bending, folding, filing

Simple sketches

Dimensions, materials, joining, thread

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- sketches and simple engineering drawings
- how to use tools and equipment correctly and safely
- how to carry out manufacturing techniques using bench skills

Unit 313 Basics of vehicle body fitting

Level:	SCQF Level 3
Credit value:	4
GLH:	38
Aim	This unit is about demonstrating the skills and knowledge required to remove and refit vehicle body components that are fixed using threaded fasteners. Learners will carry out adjustments as instructed, and with appropriate support and guidance take some responsibility for the outcomes of the activities.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when removing and refitting detachable vehicle body panels
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out the removal and replacement of detachable vehicle body components
Assessment criteria	
The learner can: 2.1 identify the correct **hand tools** and check they are fit for purpose 2.2 correctly use **hand tools** 2.3 identify vehicle body panels using the correct terminology 2.4 correctly align **detachable vehicle body components** 2.5 identify the different types of fasteners 2.6 securely fix **detachable vehicle body components** 2.7 follow prescribed quality checks to ensure correct alignment and secure fixing.	

Unit 313 Basics of vehicle body fitting

Supporting information

Unit range

Workplace procedures

Minimising the risk of damage to self and others and their property, the vehicle, its systems, the environment.

Complying with good housekeeping practices and correctly store workshop hand tools during and after use.

Detachable vehicle body components

- bonnets
- doors
- tailgates
- bolt on wings.

Fasteners and fixings

- hexagonal head bolts
- nuts; plain hexagonal
- washers; plain and spring.

Hand tools should include**:**

- spanners; open end, ring and combination
- ratchet, strong bar, sockets and extension bars
- screwdrivers; cross point and plain.

Unit 314 Basics of vehicle Mechanical Electrical Trim (MET)

Level:	SCQF Level 3
Credit value:	4
GLH:	36
Aim	This unit is about demonstrating the skills and knowledge required to remove and refit vehicle mechanical, electrical and trim components. Learners will carry out adjustments as instructed, and with appropriate support and guidance take some responsibility for the outcomes of the activities.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when removing and refitting detachable vehicle body panels
Assessment criteria	
The learner can:	
1.1	correctly use required PPE
1.2.	follow **approved workplace procedures**
1.3	identify potential health and safety hazards and risks
1.4	identify the relevant information sources
1.5	state the importance of keeping records

Learning outcome	**The learner will:**
2.	Be able to remove and replace MET components
Assessment criteria	
The learner can:	
2.1	identify the correct **hand tools** and check they are fit for purpose
2.2	correctly use **hand tools**
2.3	identify the different **types of vehicle**
2.4	identify vehicle **MET components** using the correct terminology
2.5	correctly align **MET components**.
2.6	identify the different types of **fasteners**
2.7	securely fix detachable vehicle body components
2.8	follow prescribed quality checks to ensure correct alignment and secure fixing.

Unit 314 Basics of vehicle Mechanical Electrical Trim (MET)

Supporting information

Unit range

Approved workplace procedures

Minimising the risk of damage to self and others, their property, the vehicle, its systems, the environment.

Complying with good housekeeping practices and correctly storing workshop hand tools during and after use.

MET components

- Bumpers front and rear
- Rear lamps
- Front grille/trim
- Road wheel

Fasteners and fixings

- Hexagonal head bolts
- Nuts; plain hexagonal, wheel lock and plastic insert (nyloc)
- Washers; plain and spring
- Trim clips

Hand tools

- Spanners; open end, ring and combination
- Ratchet, strong bar, sockets and extension bars
- Screwdrivers; cross point and plain
- Torque wrench
- Vehicle jacks
- Axle stands
- Wheel brace
- Wheel chocks

Types of vehicle

Saloon, hatchback, sports, estate.

Unit 315 Fundamental vehicle body repair techniques

Level:	SCQF Level 3
Credit value:	4
GLH:	38
Aim	This unit is about demonstrating the skills and knowledge required to; complete preliminary vehicle body repair activities, identify the materials used, and with appropriate guidance take some responsibility for the quality of the work.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when carrying out preliminary body panel repairs
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2. follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to carry out body repair techniques
Assessment criteria	
The learner can: 2.1 identify the correct **hand and power tools** and check they are fit for purpose 2.2 correctly use **hand and power tools** 2.3 identify the panel/substrate **material** 2.4 rough out small dents using a variety of hand tools 2.5 mix and apply plastic body filler in an economical manner 2.6 rub down body filler to the correct profile 2.7 follow prescribed quality checks to ensure acceptable profile of repair.	

Unit 315 Fundamental vehicle body repair techniques

Supporting information

Unit range

Approved workplace procedures:

Minimising the risk of damage to self and others, their property, the vehicle, its systems, the environment.

Complying with good housekeeping practices and correct storage of workshop tools and equipment during and after use.

Materials:

- carbon steels
- plastic body filler
- flatting papers

Hand and power tools:

- hammers
- dollies
- filler applicators
- flatting blocks
- sanders; disc, and DA.

Unit 316 Introduction to vehicle MAG welding techniques

Level:	SCQF Level 3
Credit value:	3
GLH:	30
Aim	This unit is about the skills and knowledge required to; use MAG welding equipment to complete plug and lap welds in low carbon steel sheet (0.75 – 1mm), and carry out operational adjustments on the equipment.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when using MAG welding equipment
Assessment criteria	
The learner can: 1.1 state the health and safety requirements relevant to electric welding principles 1.2 correctly use required PPE 1.3 follow **approved workplace procedures** 1.4 identify **potential health and safety hazards and risks** 1.5 identify the relevant information sources 1.6 state the importance of keeping records.	

