



# **City & Guilds Entry Level 3 / Level 1 Award/Certificate/Diplomas in Vehicle Maintenance (3902-01 and 3902-11)**

**Version 5.3 (May 2024)**

**Qualification Handbook**

## Qualification at a glance

<b>Subject area</b>	Vehicle Maintenance and Repair
<b>City &amp; Guilds number</b>	3902-01/11
<b>Age group approved</b>	14+
<b>Entry requirements</b>	There are no entry requirements
<b>Assessment</b>	Assignments
<b>Grading</b>	Pass/Fail
<b>Approvals</b>	Fast track or Full approval required
<b>Support materials</b>	Practical Training Workbooks, Learning Assistant
<b>Registration and certification</b>	Consult the Walled Garden/Online Catalogue for last dates

Title and level	City & Guilds qualification number	Regulatory reference number	GLH	TQT
City & Guilds Entry Level 3 Diploma in Vehicle Systems Maintenance	3902-01	500/8514/1	352	450
City & Guilds Entry Level 3 Certificate in Vehicle Systems Maintenance	3902-01	501/0610/7	184	250
City & Guilds Entry Level 3 Award in Vehicle Systems Maintenance	3902-01	501/1354/9	85	120
City & Guilds Level 1 Diploma in Vehicle Systems Maintenance	3902-11	500/8862/2	352	450
City & Guilds Level 1 Certificate in Vehicle Systems Maintenance	3902-11	501/1550/9	185	250
City & Guilds Level 1 Award in Vehicle Systems Maintenance	3902-11	501/2222/8	92	120

Version and date	Change detail	Section
5.3	<p>Updated qualification handbook format for 3902-01 and 3902-11</p> <p>'Candidates' replaced with 'learners'</p> <p>Across all units, the following has been updated / included where relevant:</p> <ul style="list-style-type: none"> <li>• Vehicle Protective Equipment (VPE)</li> <li>• 'identify' changed to 'select' correct tools and equipment</li> <li>• 'codes' changed to 'specifications'</li> </ul> <p>Updates in the following units have also been made:</p> <p><b>001:</b> AC2.5 changed to 'check engine oil level'</p> <p><b>002:</b> AC2.7, 'cooling component'</p> <p><b>003:</b> AC2.8, 'code' changed to 'part number'</p> <p><b>004:</b> AC2.6, added 'or coil packs' to range</p> <p><b>005:</b> AC1.2 added 'starting &amp; running engines safely in a confined space' as per other units, AC2.5 added 'comparisons' AC2.6 changed to 'headlamp'</p> <p><b>006:</b> 'break' updated to 'brake', AC2.10 Guidance added 'brake' before cables</p> <p><b>007:</b> AC2.4 'torque converter' removed</p> <p><b>008:</b> AC2.5 added 'comparisons' to range</p> <p><b>009:</b> Range, tools &amp; equipment - added in 'tyre inflator, tyre pressure gauge</p> <p><b>010:</b> Range - added 'different types of cleaning products / materials'</p> <p><b>011:</b> AC2.5 added 'comparisons'</p> <p><b>012:</b> LO1 - added 'when carrying out bench skill tasks'</p> <p>Level 1 unit titles - 'skills' added to all titles 'legal' updated to manufacturers' requirements</p> <p><b>103:</b> AC3.2 and guidance, 'engine catalyst' changed to 'catalytic convertor'</p>	Units

# Contents

<b>Qualification at a glance</b>	<b>2</b>
<b>Contents</b>	<b>4</b>
<b>1 Introduction</b>	<b>6</b>
<b>Structure</b>	<b>8</b>
<b>Total Qualification Time (TQT)</b>	<b>10</b>
<b>2 Centre requirements</b>	<b>11</b>
<b>Approval</b>	<b>11</b>
<b>Resource requirements</b>	<b>12</b>
<b>Quality assurance</b>	<b>12</b>
<b>Learner entry requirements</b>	<b>14</b>
<b>Age restrictions</b>	<b>14</b>
<b>Guidance on risk management of pre 16 learners</b>	<b>14</b>
<b>Access arrangements and reasonable adjustments</b>	<b>14</b>
<b>3 Delivering the qualification</b>	<b>15</b>
<b>Initial assessment and induction</b>	<b>15</b>
<b>Inclusion and diversity</b>	<b>15</b>
<b>Sustainability</b>	<b>15</b>
<b>Support materials</b>	<b>16</b>
<b>4 Assessment</b>	<b>17</b>
<b>Assessment of the qualification</b>	<b>17</b>
<b>Assessment strategy</b>	<b>18</b>
<b>Time constraints</b>	<b>18</b>
<b>Recognition of prior learning (RPL)</b>	<b>18</b>
<b>5 Units</b>	<b>19</b>
<b>Structure of the units</b>	<b>19</b>
<b>Guidance for delivery of the units</b>	<b>19</b>
<b>Unit 3902-001 Introduction to vehicle engine lubrication systems</b>	<b>20</b>
<b>Unit 3902-002 Introduction to vehicle engine cooling systems</b>	<b>23</b>
<b>Unit 3902-003 Introduction to vehicle fuel and exhaust systems</b>	<b>26</b>
<b>Unit 3902-004 Introduction to vehicle spark ignition systems</b>	<b>29</b>

---

<b>Unit 3902-005</b>	<b>Introduction to vehicle electrical systems</b>	<b>32</b>
<b>Unit 3902-006</b>	<b>Introduction to vehicle braking systems</b>	<b>35</b>
<b>Unit 3902-007</b>	<b>Introduction to vehicle transmission systems</b>	<b>38</b>
<b>Unit 3902-008</b>	<b>Introduction to vehicle steering and suspension systems</b>	<b>41</b>
<b>Unit 3902-009</b>	<b>Introduction to vehicle wheels and tyre systems</b>	<b>44</b>
<b>Unit 3902-010</b>	<b>Introduction to principles of vehicle body and interior cleaning</b>	<b>46</b>
<b>Unit 3902-011</b>	<b>Introduction to vehicle engine operating principles</b>	<b>49</b>
<b>Unit 3902-012</b>	<b>Introduction to vehicle workshop bench skills</b>	<b>52</b>
<b>Unit 3902-101</b>	<b>Skills in Vehicle Engine Lubrication Systems</b>	<b>55</b>
<b>Unit 3902-102</b>	<b>Skills in Vehicle Engine Cooling Systems</b>	<b>60</b>
<b>Unit 3902-103</b>	<b>Skills in Vehicle Fuel and Exhaust Systems</b>	<b>65</b>
<b>Unit 3902-104</b>	<b>Skills in Vehicle Spark Ignition Systems</b>	<b>70</b>
<b>Unit 3902-105</b>	<b>Skills in Vehicle Electrical Systems</b>	<b>74</b>
<b>Unit 3902-106</b>	<b>Skills in Vehicle Braking Systems</b>	<b>79</b>
<b>Unit 3902-107</b>	<b>Skills in Vehicle Transmission Systems</b>	<b>84</b>
<b>Unit 3902-108</b>	<b>Skills in Vehicle Steering and Suspension Systems</b>	<b>88</b>
<b>Unit 3902-109</b>	<b>Skills in Vehicle Wheel and Tyre Systems</b>	<b>92</b>
<b>Unit 3902-112</b>	<b>Skills in Vehicle Hand Skills and Manufacturing Techniques</b>	<b>97</b>
<b>Appendix 1</b>	<b>Sources of general information</b>	<b>102</b>