Learning outcome	**The learner will:**
2.	Be able to produce MAG plug and lap welds
Assessment criteria	
The learner can: 2.1 complete effective tacking of **materials** prior to lap and plug welding. 2.2 complete **effective** lap **welds** 2.3 complete **effective** plug **welds**.	

Learning outcome	**The learner will:**
3.	Know the principles and techniques of using MAG welding processes.
Assessment criteria	
The learner can: 3.1 state why it is important to use correct MAG **welding techniques** 3.2 state the purpose of the shielding gas 3.3 identify distortion caused by the application of heat.	

Unit 316 Introduction to vehicle MAG welding techniques

Supporting information

Unit range

Approved workplace procedures

Minimising the risk of damage to self and others, their property, the vehicle, its systems, the environment.

Complying with good housekeeping practices and correct storage of workshop tools and equipment during and after use

Health and safety hazards and risks

- heat
- fire
- burns
- ultra violet rays
- fumes
- arc eye
- spatter

Effective welds

When destructive testing is applied to effective welds the material will fail before the weld. The aesthetics of the weld is therefore of secondary importance.

Materials

Lap weld approximately 100mm x 60mm x 0.75mm – 1mm mild steel. With a length of 30mm and a pitch of 30mm.

Plug weld on material 150mm x 60mm x 0.75mm – 1mm mild steel using three plugs approximately 12mm in diameter over the length of material

All dimensions, length and pitch provided are for guidance only and may be modified to suit the local situation.

Welding techniques:

- torch angle inclination
- direction of torch travel
- speed of torch travel
- distance of torch from work piece
- tacking prior to welding
- preparation of material prior to welding
- cleaning and presentation of material post welding
- cleaning and presentation of MAG welding equipment post welding.

Unit 317 Introduction to vehicle resistance spot welding techniques

Level:	SCQF Level 3
Credit value:	2
GLH:	18
Aim	This unit is about the skills and knowledge required to; set up and use resistance spot welding equipment, complete sample welds in low carbon steel sheet (0.75 – 1mm) and carrying out destructive testing.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when setting up and using resistance spot welding equipment
Assessment criteria	
The learner can: 1.1 state the health and safety requirements relevant to electric welding principles 1.2 correctly use required PPE 1.3 follow **approved workplace procedures** 1.4 identify potential **health and safety hazards and risks** 1.5 identify the relevant information sources 1.6 state the importance of keeping records.	

Learning outcome	**The learner will:**
2.	Be able to carry out resistance spot welding
Assessment criteria	
The learner can: 2.1 set up resistance spot welding equipment to include: • welding arms • welding tips 2.2 adjust resistance spot welding equipment to include: • the voltage • timer mechanisms 2.3 prepare **materials** for resistance spot welding 2.4 complete resistance spot welding 2.5 complete destructive testing on resistance spot welds	

Learning outcome	The learner will:
3. Understand the principles and techniques of resistance spot welding processes	
Assessment criteria	
The learner can: 3.1 list the **variables of resistance spot welding** 3.2 state the methods used to check the effectiveness of resistance spot welds 3.3 identify distortion caused by the application of heat	

Unit 317 Introduction to vehicle resistance spot welding techniques

Supporting information

Unit range

Approved workplace procedures

Minimising the risk of damage to self and others, their property, the vehicle, its systems, the environment.

Complying with good housekeeping practices and correct storage of workshop tools and equipment during and after use.

Health and safety hazards and risks

- heat
- fire
- burns
- fumes
- spatter

Materials

All dimensions (approx 100mm x 25mm x 0.75 - 1mm) are for guidance only and may be modified to suit the local situation.

Variables of resistance spot welding

- heat
- pressure
- time

Unit 318 Introduction to vehicle panel preparation techniques

Level:	SCQF Level 3
Credit value:	3
GLH:	28
Aim	This unit is about demonstrating the skills and knowledge required to prepare vehicle body panels for subsequent paint coats while working under clear guidelines.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when preparing vehicle body panels
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2 follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records.	

Learning outcome	**The learner will:**
2.	Be able to prepare vehicle body panels
Assessment criteria	
The learner can: 2.1 identify the correct **hand, power tools and equipment** and check they are fit for purpose 2.2 correctly use **hand, power tools and equipment** 2.3 hand flat vehicle body panels 2.4 flat vehicle body panels using power tools 2.5 feather edge a repaired body panel 2.6 clean tools and equipment and obtain confirmation that that they are left in a clean and serviceable condition.	

Learning outcome	The learner will:
3. Know the materials used in vehicle body panel preparation.	
Assessment criteria	
The learner can: 3.1 identify the types and grades of **abrasive materials** used for vehicle body panel preparation 3.2 list the different types of **paint material** 3.3 list the different types of **paint coat**.	

Unit 318 Introduction to vehicle panel preparation techniques

Supporting information

Unit range

Approved workplace procedures

Minimising the risk of damage to self and others their property, the vehicle, its systems, the environment including the disposal of waste materials.

Complying with good housekeeping practices and correct storage of workshop tools and equipment during and after use.

Hand, power tools and equipment

- power sanders, pneumatic and electric
- dust extraction equipment
- airlines and power leads.
- flatting blocks

Abrasive materials

- scouring pads
- latting papers.

Paint materials

Thinners, activators, primers and undercoats.

Paint coats

Primers and undercoats.