---

# 1 Introduction

This document tells you what you need to do to deliver the qualifications.

Area	Description
Who are the qualifications for?	<p>These qualifications are for those individuals who are interested in a starting point in the motor vehicle maintenance industry, whether they want to learn the basics of how to maintain and repair different types of vehicles (cars, vans, trucks, motorcycles), or how to fit and replace parts and carry out basic maintenance checks and activities.</p> <p>These qualifications are for anyone looking to explore an introduction to the motor industry. Learners do not need any previous experience or need to be in a current work placement.</p>
What do the qualifications cover?	<p>These qualifications allow learners to learn, develop and practice the skills required for employment and / or career progression in the automotive industry.</p> <p>They cover the skills and knowledge required to complete basic maintenance activities on a variety of vehicle systems including:</p> <ul style="list-style-type: none"><li>• engine</li><li>• lubrication</li><li>• fuel</li><li>• electrical</li><li>• braking</li><li>• steering</li><li>• suspension.</li></ul>
What opportunities for progression are there?	<p>Learners may progress onto the following qualifications:</p> <p>City &amp; Guilds Level 1 and 2 qualifications in Vehicle Maintenance and Repair (7290)</p>

Area	Description
Who did we develop the qualifications with?	These qualifications were developed with reference to National Occupational Standards as set by automotive industry experts.

Is it part of an apprenticeship framework or initiative?

No

## Structure

To achieve the **City & Guilds Entry Level 3 Diploma in Vehicle Systems Maintenance (3902-01)**, learners must achieve a minimum of 45 credits from units 001-012 and 101-109, 112. At least 50% of the credits must come from units 001-012.

To achieve the **City & Guilds Entry Level 3 Certificate in Vehicle Systems Maintenance (3902-01)**, learners must achieve a minimum of a minimum of 25 credits from units 001-012 and 101-109, 112. At least 50% of the credits must come from units 001-012.

To achieve the **City & Guilds Entry Level 3 Award in Vehicle Systems Maintenance (3902-01)**, learners must achieve a minimum of 12 credits from units 001-012 and units 101-109, 112. At least 50% of the credits must come from units 001-012.

To achieve the **City & Guilds Level 1 Diploma in Vehicle Systems Maintenance (3902-11)**, learners must achieve a minimum of 45 credits from units 001-012 and 101-109, 112. At least 50% of the credits must come from units 101-109, 112.

To achieve the **City & Guilds Level 1 Certificate in Vehicle Systems Maintenance (3902-11)**, learners must achieve a minimum of 25 credits from units 001-012 and 101-109, 112. At least 50% of the credits must come from units 101-109, 112.

To achieve the **City & Guilds Level 1 Award in Vehicle Systems Maintenance (3902-11)**, learners must achieve a minimum of 12 credits from units 001-012 and 101-109, 112 with at least 50% of the credits from units 101-109, 112.

City & Guilds unit number	Unit title	GLH	Credit
3902-001	Introduction to Vehicle Engine Lubrication Systems	38	5
3902-002	Introduction to Vehicle Engine Cooling Systems	32	4
3902-003	Introduction to Vehicle Fuel and Exhaust Systems	39	5
3902-004	Introduction to Vehicle Spark Ignition Systems	43	5
3902-005	Introduction to Vehicle Electrical Systems	38	5
3902-006	Introduction to Vehicle Braking Systems	35	5
3902-007	Introduction to Vehicle Transmission Systems	38	5
3902-008	Introduction to Vehicle Steering and Suspension Systems	36	5
3902-009	Introduction to Vehicle Wheels and Tyre Systems	32	4

3902-010	Introduction to Principles of Vehicle Body and Interior Cleaning	33	4
3902-011	Introduction to Vehicle Engine Operating Principles	31	4
3902-012	Introduction to Vehicle Workshop Bench Skills	26	4
3902-101	Vehicle Engine Lubrication Systems	38	5
3902-102	Vehicle Engine Cooling Systems	32	4
3902-103	Vehicle Fuel and Exhaust Systems	39	5
3902-104	Vehicle Spark Ignition Systems	42	5
3902-105	Vehicle Electrical Systems	38	5
3902-106	Vehicle Braking Systems	35	5
3902-107	Vehicle Transmission Systems	38	5
3902-108	Vehicle Steering and Suspension Systems	36	5
3902-109	Vehicle Wheels and Tyre Systems	32	4
3902-112	Vehicle Hand Skills and Manufacturing Techniques	28	4

## Total Qualification Time (TQT)

Total Qualification Time (TQT) is the number of notional hours which represents an estimate of the total amount of time that could reasonably be expected for a learner to demonstrate the achievement of the level of attainment necessary for the award of a qualification.

TQT comprises of the following two elements:

- 1) the number of hours that an awarding organisation has assigned to a qualification for guided learning
- 2) an estimate of the number of hours a learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by – but, unlike guided learning, not under the immediate guidance or supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training.

Title and level	GLH	TQT
City & Guilds Entry Level 3 Diploma in Vehicle Maintenance	352	450
City & Guilds Entry Level 3 Certificate in Vehicle Systems Maintenance	184	250
City & Guilds Entry Level 3 Award in Vehicle Systems Maintenance	85	120
City & Guilds Level 1 Diploma in Vehicle Systems Maintenance	352	450
City & Guilds Level 1 Certificate in Vehicle Systems Maintenance	185	250
City & Guilds Level 1 Award in Vehicle Systems Maintenance	92	120

## 2 Centre requirements

### Approval

#### Full approval

To offer these qualifications, new centres will need to gain both centre and qualification approval. Please refer to the document **Centre Approval Process: Quality Assurance Standards** for further information.

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

## Resource requirements

### Centre staffing

Staff delivering these qualifications must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be occupationally competent or technically knowledgeable in the area(s) for which they are delivering training and/or have experience of providing training (this knowledge must be to the same level as the training being delivered)
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training.

### Continuing professional development (CPD)

Centres are expected to support their staff in ensuring that their knowledge remains current of the occupational area and of best practice in delivery, mentoring, training, assessment and quality assurance, and that it takes account of any national or legislative developments.

### Physical resources and site agreements

Centres must have access to sufficient equipment in the centre or workplace to ensure learners 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.

### Vehicle types

The units are flexible and are designed in a way to be delivered and assessed utilising a range of vehicle types including:

- Light vehicles
- Heavy vehicles
- Motorcycles and scooters
- Quad and land-based vehicles
- Tractors.

## 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. All external quality assurance processes reflect the minimum requirements for verified and moderated assessments, as detailed in the Centre Assessment Standards Scrutiny (CASS), section H2 of Ofqual's General Conditions. For more information on both CASS and City and Guilds Quality Assurance processes visit: the [What is CASS?](#) and [Quality Assurance Standards](#) documents on the City & Guilds website.

Standards and rigorous quality assurance are maintained by the use of:

- Internal quality assurance
- City & Guilds external quality assurance.

In order to carry out the quality assurance role, Internal Quality Assurers must:

- have appropriate teaching and vocational knowledge and expertise
- have experience in quality management/internal quality assurance
- hold or be working towards an appropriate teaching/training/assessing qualification
- be familiar with the occupation and technical content covered within the qualification.

External quality assurance for the qualification will be provided by City & Guilds EQA process. EQAs are appointed by City & Guilds to approve centres, and to monitor the assessment and internal quality assurance carried out by centres. External quality assurance is carried out to ensure that assessment is valid and reliable, and that there is good assessment practice in centres.

The role of the EQA is to:

- provide advice and support to centre staff
- ensure the quality and consistency of assessments and marking/grading within and between centres by the use of systematic sampling
- provide feedback to centres and to City & Guilds.

## **Learner entry requirements**

City & Guilds does not set entry requirements for these qualifications. However, centres must ensure that learners have the potential and opportunity to gain the qualification successfully.

## **Age restrictions**

This qualification is approved for learners aged 14 or above.

## **Guidance on risk management of pre-16 learners**

Centres offering the Entry Level 3 and Level 1 Award, Certificate and Diploma in Vehicle Systems and Body & Paint Maintenance (3902) to learners 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 Quality Assurer on request.

## **Access arrangements and reasonable adjustments**

City & Guilds has considered the design of this qualification and its assessments in order to best support accessibility and inclusion for all learners. We understand however that individuals have diverse learning needs and may require reasonable adjustments to fully participate. Reasonable adjustments, such as additional time or alternative formats, may be provided to accommodate learners with disabilities and support fair access to assessment.

Access arrangements are adjustments that allow learners with disabilities, special educational needs, and temporary injuries to access the assessment and demonstrate their skills and knowledge without changing the demands of the assessment. These arrangements must be made before assessment takes place.

The Equality Act 2010 requires City & Guilds to make reasonable adjustments where a disabled person would be at a substantial disadvantage in undertaking an assessment.

It is the responsibility of the centre to ensure at the start of a programme of learning that learners will be able to access the requirements of the qualification.

Please refer to the JCQ access arrangements and reasonable adjustments and Access arrangements - when and how applications need to be made to City & Guilds for more information. Both are available on the City & Guilds website:

<http://www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library/policies-and-procedures/access-arrangements-reasonable-adjustments>

## 3 Delivering the qualification

### Initial assessment and induction

An initial assessment of each learner should be made before the start of their programme to identify:

- if the learner has any specific training needs
- support and guidance they may need when working towards their qualification
- any units they have already completed or credit they have accumulated which is relevant to the qualification
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the learner fully understands the requirements of the qualification, their responsibilities as a learner and the responsibilities of the centre. This information can be recorded on a learning contract.

### Inclusion and diversity

City & Guilds is committed to improving inclusion and diversity within the way we work and how we deliver our purpose which is to help people and organisations develop the skills they need for growth.

More information and guidance to support centres in supporting inclusion and diversity through the delivery of City & Guilds qualifications can be found here:

[Inclusion and diversity | City & Guilds \(cityandguilds.com\)](https://www.cityandguilds.com)

### Sustainability

City & Guilds are committed to net zero. Our ambition is to reduce our carbon emissions by at least 50% before 2030 and develop environmentally responsible operations to achieve net zero by 2040 or sooner if we can. City & Guilds is committed to supporting qualifications that support our customers to consider sustainability and their environmental footprint.

More information and guidance to support centres in developing sustainable practices through the delivery of City & Guilds qualifications can be found here:

[Our Pathway to Net Zero | City & Guilds \(cityandguilds.com\)](https://www.cityandguilds.com)

Centres should consider their own carbon footprint when delivering this qualification and consider reasonable and practical ways of delivering this qualification with sustainability in mind. This could include:

- reviewing purchasing and procurement processes (such as buying in bulk to reduce the amount of travel time and energy, considering and investing in the use of components that can be reused, instead of the use of disposable or single use consumables)
- reusing components wherever possible
- waste procedures (ensuring that waste is minimised, recycling of components is in place wherever possible)
- minimising water use and considering options for reuse/salvage as part of plumbing activities wherever possible.

## Support materials

The following resources are available for these qualifications

Description	How to access
Practical Training Workbooks	<a href="http://www.cityandguilds.com">www.cityandguilds.com</a>

## 4 Assessment

### Assessment of the qualification

Learners must:

- successfully complete the practical tasks and oral questions for each unit.

The overall grading of both qualifications is Pass/Fail only.

All assessments, within the designated rules of combination must be achieved at a minimum of **Pass** for the qualification(s) to be awarded.

## **Assessment strategy**

City & Guilds has written the following assessments to use with these Qualifications:

- Practical Assignments comprising practical tasks, observation and oral questioning.

The Assessment Packs, containing the practical assignments, oral questions and Assessor recording forms can be downloaded from the City & Guilds website.