Unit 320 Application of paint materials to vehicles using spray gun techniques

Level:	SCQF Level 3
Credit value:	3
GLH:	28
Aim	In this unit learners will be able to demonstrate the skills and knowledge required to apply foundation coat materials using a previously prepared and set spray gun.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when applying foundation coat materials.
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2 follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records 1.6 state the need for fume extraction when applying **foundation coat materials**.	

Learning outcome	**The learner will:**
2.	Be able to apply foundation coat materials.
Assessment criteria	
The learner can: 2.1 use a pre-prepared spray gun to apply **foundation coat materials** 2.2 identify the correct spray gun pattern 2.3 clean tools and equipment and obtain confirmation that that they are left in a clean and serviceable condition.	

Unit 320 Application of paint materials to vehicles using spray gun techniques

Supporting information

Unit range

Approved workplace procedures:

Minimising the risk of damage to self and others their property, the vehicle, its systems, the environment including the disposal of waste materials.

Complying with good housekeeping practices, maintaining a clean working environment and correct storage of workshop tools and equipment during and after use.

Foundation coat materials:

- etch primers, primers
- thinners
- activators

Unit 321 Mix foundation coat materials for spray gun application

Level:	SCQF Level 3
Credit value:	2
GLH:	18
Aim	In this unit learners will be able to demonstrate the skills and knowledge required to mix foundation coat materials for application by spray gun.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when preparing vehicle body panels.
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2 follow **approved workplace procedures** 1.3 identify potential health and safety hazards and risks 1.4 state the importance of controlling paint shop substances which may be hazardous to health 1.5 identify the relevant information sources 1.6 state the importance of keeping records	

Learning outcome	**The learner will:**
2.	Be able to mix foundation coat materials.
Assessment criteria	
The learner can: 2.1 use pre-selected technical information to support the mixing of **foundation coat materials** 2.2 use **hand tools** for mixing **foundation coat materials** 2.3 use measuring equipment for mixing **foundation coat materials** 2.4 mix **foundation coat materials** 2.5 clean tools and equipment and obtain confirmation that they are left in a clean and serviceable condition.	

Unit 321 Mix foundation coat materials for spray gun application

Supporting information

Unit range

Approved workplace procedures:

Minimising the risk of damage to self and others their property, the vehicle, its systems, the environment including the disposal of waste materials.

Complying with good housekeeping practices and correct storage of workshop tools and equipment during and after use.

Hand tools:

- mixing sticks
- measuring sticks
- mixing containers

Foundation coat materials:

- etch primers and primers.
- thinners
- activators

Unit 322 Manufacture single tolerance vehicle body components

Level:	SCQF Level 3
Credit value:	4
GLH:	36
Aim	This unit is about demonstrating the skills, knowledge and understanding required to use a range of workshop tools and equipment to manufacture typical vehicle body components which have a single 'critical or key' dimension. Typical tolerances being ± 1mm in sheet metal and ± 0.5mm in non-sheet materials.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when manufacturing vehicle body components.
Assessment criteria	
The learner can:	
1.1	use appropriate PPE and methods
1.2	follow approved workplace procedures
1.3	identify potential health and safety hazards and risks.
1.4	identify the relevant information sources.
1.5	state the importance of keeping records
1.6	state how to safely handle and dispose of used and waste materials, components and fluids.

Learning outcome	**The learner will:**
2.	Be able to use tools and equipment to manufacture vehicle body components
Assessment criteria	
The learner can:	
2.1	identify the workshop hand tools used for the manufacture of vehicle body components
2.2	demonstrate how to check the condition and operation of the tools and equipment required for manufacturing vehicle body components
2.3	demonstrate how to prepare the tools and equipment required for manufacturing vehicle body components
2.4	demonstrate how to use the tools and equipment required for manufacturing vehicle body components
2.5	demonstrate a range of techniques for: • measuring

- marking out
- cutting
- fabrication
- forming
- drilling
- thread cutting
- filing

2.6 demonstrate how to check manufactured vehicle body components for compliance

2.7 produce working drawings or sketches that illustrate the main features of the manufactured vehicle body components.

Learning outcome	**The learner will:**
3.	Understand the methods and techniques when manufacturing vehicle body components

Assessment criteria

The learner can:

3.1 identify the different materials used to manufacture vehicle body components including carbon steels and aluminium alloys

3.2 state typical vehicle body component applications for the materials used

3.3 state how materials are modified to provide strength by forming, alloying and heat treatment

3.4 state the importance of hardness, toughness, rigidity and tensile strength as material properties.

Unit 323 Prepare vehicle body panels for foundation coat materials using masking materials and techniques

Level:	SCQF Level 3
Credit value:	4
GLH:	36
Aim	This unit is about demonstrating the skills and knowledge required to prepare vehicles for foundation coat materials using masking materials and techniques.

Learning outcome	**The learner will:**
1.	Be able to follow approved and safe procedures when applying masking methods.
Assessment criteria	
The learner can: 1.1 correctly use required PPE 1.2 follow approved workplace procedures 1.3 identify potential health and safety hazards and risks 1.4 identify the relevant information sources 1.5 state the importance of keeping records.	

Learning outcome	**The learner will:**
2.	Be able to use masking materials and techniques to prepare vehicle body panels for foundation coat materials.
Assessment criteria	
The learner can: 2.1 use suitable masking materials to mask up vehicle parts and components 2.2 mask vehicle parts and components 2.3 remove masking materials after foundation coat application 2.4 use suitable masking materials to mask up vehicle parts and components.	

Learning outcome	The learner will:
3. Understand the methods and techniques used in masking up vehicle panels and components.	
Assessment criteria	
The learner can: 3.1 list the materials used to mask vehicle parts and components: • masking tape • masking paper • plastic masking sheets 3.2 state the importance of accurate application of masking materials. 3.3 state the importance of using the correct masking material for the application. 3.4 remove masking materials without damaging the vehicle 3.5 state the importance of timely removal of masking materials.	