## **Time constraints**

Learners must finish their assessment within their registration period.

## **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.

## 5 Units

### Structure of the units

These units each have the following:

- City & Guilds reference number
- title
- level
- guided learning hours (GLH)
- credit value
- unit aim
- assessment type
- learning outcomes, which are comprised of a number of assessment criteria
- supporting information.

### Guidance for delivery of the units

These qualifications comprise a number of **units**.

Each **unit** is divided into **learning outcomes** which describe in further detail the skills and knowledge that a candidate should possess.

Each **learning outcome** has a set of **assessment criteria** (performance and knowledge and understanding) which specify the desired criteria that must be satisfied before an individual can be said to have performed to the agreed standard.

**Range** statements define the breadth or scope of a learning outcome and its assessment criteria by setting out the various circumstances in which they are to be applied.

**Supporting information** provides guidance of the evidence requirement for the unit and specific guidance on delivery and range statements. Centres are advised to review this information carefully before delivering the unit.

## Unit 3902-001 Introduction to vehicle engine lubrication systems

<b>Unit reference:</b>	D/600/4277
<b>Old unit number</b>	3901-011
<b>Level:</b>	Entry Level 3
<b>Credit value</b>	5
<b>GLH:</b>	38
<b>Assessment type:</b>	Practical tasks with verbal questioning
<b>Aim:</b>	This unit is about the basic maintenance of engine lubrication systems for a range of vehicle types.

---

### Learning outcome

The learner will:

- LO1 Be able to follow approved and safe procedures when carrying out removal and replacement activities on engine lubrication systems

### Assessment criteria

The learner can:

- AC1.1 correctly use required **PPE and VPE**
- AC1.2 follow approved workplace procedures
- AC1.3 identify potential health and safety hazards and risks
- AC1.4 identify the relevant information sources
- AC1.5 state the importance of keeping records.

---

### Range

AC1.1 Personal Protective Equipment and Vehicle Protective Equipment

---

### Learning outcome

The learner will:

- LO2 Be able to carry out removal and replacement activities on engine lubrication systems

## Assessment criteria

The learner can:

- AC2.1 select the correct **tools and equipment** and check they are fit for purpose
  - AC2.2 correctly use tools and equipment
  - AC2.3 identify the major **components** of the engine lubrication system
  - AC2.4 describe the operation and purpose of the following: oil filter, lubricating oils, valve cover/casing and gasket, dip stick
  - AC2.5 check engine oil level
  - AC2.6 demonstrate basic removal and fitting techniques
  - AC2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items
  - AC2.8 identify grades and specification of engine oil.
- 

## Range

- AC2.1 Hand tools, torque wrench, oil drainer, sump plug spanner, oil filter removal tool
- AC2.3 Petrol and diesel engines

# **Unit 3902-001      Introduction to vehicle engine lubrication systems**

## **Supporting information**

### **Unit 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 learners have a good understanding of how to:

- replace oil with a suitable grade and specification
- change a filter (examples include: canister, element 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 therefore the option of an engine casing removal and replacement demonstrates similar skills for this unit.

Two stroke engines: learners would be expected to change oil on a four-stroke engine.

## Unit 3902-002 Introduction to vehicle engine cooling systems

<b>Unit reference:</b>	M/600/4431
<b>Old unit number</b>	3901-012
<b>Level:</b>	Entry Level 3
<b>Credit value</b>	4
<b>GLH:</b>	32
<b>Aim:</b>	This unit is about the basic maintenance of cooling systems for a range of vehicle types.

---

### Learning outcome

The learner will:

- LO1 Be able to follow approved and safe procedures when carrying out removal and replacement activities on engine lubrication systems.

### Assessment criteria

The learner can:

- AC1.1 correctly use required **PPE and VPE**
- AC1.2. follow approved workplace procedures
- AC1.3 identify potential health and safety hazards and risks
- AC1.4 identify the relevant information sources
- AC1.5 state the importance of keeping records.

---

### Range

AC1.1 Personal Protective Equipment and Vehicle Protective Equipment

---

### Learning outcome

The learner will:

- LO2 Be able to carry out removal and replacement activities on engine cooling systems

## Assessment criteria

---

The learner can:

- AC2.1 select correct tools and equipment and check they are fit for purpose
- AC2.2 correctly use tools and equipment
- AC2.3 identify the major **components** relevant to the cooling system
- AC2.4 state the basic operation and purpose of the following; thermostat, radiator, water pump, antifreeze
- AC2.5 examine engine cooling systems
- AC2.6 demonstrate basic removal and fitting techniques
- AC2.7 make a gasket to fit a cooling component
- AC2.8 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items
- AC2.9 identify specifications and grades of coolant additives.

## Range

AC2.3 Thermostat casing gasket, water pump.

## **Unit 3902-002      Introduction to vehicle engine cooling systems**

### Supporting information

#### **Unit 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 learners 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.

Learners must be able to remove two similar cooling system components and display the skills needed for removal and refitting including correct tightening procedures.

An engine rig can be used for this unit.

## Unit 3902-003 Introduction to vehicle fuel and exhaust systems

<b>Unit reference:</b>	Y/600/4438
<b>Old unit number</b>	3901-013
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	5
<b>GLH:</b>	39
<b>Aim:</b>	This unit is about the basic maintenance of vehicle fuel and exhaust systems.

### Learning outcome

The learner will:

- LO1 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:

- AC1.1 correctly use required **PPE and VPE**
- AC1.2 follow approved workplace procedures
- AC1.3 identify potential health and safety hazards and risks
- AC1.4 identify the relevant information sources
- AC1.5 state the importance of keeping records.

### Range

- AC1.1 Personal Protective Equipment and Vehicle Protective Equipment

### Learning outcome

The learner will:

- LO2 Be able to carry out removal and replacement activities on vehicle fuel and exhaust systems.

## Assessment criteria

The learner can:

---

- AC2.1 select the correct **tools and equipment** and check they are fit for purpose
- AC2.2 correctly use **tools and equipment**
- AC2.3 identify the major **components** of the vehicle fuel and exhaust systems
- AC2.4 state the basic operation and purpose of the following: air filter, exhaust, fuel injector, fuel filter
- AC2.5 **examine** vehicle fuel and exhaust systems
- AC2.6 demonstrate basic **removal and fitting** techniques
- AC2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items
- AC 2.8 identify replacement component part number.

## Range

---

- AC2.1/2.2 Hand tools, torque wrench
- AC2.3 Spark ignition (si), compression ignition (ci)
- AC2.5 Aural, visual, functional, measurements
- AC2.6 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 (including environmental impact).

## **Unit 3902-003      Introduction to vehicle fuel and exhaust 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 learners 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.

Learners will need to display the skills needed for component removal and refitting, including correct tightening procedures.

An engine rig can be used for this unit.

## Unit 3902-004 Introduction to vehicle spark ignition systems

<b>Unit reference:</b>	D/600/4439
<b>Old unit number</b>	3901-014
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	5
<b>GLH:</b>	43
<b>Aim:</b>	This unit is about the basic maintenance of ignition systems on petrol engines.

### Learning outcome

The learner will:

- LO1 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:

- AC1.1 correctly use required **PPE and VPE**
- AC 1.2 follow approved workplace procedures
- AC 1.3 identify potential health and safety hazards and risks
- AC 1.4 identify the relevant information sources
- AC 1.5 state the importance of keeping records.

### Range

AC1.1 Personal Protective Equipment and Vehicle Protective Equipment.

## Learning outcome

The learner will:

LO2 Be able to carry out removal and replacement activities on vehicle spark ignition systems.

## Assessment criteria

The learner can:

---

AC2.1 select the correct **tools and equipment** and check they are fit for purpose

AC2.2 correctly use **tools and equipment**

AC2.3 identify the major components of vehicle spark ignition systems

AC2.4 state the basic operation and purpose of the following: high tension lead, spark plugs, ignition coil

AC2.5 **examine** vehicle spark ignition systems

AC2.6 demonstrate basic **removal and fitting techniques**

AC2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items

AC2.8 identify correct replacement component codes.

## Range

---

AC2.1/ AC2.2 Hand tools, torque wrench, multi-meter.

AC2.5 Aural, visual, functional, measurements, comparisons.

AC2.6 Remove and test high tension leads, or coil packs, remove and refit spark plugs, check and compare spark plugs, specifications and colouring, adjust spark plug gaps, remove ignition coil, dispose of waste components.

## **Unit 3902-004      Introduction to vehicle spark ignition 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 learners 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
  - Identify spark plug specification
  - high tension lead resistance
  - visual damage to ignition coil.

An engine rig can be used for this unit.

## Unit 3902-005 Introduction to vehicle electrical systems

<b>Unit reference:</b>	R/600/4440
<b>Old unit number</b>	3901-015
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	5
<b>GLH:</b>	38
<b>Aim:</b>	This unit is about the maintenance of light vehicle electrical systems.

### Learning outcome

The learner will:

LO1 Be able to follow approved and safe procedures when carrying out removal and replacement activities on electrical systems.

### Assessment criteria

The learner can:

AC1.1 correctly use required **PPE and VPE**

AC 1.2 follow **approved workplace procedures**

AC 1.3 identify potential health and safety hazards and risks

AC 1.4 identify relevant information sources

AC 1.5 state the importance of keeping records.

### Range

AC1.1 Personal Protective Equipment and Vehicle Protective Equipment.

AC1.2 Safe handling and disposal of used electrical components, starting and running engines safely in a confined space.

## Learning outcome

The learner will:

LO2 Be able to carry out removal, repair and replacement activities on electrical systems.

## Assessment criteria

The learner can:

---

AC 2.1 select the correct **tools and equipment** and check they are fit for purpose

AC 2.2 correctly use **tools and equipment**

AC 2.3 identify the major components of the electrical system

AC 2.4 state the basic operation and purpose of the following: battery, brake lights, headlamps, fuse, relay

AC 2.5 **examine** electrical systems

AC 2.6 demonstrate basic **removal, repair and fitting techniques**

AC 2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items

AC 2.8 identify correct replacement component specifications.

## Range

AC2.1/2.2 Hand tools, multi-meter, soldering iron.

AC2.5 Aural, visual, functional, measurements, comparisons.

AC2.6 Replace headlamp bulb, brake light bulb, replace fuse, replace relay. Remove and fit battery, check battery voltages, solder wire and terminal.

## Unit 3902-005 Introduction to 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 learners 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 head lamp and brake light bulbs
  - Use a multi-meter to check for continuity
  - Solder wire and terminals.

## Unit 3902-006 Introduction to vehicle braking systems

<b>Unit reference:</b>	Y/600/4441
<b>Old unit number</b>	3902-016
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	5
<b>GLH:</b>	35
<b>Aim:</b>	This unit is about basic maintenance of light vehicle braking systems.

### Learning outcome

The learner will:

- LO1 Be able to follow approved and safe procedures when carrying out removal and replacement activities on engine lubrication systems.

### Assessment criteria

The learner can:

- AC1.1 correctly use required **PPE and VPE**
- AC 1.2 follow **approved workplace procedures**
- AC 1.3 identify potential health and safety hazards and risks
- AC 1.4 identify relevant information sources
- AC 1.5 state the importance of keeping records.

### Range

- AC1.1 Personal Protective Equipment and Vehicle Protective Equipment
- AC1.2 Safe handling and disposal of used and waste brake fluids and components. Start and run engines safely in a confined space.

## Learning outcome

The learner will:

LO2 Be able to carry out braking system removal, comparison and replacement activities

## Assessment criteria

The learner can:

AC2.1 select the correct tools and equipment and check they are fit for purpose

AC2.2 correctly use **tools and equipment**

AC2.3 identify the major components of the braking system

AC2.4 check condition of the brake cables and brake pipes

AC2.5 state the basic operation and purpose of the following: brake pads, brake disc, brake shoe, brake drum, brake fluid, brake cable, master cylinder

AC2.6 **examine** braking systems

AC2.7 demonstrate basic **removal, comparison and fitting techniques**

AC2.8 check and top up brake fluid

AC2.9 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items

AC2.10 identify specifications and grades of brake fluid.

## Range

AC2.2 Hand tools, multi meter, soldering iron.

AC2.6 Aural, visual, functional, measurements.

AC2.7 Brake pads, brake shoes.

## **Unit 3902-006      Introduction to 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 learners have a good understanding of how to:

- remove and refit braking system components
- top up brake fluid levels
- check relevant brake pipe, brake 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 3902-007 Introduction to vehicle transmission systems

<b>Unit reference:</b>	D/600/4442
<b>Old unit number</b>	3901-017
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	5
<b>GLH:</b>	38
<b>Aim:</b>	This unit is about the basic maintenance of light vehicle transmission systems.