Unit 401 Vehicle engine lubrication systems

Level:	SCQF Level 4
Credit value:	5
GLH:	38
Aim	This unit is about engine lubrication systems.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of used and waste oils • handling and disposal of used engine mechanical parts • starting and safe running of engines in a confined space 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2. Know how to locate and use relevant sources of information	
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • documenting vehicle type • removal/replacement information • parts and consumables used • specification and data • tightening torque figures • types of oils used 2.2 demonstrate the importance of following correct technical data for removal and replacement activities of • cylinder head and gasket	

- check gaps and clearances
- coolant and additives
- oils and lubricants
- sealants

2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	The learner will:
3. Understand how the vehicle engine lubrication system operates	

Assessment criteria

The learner can:

3.1 describe the concept of the engine and major components which are relevant to the engines cylinder head and its systems they are working on

- petrol four stroke
- diesel four stroke
- two stroke

3.2 describe the operation and purpose of the main engine components which include:

- crankshaft and bearings
- cylinder head gasket
- lubricating oils
- cylinder head
- valves or ports
- piston and rings

Learning outcome	The learner will:
4. Know how to select and use the appropriate tools and equipment to carry out the removal and replacement activities to the vehicle engine system	

Assessment criteria

The learner can:

4.1 demonstrate and describe how to prepare, test and use all the equipment required to carry out removal and replacement activities to the engine cylinder head and its systems.

- Tightening angle gauge
- General hand tools
- Specialist tools
- Torque wrench
- Straight edge
- Feeler blades

Learning outcome	The learner will:
5. Know how to carry out the removal and replacement activities on engine lubrication systems	
Assessment criteria	
The learner can: 5.1 demonstrate the correct procedure for carrying out cylinder head removal and replacement activities: • checking cylinder head flatness • tightening bolt torque procedure • filling of liquids and lubricants • tightening using angle gauge • removing cylinder head • selecting hand tools • disposal of waste • draining fluids 5.2 demonstrate the correct procedure for carrying out cylinder head inspection for flatness • clean off old gasket • straight edge and feeler blades 5.3 demonstrate basic examination methods which include • aural • visual • functional • measurements 5.4 describe how to recognise and report cosmetic damage to vehicle components and units outside normal engine mechanical systems activities 5.5 describe how to identify codes and grades of lubricants and coolants	

Unit 401 Vehicle engine lubrication systems

Supporting information

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- how to remove and refit a cylinder head
- how to check cylinder head for flatness
- correct tightening procedures

It is important is that candidates

- show ability to check their own work for missing parts/components
- identify basic faults which include oil leaks to the areas worked upon

Two stroke engine: if carrying out this activity on a two stroke engine, it will be necessary to demonstrate you are also able to check gaps and clearances correctly; this could be on another engine.

Unit 402 Vehicle engine cooling systems

Level:	SCQF Level 4
Credit value:	4
GLH:	32
Aim	This unit is about engine cooling systems.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of used and waste coolant • handling and disposal of waste cooling system components • starting and safe running of engines in a confined space 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2. Know how to locate and use relevant sources of information	
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • vehicle types • specification • replacement information • tightening torque figures • electrical and electronic readings • types of coolant and percentages of antifreeze used 2.2 demonstrate the importance of following correct technical data for removal and replacement activities of • thermostat	

- thermistor
- fan control thermal switch

2.3 demonstrate the importance of following correct cooling system test technical data for:
- fan control thermal switch
- thermostat opening time
- thermistor

2.4 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	The learner will:
3. Understand how the vehicle engine cooling system operates	
Assessment criteria	
The learner can: 3.1 describe the concept of the engine and components which are relevant to the cooling system they are working on • petrol four stroke • diesel four stroke • two stroke 3.2 describe the basic operation and purpose of the: • thermostat • thermistor	

Learning outcome	The learner will:
4. Know how to select and use the appropriate tools and equipment to carry out the removal and replacement activities to the engine cooling system	
Assessment criteria	
The learner can: 4.1 demonstrate and describe how to prepare, test and use all the equipment required to carry out removal and replacement activities to the engine cooling system. • electrical test equipment • pressure test equipment • antifreeze equipment • general hand tools • torque wrench	

Learning outcome	The learner will:
5. Know how to carry out the relevant removal and replacement activities on vehicle engine cooling systems	
Assessment criteria	
The learner can: 5.1 demonstrate the correct procedure for carrying out cooling system removal and replacement activities: • fan control thermal switch • coolant thermistor	

- thermostat

5.2 carry out basic electrical functional tests on the
- fan control thermal switch
- coolant thermistor

5.3 carry out functional tests to the
- thermostat

5.4 demonstrate they can manufacture a gasket to fit
- the thermostat casing gasket

5.5 demonstrate basic examination methods which include
- aural
- visual
- functional
- measurements

5.6 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

5.7 describe how to identify codes and grades of coolant additives

Unit 402 Vehicle engine cooling systems

Supporting information

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- how to remove and refit cooling system electrical components
- how to carry out basic electrical/electronic functional testing
- how to make and fit a new gasket
- correct tightening procedures

It is important is that candidates

- demonstrate the ability to check their own work for missing parts/components
- identify basic faults which include coolant leaks to the areas worked upon

Unit 403 Vehicle fuel and exhaust systems

Level:	SCQF Level 4
Credit value:	5
GLH:	39
Aim	This unit gives candidates the knowledge and skills to remove and replace vehicle fuel and exhaust systems.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for handling and disposal of • fuel and exhaust components • engine lambda sensor • starting and safe running of engines in a confined space 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2. Know how to locate and use relevant sources of information	
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • vehicle type and specification • types of fuel and lambda sensor • maintenance information • tightening torque figures • exhaust catalyst 2.2 demonstrate the importance of following correct technical data for	

removal and replacement activities for all of the following components:

- a fuel injector
- exhaust catalyst
- lambda sensor

2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	The learner will:
3. Understand how the vehicle fuel and exhaust systems operate	
Assessment criteria	
The learner can: 3.1 describe and demonstrate the concept of the engine and major components which are relevant to the fuel injector, lambda sensor and exhaust system they are working on; either systems 3.2 describe the operation and purpose of the: • exhaust catalyst • lambda sensor • fuel injector	

Learning outcome	The learner will:
4. Know how to select and use the appropriate tools and equipment to remove and replace fuel and exhaust systems	
Assessment criteria	
The learner can: 4.1 demonstrate and describe how to prepare, test and use all the equipment required to carry out removal and replacement activities to the engine fuel injector, lambda sensor and exhaust catalyst. • general hand tools • torque wrench • electrical test equipment • exhaust emissions tester	

Learning outcome	The learner will:
5. Know how to carry removal and replacement activities for fuel and exhaust systems	
Assessment criteria	
The learner can: 5.1 demonstrate the correct procedure for carrying out removal and replacement activities to: • engine fuel injectors • lambda sensors • exhaust catalysts • check for fuel leaks • check for exhaust leaks • disposal of waste components 5.2 demonstrate examination methods which include	

- aural
- visual
- functional
- measurements

5.3 demonstrate and describe operational test procedures for:

- lambda sensor
- exhaust catalyst

5.4 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

5.5 describe how to identify for correct replacement component codes.

Unit 403 Vehicle fuel and exhaust systems

Supporting information

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Spark ignition
- Compression ignition
- Motorcycle
- Horticulture vehicles

It is important that candidates have a good understanding of:

- how to remove and refit fuel injectors
- lambda sensors and exhaust catalyser
- system components
- correct tightening procedures.

It is important is that candidates

- demonstrate the ability to check their own work for missing parts/components.
- identify basic faults which include fuel and exhaust leaks to the areas worked upon

Unit 404 Vehicle spark ignition systems

Level:	SCQF Level 4
Credit value:	5
GLH:	42
Aim	This unit gives candidates the knowledge and skills to remove and replace spark ignition systems.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of spark ignition components • starting and safe running of engines in a confined space 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2. Know how to locate and use relevant sources of information	
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • vehicle types • specification • maintenance information • tightening torque figures • types of ignition components used 2.2 demonstrate the importance of following correct technical data for removal and replacement activities for all of the following components • electronic engine sensor	

- engine electronic control unit
- ignition coil

2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	The learner will:
3. Understand how the vehicle system operates	
Assessment criteria	
The learner can: 3.1 describe the concept of the engine and major components which are relevant to the ignition system they are working on 3.2 describe the basic operation and purpose of the: • engine position sensor • engine electronic control unit • ignition coil/s	

Learning outcome	The learner will:
4. Know how to select and use the appropriate tools and equipment to carry out removal and replacement activities to the engine ignition system	
Assessment criteria	
The learner can: 4.1 demonstrate and describe how to prepare, test and use all the equipment required to carry out removal and replacement activities to the engine ignition system. • general hand tools • torque wrench • electrical test equipment	

Learning outcome	The learner will:
5. Know how to carry out the relevant removal and replacement activities	
Assessment criteria	
The learner can: 5.1 demonstrate the correct procedure for carrying out engine ignition system removal and replacement activities: • engine position sensor • engine electronic control unit • ignition coil/s 5.2 demonstrate a diagnostic fault code reader activity (EOBD) and search system for stored fault codes/data 5.3 measure the internal resistance of • engine position sensor • ignition coil/s 5.4 demonstrate basic examination methods which include • aural • visual	

- functional
- measurements
- comparisons

5.5 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

Unit 404 Vehicle spark ignition systems
Supporting information

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Spark ignition
- Compression ignition: (see notes below)
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- how to remove and refit ignition system components
- correct tightening procedures

It is important that candidates:

- demonstrate the ability to check their own work for missing parts/components
- identify basic faults which include:
- visual damage to ignition coil
- basic resistance checks (high/low/open circuit)
- diagnostic fault codes

Compression ignition engine: The unit is about testing ignition system components: engine position sensor, ECU and ignition coil. The compression ignition engine does not use an ignition coil, however this unit is about using electronic test equipment, substitute this item with a similar component for the candidate to test resistance and continuity. Example could be an electrical relay.