### Learning outcome

The learner will:

- LO1 Be able to follow approved and safe procedures when carrying out removal replacement activities on vehicle transmission systems.

### Assessment criteria

The learner can:

- AC1.1 correctly use required **PPE and VPE**
- AC1.2 follow **approved workplace procedures**
- AC1.3 identify potential health and safety hazards and risks
- AC1.4 identify the relevant information sources
- AC1.5 state the importance of keeping records.

### Range

- AC1.1 Personal Protective Equipment and Vehicle Protective Equipment
- AC1.2 Safely dispose of used and waste transmission components and fluids. Safely start and run engines in a confined space.

### Learning outcome

The learner will:

- LO2 Be able to carry out removal and replacement activities on vehicle transmission systems.

## Assessment criteria

The learner can:

---

AC2.1 select the correct **tools and equipment** and check they are fit for purpose

AC2.2 correctly use **tools and equipment**

AC2.3 identify the major components of the transmission system

AC2.4 state the basic operation and purpose of the following: clutch, drive-line, gear train, final drive, wheel bearing

AC2.5 **examine** transmission systems

AC2.6 demonstrate basic **removal and fitting** techniques

AC2.7 check and top up transmission lubricants

AC2.8 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items

AC2.9 identify specifications and grades of transmission lubricants.

## Range

AC 2.1 / AC2.2 Hand tools, torque wrench

AC 2.5 Aural, visual, functional, measurements

AC2.6 Clutch, drive-line, wheel bearing.

## **Unit 3902-007      Introduction to 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 learners 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 3902-008

## Introduction to vehicle steering and suspension systems

<b>Unit reference:</b>	R/600/4471
<b>Old unit number</b>	3901-018
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	5
<b>GLH:</b>	36
<b>Aim:</b>	This unit is about the basic maintenance of vehicle suspension and steering systems.

### Learning outcome

The learner will:

- LO1 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:

- AC1.1 correctly use required **PPE and VPE**
- AC1.2 follow **approved workplace procedures**.
- AC1.3 identify potential health and safety hazards and risks
- AC1.4 identify the relevant information sources
- AC1.5 state the importance of keeping records.

### Range

- AC1.1 Personal Protective Equipment and Vehicle Protective Equipment
- AC1.2 Safely handle and dispose of used and waste steering and suspension fluids and components. Safely start and run engines in a confined space.

### Learning outcome

The learner will:

- LO2 Be able to carry out removal replacement activities on vehicle suspension and steering systems

## Assessment criteria

The learner can:

---

- AC2.1 select the correct **tools and equipment** and check they are fit for purpose
- AC2.2 correctly use **tools and equipment**
- AC2.3 identify the major components of the suspension and steering systems
- AC2.4 state the basic operation and purpose of the following: damper, spring, steering components
- AC2.5 **examine** steering and suspension systems
- AC2.6 demonstrate **basic removal and fitting techniques**
- AC2.7 carry out **steering and suspension checks**
- AC.8 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items
- AC 2.9 identify specifications and grades of steering and suspension lubricants.

## Range

---

- AC2.1/2.2 Hand tools, alignment gauge, torque wrench
- AC2.5 Aural, visual, functional, comparison
- AC2.6 Damper, spring, steering joint or bearing
- AC2.7 Front wheel alignment, front to rear wheel alignment, damper checks.

## **Unit 3902-008      Introduction to 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 learners 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 3902-009

## Introduction to vehicle wheels and tyre systems

<b>Unit reference:</b>	Y/600/4472
<b>Old unit number</b>	3901-019
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	4
<b>GLH:</b>	32
<b>Aim:</b>	This unit is about the basic maintenance of light vehicle wheel and tyre systems.

### Learning outcome

The learner will:

- LO1 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:

- AC1.1 correctly use required **PPE and VPE**
- AC1.2 follow **approved workplace procedures**
- AC1.3 identify potential health and safety hazards and risks
- AC1.4 identify the relevant information sources
- AC1.5 state the importance of keeping records.

### Range

- AC1.1 Personal Protective Equipment and Vehicle Protective Equipment
- AC1.2 Safely handle and dispose of used and waste tyres.

### Learning outcome

The learner will:

- LO2 Be able to carry out removal replacement and checking activities on vehicle wheels and tyres.

## Assessment criteria

The learner can:

---

- AC2.1 select the correct **tools and equipment** and check they are fit for purpose
- AC2.2 correctly **use tools and equipment**
- AC2.3 identify the major components of the wheels and tyre system
- AC2.4 state the basic operation and purpose of the following: tyres, valves, wheels balance, weights
- AC2.5 **examine** wheels and tyres for: damage, balance, leaks, wear limits & characteristics, tyre types and side wall markings
- AC2.6 demonstrate basic removal, checking and fitting activities on vehicle wheels and tyres
- AC2.7 state how to recognise and report cosmetic damage to vehicle components and units outside normal service items
- AC2.8 identify wheel and tyre types and markings.

## Range

---

- AC2.1/2.2 Hand tools, wheel balance equipment, water bath, torque wrench, tyre depth gauge, air line, tyre inflator, tyre pressure gauge
- AC2.5 Visual, functional, measurements.

## Unit 3902-010

## Introduction to principles of vehicle body and interior cleaning

<b>Unit reference:</b>	Y/600/4522
<b>Old unit number</b>	3901-020
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	4
<b>GLH:</b>	33
<b>Aim:</b>	This unit is about the valeting of light vehicle interiors and exteriors.

### Learning outcome

The learner will:

- LO1 Be able to follow approved and safe procedures when valeting light vehicle interiors and exteriors.

### Assessment criteria

The learner can:

- AC1.1 correctly use required **PPE and VPE**
- AC1.2 follow **approved workplace procedures**
- AC1.3 identify potential health and safety hazards and risks
- AC1.4 identify the relevant information sources
- AC1.5 state the importance of keeping records.

### Range

- AC1.1 Personal Protective Equipment and Vehicle Protective Equipment
- AC1.2 Safely handle and dispose of used and waste cleaning materials. Safely start and run engines in a confined space.

### Learning outcome

The learner will:

- LO2 Be able to carry out body and cleaning activities

## Assessment criteria

The learner can:

---

AC2.1 select the correct **equipment** and check it is fit for purpose

AC2.2 correctly use **equipment**

AC2.3 **examine** vehicle

AC2.4 demonstrate vehicle **cleaning activities** to include: internal, external, glass, wheels and tyres

AC2.5 state how to recognise and report cosmetic damage to vehicle components and units outside normal vehicle body and cleaning activities

AC2.6 identify different types of cleaning products / materials and equipment.

## Range

---

AC2.1/AC2.2 Pressure washer, cleaning cloths, sponges and brushes, vacuum cleaner, different types of cleaning products / materials.

AC2.3 Visual, functional

AC2.4 Exterior, interior, wheels, tyres, glass.

## **Unit 3902-010      Introduction to principles of vehicle body and interior cleaning**

### 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 learners 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 3902-011

## Introduction to vehicle engine operating principles

<b>Unit reference:</b>	M/600/4560
<b>Old unit number</b>	3901-021
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	4
<b>GLH:</b>	31
<b>Aim:</b>	This unit is about basic vehicle engine operating principles.

### Learning outcome

The learner will:

LO1. Be able to follow approved and safe procedures when working on engine systems.

### Assessment criteria

The learner can:

AC1.1 correctly use required **PPE and VPE**

AC1.2. follow **approved workplace procedures**

AC1.3 identify potential health and safety hazards and risks

AC1.4 identify the relevant information sources

AC1.5 state the importance of keeping records.

### Range

AC1.1 Personal Protective Equipment and Vehicle Protective Equipment.

AC1.2 Safely handle and dispose of used waste components and fluids. Safely start and run engines in a confined space.

### Learning outcome

The learner will:

LO2 Know the principles of vehicle engine operation.

### Assessment criteria

The learner can:

AC2.1 identify the major **components** of engine operating principles and its systems

AC2.2 state the operation and purpose of the following: crankshaft and bearings, cylinder head gasket, lubricating oils, cylinder head, valves or ports, piston and rings.

### Range

AC2.1 Petrol or diesel engine.

### Learning outcome

The learner will:

LO3 Be able to dismantle and reassemble engines

### Assessment criteria

The learner can:

AC3.1 select the correct tools and equipment and check they are fit for purpose

AC3.2 correctly use tools and equipment

AC3.3 carry out **examination methods**

AC3.4 identify the **main engine components**

AC3.5 demonstrate basic **engine component removal and fitting techniques**

AC3.6 state how to recognise and report damaged or missing parts and components

AC3.7 identify specifications and grades of lubricants and coolant.

### Range

AC3.3 Aural, visual, functional, measurements, comparison.

AC3.4 Crankshaft and bearings, cylinder head, lubricating oils, valves or ports, piston, con rod and rings, block and sump.

AC3.5 Tightening bolt torque procedure, tightening procedures.

# **3902-011 Introduction to vehicle engine operating principles**

## 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 learners 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 learners:

- show the 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 3902-012 Introduction to vehicle workshop bench skills

<b>Unit reference:</b>	A/600/4562
<b>Old unit number</b>	3901-031
<b>Level:</b>	Entry Level 3
<b>Credit Value</b>	4
<b>GLH:</b>	26
<b>Aim:</b>	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:

LO1 Be able to follow approved and safe procedures when carrying out bench skill tasks.

### Assessment criteria

The learner can:

AC1.1 correctly use required **PPE**

AC1.2 follow **approved workplace procedures**

AC1.3 identify potential health and safety hazards and risks

AC1.4 identify the relevant information sources

AC1.5 state the importance of keeping records.

### Range

AC1.1 Personal Protective Equipment

AC1.2 Safely handle and dispose of used and waste materials.

### Learning outcome

The learner will:

LO2 Be able to carry out vehicle workshop bench skill techniques.

## Assessment criteria

The learner can:

AC2.1 select the correct tools and **equipment** and check it is fit for purpose

---

AC2.2 correctly use **equipment**

AC2.3 state why materials properties are important

AC2.4 draw **simple sketches**

AC2.5 carry out vehicle workshop **bench skills and manufacturing techniques**.

## Range

AC2.1 / AC2.2 Hand tools, centre punch, measuring equipment, specialist, hammer, files, taps, dies, drills, vice.

AC2.4 Dimensions, materials, joining, thread.

AC2.5 Joining techniques, making threads, cutting metals, measuring, bending, folding, filing.

# Unit 3902-012 Introduction to vehicle workshop bench skills

## 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 learners 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 3902-101 Skills in Vehicle Engine Lubrication Systems

<b>Unit reference:</b>	F/600/4563
<b>Level:</b>	Level 1
<b>Credit value:</b>	5
<b>GLH:</b>	38
<b>Aim</b>	This unit will enable the learner to develop skills to carry out removal and replacement activities on engine lubrication systems for a number of vehicle types, including how to source appropriate information, recognise and different types of engines and components and their purpose, select appropriate tools and equipment and identify basic faults.

### Learning outcome

The learner will:

LO1 Know legislative and organisational requirements

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon:

AC1.2 ensure the legal requirements relating to the activity are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment

AC1.4 demonstrate and describe workplace procedures for

- handling and disposal of used and waste oils
- handling and disposal of used engine parts
- starting and safe running of engines in a confined space

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship.

### Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle types
- specification
- replacement information
- tightening torque figures
- electrical and electronic readings
- specifications of coolant and percentages of antifreeze used.

AC2.2 demonstrate the importance of following correct technical data for removal and replacement activities of

- thermostat
- thermistor
- fan control thermal switch.

AC2.3 demonstrate the importance of following correct cooling system test technical data for:

- fan control thermal switch
- thermostat opening time
- thermistor.

AC2.4 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how the vehicle engine lubrication system operates

## Assessment criteria

The learner can:

AC3.1 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.

AC3.2 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:

LO4. 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:

AC4.1 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:

LO5 Know how to carry out the removal and replacement activities on engine lubrication systems

## Assessment criteria

The learner can

AC5.1 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.

AC5.2 demonstrate the correct procedure for carrying out cylinder head inspection for flatness

- clean off old gasket
- straight edge and feeler blades.

AC5.3 demonstrate basic examination methods which include:

- aural
- visual
- functional
- measurements.

AC5.4 describe how to recognise and report cosmetic damage to vehicle components and units outside normal engine mechanical systems activities.

AC5.5 describe how to identify specifications and grades of lubricants and coolants.

# Unit 3902-101 Skills in Vehicle Engine Lubrication Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles.

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

It is important that learners 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 that learners:

- 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 for learners to demonstrate they are also able to check gaps and clearances correctly; this could be on another engine.