Unit 405 Vehicle electrical systems

Level:	SCQF Level 4
Credit value:	5
GLH:	38
Aim	This unit gives candidates the knowledge and skills to carry out the removal, replacement and testing of vehicle electrical systems.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of electrical system components • starting and safe running of engines in a confined space 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2. Know how to locate and use relevant sources of information	
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • vehicle type • specification • maintenance information • tightening torque figures • types of electrical components used 2.2 demonstrate the importance of following correct technical data for removal and replacement activities for all of the following components:	

- battery
- starter motor
- alternator

2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	The learner will:
3. Understand how the vehicle system operates	
Assessment criteria	
The learner can: 3.1 describe the concept of the engines components which are relevant to the electrical system they are working on 3.2 describe the basic operation and purpose of the: • battery • starter motor • alternator	

Learning outcome	The learner will:
4. Know how to select and use the appropriate tools and equipment to carry out removal and replacement activities to the vehicle electrical system	
Assessment criteria	
The learner can: 4.1 demonstrate and describe how to prepare, test and use all the equipment required to carry out removal and replacement activities to the vehicle electrical system. • general hand tools • general multi-meter • torque wrench • jump leads	

Learning outcome	The learner will:
5. Know how to carry out basic system checks and relevant removal, repair and replacement activities on vehicle electrical systems	
Assessment criteria	
The learner can: 5.1 describe the correct procedure for carrying out system checks to the vehicle electrical systems: • battery • alternator • starter motor 5.2 carry out removal and replacement activities to: • battery • alternator • starter motor 5.3 carry out a simple starter motor test with	

- battery
- jump leads

5.4 carry out a simple alternator charge test with a voltmeter

5.5 carry out a simple battery test with a voltmeter

5.6 demonstrate basic examination methods which include

- aural
- visual
- functional
- measurements
- comparisons

5.7 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

Unit 405 Vehicle electrical systems
Supporting information

Guidance
This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- carry out simple electrical function tests for the type of vehicle worked upon
- adapt the electrical system checks to the vehicles worked upon
- remove and refit electrical system components as listed

Unit 406 Vehicle braking systems

Level:	SCQF Level 4
Credit value:	5
GLH:	35
Aim	This unit gives the candidate the knowledge and skills to carry out removal and replacement activities to a vehicle braking system.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of used and waste brake fluid • handling and disposal of waste braking system components • starting and safe running of engines in a confined space 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2. Know how to locate and use relevant sources of information	
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • vehicle types • specification • maintenance information • brake disc run-out • tightening torque figures • types of brake fluid used • brake pipe materials	

2.2 demonstrate the importance of following correct technical data for removal and replacement activities for the following:
- brake calliper
- brake pads
- brake fluid

2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	**The learner will:**
3.	Understand how the vehicle braking system operates

Assessment criteria

The learner can:

3.1 describe the concept of the vehicles major components which are relevant to the braking system they are working on

3.2 describe the basic operation and purpose of the following:
- master cylinder
- brake calliper
- brake pipes
- brake pads
- brake disc
- brake fluid

Learning outcome	**The learner will:**
4.	Know how to select and use the appropriate tools and equipment to carry out removal and replacement activities to the vehicles braking system

Assessment criteria

The learner can:

4.1 demonstrate and describe how to prepare, test and use all the equipment required to carry out removal and replacement activities to the vehicles braking system.
- general hand tools
- brake bleed tools
- torque wrench

4.2 demonstrate and describe how to prepare, test and use all the equipment required to carry out brake disc run out inspection.
- dial test equipment

4.3 demonstrate and describe how to prepare, test and use all the equipment required to carry out brake pipe manufacture.
- brake flaring tool
- brake pipe bend equipment

Learning outcome	The learner will:
5. Know how to carry out the relevant removal and replacement activities and level checks, including basic manufacturing techniques and system checks	
Assessment criteria	
The learner can: 5.1 describe and demonstrate the correct procedure for carrying out braking system removal and replacement activities: • brake calliper • brake pads • brake disc 5.2 carry out a brake disc run-out inspection and use • dial test equipment 5.3 manufacture a brake pipe and use • brake flaring tools • pipe bending equipment 5.4 check and top up brake fluid • hygrometer (boil test) 5.5 demonstrate examination methods which include • aural • visual • functional • measurements 5.6 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items 5.7 describe how to identify codes and grades of brake fluid.	

Unit 406 Vehicle braking systems
Supporting information

Guidance
This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of how to:

- remove and refit braking system components
- top up brake fluid levels
- correctly use dial test equipment
- manufacture a brake pipe

It is important that candidates:

- demonstrate the ability to check their own work for missing parts/components
- identify basic faults which include worn and damaged brake components to the vehicles worked upon

Unit 407 Vehicle transmission systems

Level:	SCQF Level 4
Credit value:	5
GLH:	38
Aim	This unit is about demonstrating the skills and knowledge required to remove and refit vehicle transmission systems.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of used transmission lubricants • handling and disposal of waste transmission system components • starting and safe running of engines in a confined space 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2. Know how to locate and use relevant sources of information	
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • vehicle types • specification • maintenance information • tightening torque figures • types of transmission fluid used 2.2 demonstrate the importance of following correct technical data for removal and replacement activities for any **one** of the following:	

- manual gearbox
- automatic gearbox
- range change device
- P.T.O. Device

2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	The learner will:
3. Understand how the vehicle transmission system operates	
Assessment criteria	
The learner can: 3.1 describe the concept of the vehicles major components which are relevant to the transmission system they are working upon, from • manual gearbox • automatic gearbox • range change device • P.T.O. Device 3.2 describe the basic purpose of the following • clutch • torque converter • manual gearbox • automatic gearbox • range change device	

Learning outcome	The learner will:
4. Know how to select and use the appropriate tools and equipment to carry out removal and replacement activities to the vehicles transmission system	
Assessment criteria	
The learner can: 4.1 demonstrate and describe how to prepare, test and use all the equipment required to carry out removal and replacement activities to the vehicle transmission system. • general hand tools • lifting equipment • torque wrench	

Learning outcome	The learner will:
5. Know how to carry out the transmission system removal and replacement activities and level checks	
Assessment criteria	
The learner can: 5.1 describe and demonstrate the correct procedure for carrying out transmission system removal and replacement activities: to one of the following • manual gearbox	

- automatic gearbox
- range change device
- P.T.O. device

5.2 check and top up transmission lubricants

5.3 demonstrate basic examination methods which include

- aural
- visual
- functional
- measurements

5.4 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

5.5 describe how to identify codes and grades of transmission lubricants.

Unit 407 Vehicle transmission systems
Supporting information

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- how to remove and refit transmission system components
- how to top up transmission fluid levels
- correct tightening procedures

It is important that candidates:

- demonstrate the ability to check their own work for missing parts/components
- identify basic faults which include worn and damaged transmission components to the vehicles worked upon

Unit 408 Vehicle steering and suspension systems

Level:	SCQF Level 4
Credit value:	5
GLH:	36
Aim	This unit is for candidates to demonstrate the skills and knowledge required to carry out removal ad replacement activities to vehicle steering and suspension systems.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of used steering and suspension lubricants • handling and disposal of waste steering and suspension system components • starting and safe running of engines in a confined space 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2. Know how to locate and use relevant sources of information	
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • vehicle types • specification • maintenance information • tightening torque figures	

- types of steering and suspension fluids used

2.2 demonstrate the importance of following correct technical data for removal and replacement activities for steering and suspension components

2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	The learner will:
3. Understand how the vehicle suspension and steering systems operate	
Assessment criteria	
The learner can: 3.1 describe the basic concept of the vehicles major components which are relevant to the steering and suspension system they are working upon 3.2 describe the operation and purpose of the following: • suspension • steering system • steering components • suspension components	

Learning outcome	The learner will:
4. Know how to select and use the appropriate tools and equipment to carry out removal and replacement activities to the vehicles steering and suspension system	
Assessment criteria	
The learner can: 4.1 demonstrate and describe how to prepare, test and use **all** the equipment required to carry out removal and replacement activities to the vehicles steering and suspension system. • general hand tools • spring compressor • alignment equipment • torque wrench	

Learning outcome	The learner will:
5. Know how to carry out the relevant removal and replacement activities and alignment checks on vehicle steering and suspensions systems	
Assessment criteria	
The learner can: 5.1 demonstrate the correct procedure for carrying out steering and suspension system removal and replacement activities to the following: • suspension strut unit • steering joint or bearing 5.2 carry out strip down procedure • suspension strut unit	

- steering joint or bearing

5.3 evaluate and report on unit components
- suspension strut unit
- steering joint or bearing

5.4 reassemble unit components
- suspension strut unit
- steering joint or bearing

5.5 adjust and align unit components
- suspension strut unit
- steering joint or bearing

5.6 demonstrate examination methods which include
- aural
- visual
- functional
- measurements

5.7 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

5.8 describe how to identify codes and grades of steering and suspension lubricants.

Unit 408 Vehicle steering and suspension systems

Supporting information

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- how to remove and refit steering and suspension system components
- how to strip down evaluate and compare
- how to check alignment
- correct tightening procedures

It is important that candidates:

- demonstrate the ability to check their own work for missing parts/components
- identify faults which include worn and damaged steering and suspension components to the vehicles worked upon

Unit 409 Vehicle wheel and tyre systems

Level:	SCQF Level 4
Credit value:	4
GLH:	32
Aim	This unit is about demonstrating the skills and knowledge required to carry out the removal and replacement of vehicle wheel and tyre systems.

Learning outcome	**The learner will:**
1.	Know legislative and organisational requirements
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to removal and replacement activities for the types of vehicles worked upon 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of used wheels and tyres • correct use of air supply systems • starting and safe running of engines in a confined space. 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property. 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	**The learner will:**
2	Know how to locate and use relevant sources of information
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • vehicle types • specification • maintenance information • tightening torque figures 2.2 demonstrate the importance of following correct technical data for removal and replacement activities for:	

- wheels
- tyres

2.3 demonstrate the importance of following correct technical data for tyre repair activities on
- puncture
- balance
- air valve (schrader)

2.4 demonstrate the importance of working to agreed timescales and keeping others informed of progress

Learning outcome	**The learner will:**
3.	Understand how the vehicle wheels and tyre system operates

Assessment criteria

The learner can:

3.1 describe the basic concept of the vehicles major components which are relevant to the wheels and tyres system they are working upon

3.2 describe the construction, operation and purpose of the following:
- tyres
- valves
- wheels
- balance weights

3.3 describe legal impacts relating to repair activities to the tyre and further use

Learning outcome	**The learner will:**
4	Know how to select and use the appropriate tools and equipment to carry out the activity

Assessment criteria

The learner can:

4.1 demonstrate and describe how to prepare, test and use **all** the equipment required when carrying out removal and replacement activities to the vehicles wheels and tyre system.
- wheel balance equipment
- puncture repair equipment
- pressure test equipment
- general hand tools
- tyre depth gauge
- torque wrench
- water bath
- air line

Learning outcome	The learner will:
5	Know how to carry out the relevant removal and replacement activities and checks on vehicle wheel and tyre systems

Assessment criteria

The learner can:

5.1 demonstrate the correct procedure for carrying out wheels and tyres system removal and replacement activities to the types of vehicle worked upon

5.2 demonstrate wheel and tyre checks including examination procedures for

- wear limits and characteristics
- tyre types and side wall marking
- damage
- balance
- leaks

5.3 carry out a puncture repair to a tyre and making good for use, using

- wheel balance equipment
- puncture repair equipment
- pressure test equipment
- general hand tools
- tyre depth gauge
- torque wrench
- water bath
- air line

5.3 demonstrate basic examination methods which include

- visual
- functional
- measurements

5.4 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

5.5 describe how to identify wheel and tyre types and markings

Unit 409 Vehicle wheel and tyre systems

Supporting information

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- how to remove and refit wheel and tyre system components
- how to repair a puncture to a tyre
- how to balance a wheel
- how to check for leaks
- correct tightening procedures.
- tyre markings and types

It is important that candidates have a good understanding of:

- demonstrate the ability to check their own work for missing parts/components
- identify faults which include worn and damaged wheel and tyre components to the vehicles worked upon

Unit 412 Vehicle hand skills and manufacturing techniques

Level:	SCQF Level 4
Credit value:	4
GLH:	28
Aim	This unit is about demonstrating the skills and knowledge required to carry out vehicle hand skills and manufacturing techniques.

Learning outcome	**The learner will:**
1. Know legislative and organisational requirements	
Assessment criteria	
The learner can: 1.1 describe and demonstrate the manufacturers and legal requirements relating to vehicle hand skills and manufacturing techniques. 1.2 ensure the legal requirements relating to the activity are maintained 1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle hand skills and manufacturing techniques including personal protective equipment 1.4 demonstrate and describe workplace procedures for • handling and disposal of used lubricants • handling and disposal of waste metals. 1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property. 1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship	

Learning outcome	The learner will:
2	Know how to locate and use relevant sources of information
Assessment criteria	
The learner can: 2.1 ensure their records are accurate for • specification • maintenance information • dimensions • materials • equipment 2.2 demonstrate the importance of following correct technical data for vehicle hand skills and manufacturing techniques 2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress	

Learning outcome	The learner will:
3.	Understand how to carry out vehicle hand skills and manufacturing techniques
Assessment criteria	
The learner can: 3.1 describe and illustrate vehicle hand skills and manufacturing techniques for • joining techniques • making threads • cutting metals • measuring • filing 3.2 describe the importance of using correct materials for carrying out vehicle hand skills and manufacturing techniques 3.3 illustrate examples of understanding simple engineering drawings for • dimensions • materials • joining • threads	

Learning outcome	The learner will:
4	Know how to select and use the appropriate tools and equipment to carry out the activity
Assessment criteria	
The learner can: 4.1 demonstrate and describe how to prepare, test and use **all** the equipment required for carrying out vehicle hand skills and manufacturing techniques: • general hand tools • files	

- taps
- dies
- hammer
- drills
- vice
- centre punch
- micrometer
- rule

Learning outcome	The learner will:
5	Know how to carry vehicle hand skills and manufacturing techniques

Assessment criteria

The learner can:

5.1 illustrate they are able to understand basic engineering drawings for
- dimensions
- materials
- joining
- threads

5.2 demonstrate the correct procedure for manufacturing a simple vehicle service tool using techniques of
- making threads
- cutting metals
- measuring
- joining
- filing

5.3 demonstrate and use all the equipment required to carrying out vehicle hand skills and manufacturing techniques
- general hand tools
- files
- taps
- dies
- hammer
- drill
- vice
- centre punch
- micrometer
- rule

Unit 412 Vehicle hand skills and manufacturing techniques

Supporting information

Guidance

This unit can be adapted to suit a range of vehicle and engine types.

- Light vehicle
- Heavy vehicle
- Motorcycle
- Quad bike
- Horticulture vehicles

It is important that candidates have a good understanding of:

- basic engineering drawings
- how to use tools and equipment safely
- how to manufacture a simple tool
- how to carry out the hand skills and techniques as listed in section 3

Examples of tools which can be manufactured by candidates which include all the skills and equipment needed to undertake this unit are:

- brake pipe clamp
- pad saw
- flywheel locking tool
- bearing puller
- vice clamp

Appendix 1 Relationships to other qualifications

Links to other qualifications

Mapping is provided as guidance and suggests areas of commonality between the qualifications. It does not imply that candidates completing units in one qualification have automatically covered all of the content of another.

Centres are responsible for checking the different requirements of all qualifications they are delivering and ensuring that candidates meet requirements of all units/qualifications.

This qualification has connections to the:

- SCQF Level 3 3901 qualification in Award in Vehicle Systems and Body and Paint Maintenance

Appendix 2 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on **www.cityandguilds.com**.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document includes sections on:

- The centre and qualification approval process
- Assessment, internal quality assurance and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- Maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- Regulatory Arrangements for the Qualifications and Credit Framework (2008)
- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information such on such things as:

- **Walled Garden:** how to register and certificate candidates on line
- **Qualifications and Credit Framework (QCF)**: general guidance about the QCF and how qualifications will change, as well as information on the IT systems needed and FAQs
- **Events**: dates and information on the latest Centre events
- **Online assessment**: how to register for e-assessments.

Centre Guide – Delivering International Qualifications contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification. Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

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Useful contacts

UK learners General qualification information	T: +44 (0)844 543 0033 E: **learnersupport@cityandguilds.com**
International learners General qualification information	T: +44 (0)844 543 0033 F: +44 (0)20 7294 2413 E: **intcg@cityandguilds.com**
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **centresupport@cityandguilds.com**
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) E: **singlesubjects@cityandguilds.com**
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **intops@cityandguilds.com**
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **walledgarden@cityandguilds.com**
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 E: **business@cityandguilds.com**
Publications Logbooks, Centre documents, Forms, Free literature	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413

If you have a complaint, or any suggestions for improvement about any of the services that we provide, email: **feedbackandcomplaints@cityandguilds.com**

About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Land Based Services (land-based qualifications), the Centre for Skills Development (CSD works to improve the policy and practice of vocational education and training worldwide) and Learning Assistant (an online e-portfolio).

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