## Unit 3902-102 Skills in Vehicle Engine Cooling Systems

<b>Unit reference:</b>	H/600/4569
<b>Level:</b>	Level 1
<b>Credit value:</b>	4
<b>GLH:</b>	32
<b>Aim</b>	This unit is about engine cooling systems.

### Learning outcome

The learner will:

LO1 Know legislative and organisational requirements.

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon.

AC1.2 ensure manufacturers' procedures relating to the activity are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment (PPE) and vehicle protective equipment (VPE).

AC1.4 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.

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property

AC .6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship

## Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information.

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle types
- specification
- replacement information
- tightening torque figures
- electrical and electronic readings
- specifications of coolant and percentages of antifreeze used.

AC2.2 demonstrate the importance of following correct technical data for removal and replacement activities of:

- thermostat
- thermistor
- fan control thermal switch.

AC2.3 demonstrate the importance of following correct cooling system test technical data for:

- fan control thermal switch
- thermostat opening time
- thermistor.

AC2.4 demonstrate the importance of working to agreed timescales and keeping others informed of progress

## Learning outcome

The learner will:

LO3 Understand how the vehicle engine cooling system operates.

## Assessment criteria

The learner can:

AC3.1 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.

AC3.2 describe the basic operation and purpose of the:

- thermostat
- thermistor

## Learning outcome

The learner will:

LO4 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:

AC4.1 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:

LO5 Know how to carry out the relevant removal and replacement activities on vehicle engine cooling systems

---

## Assessment criteria

The learner can:

AC5.1 demonstrate the correct procedure for carrying out cooling system removal and replacement activities:

- fan control thermal switch
- coolant thermistor
- thermostat.

AC5.2 carry out basic electrical functional tests on the:

- fan control thermal switch
- coolant thermistor.

AC5.3 carry out functional tests to the:

- thermostat.

AC5.4 demonstrate they can manufacture a gasket to fit:

- the thermostat casing gasket.

AC5.5 demonstrate basic examination methods which include:

- aural
- visual
- functional
- measurements.

AC5.6 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items.

AC5.7 describe how to identify specifications and grades of coolant additives.

# Unit 3902-102 Skills in Vehicle Engine Cooling Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles.

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

It is important that learners 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 learners

- 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 3902-103

## Skills in Vehicle Fuel and Exhaust Systems

<b>Unit reference:</b>	K/600/4573
<b>Level:</b>	Level 1
<b>Credit value:</b>	5
<b>GLH:</b>	39
<b>Aim</b>	This unit gives learners the knowledge and skills to remove and replace vehicle fuel and exhaust systems.

### Learning outcome

The learner will:

LO1 Know legislative and organisational requirements

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon

AC1.2 ensure manufacturers' procedures are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment and vehicle protective equipment (VPE)

AC1.4 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

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship.

---

## Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle type and specification
- types of fuel and lambda sensor
- maintenance information
- tightening torque figures
- exhaust catalyst

AC2.2 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

AC2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how the vehicle fuel and exhaust systems operate

## Assessment criteria

The learner can:

AC3.1 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

AC3.2 describe the operation and purpose of the:

- exhaust catalytic convertor
- lambda sensor
- fuel injector

## Learning outcome

The learner will:

LO4 Know how to select and use the appropriate tools and equipment to remove and replace fuel and exhaust systems

## Assessment criteria

The learner can:

AC4.1 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:

LO5 Know how to carry out removal and replacement activities for fuel and exhaust systems

## Assessment criteria

The learner can:

AC5.1 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.

AC5.2 demonstrate examination methods which include:

- aural
- visual
- functional
- measurements.

AC5.3 demonstrate and describe operational test procedures for:

- lambda sensor
- exhaust catalyst.

AC5.4 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items.

AC5.5 describe how to identify for correct replacement component specifications..

# Unit 3902-102 Skills in Vehicle Engine Cooling Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles.

- Spark ignition
- Compression ignition
- Motorcycle
- Horticulture vehicles

It is important that learners have a good understanding of:

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

It is important is that learners:

- 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 3902-104 Skills in Vehicle Spark Ignition Systems

<b>Unit reference:</b>	H/600/4586
<b>Level:</b>	Level 1
<b>Credit value:</b>	5
<b>GLH:</b>	42
<b>Aim</b>	This unit gives learners the knowledge and skills to remove and replace spark ignition systems.

### Learning outcome

The learner will:

LO1 Know legislative and organisational requirements

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon

AC1.2 ensure manufacturers' procedures relating to the activity are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment (PPE) and vehicle protective equipment (VPE)

AC1.4 demonstrate and describe workplace procedures for:

- handling and disposal of spark ignition components
- starting and safe running of engines in a confined space.

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship.

### Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle types
- specification
- maintenance information
- tightening torque figures
- types of ignition components used.

AC2.2 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.

AC2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how the vehicle system operates.

## Assessment criteria

The learner can:

AC3.1 describe the concept of the engine and major components which are relevant to the ignition system they are working on.

AC3.2 describe the basic operation and purpose of the:

- engine position sensor
- engine electronic control unit
- ignition coil/s.

## Learning outcome

The learner will:

LO4 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:

AC4.1 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:

LO5 Know how to carry out the relevant removal and replacement activities.

## Assessment criteria

The learner can:

AC5.1 demonstrate the correct procedure for carrying out engine ignition system removal and replacement activities:

- engine position sensor
- engine electronic control unit
- ignition coil/s.

AC5.2 demonstrate a diagnostic fault code reader activity (EOBD) and search system for stored fault codes/data.

AC5.3 measure the internal resistance of

- engine position sensor
- ignition coil/s.

AC5.4 demonstrate basic examination methods which include:

- aural
- visual
- functional
- measurements
- comparisons.

AC5.5 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items.

# Unit 3902-102 Skills in Vehicle Engine Cooling Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles.

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

It is important that learners have a good understanding of:

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

It is important that learners:

- 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. An example could be an electrical relay.

## Unit 3902-105 Skills in Vehicle Electrical Systems

<b>Unit reference:</b>	A/600/4593
<b>Level:</b>	Level 1
<b>Credit value:</b>	5
<b>GLH:</b>	38
<b>Aim</b>	This unit gives learners the knowledge and skills to carry out the removal, replacement and testing of vehicle electrical systems.

### Learning outcome

The learner will:

LO1 Know legislative and organisational requirements.

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon.

AC1.2 ensure the legal requirements relating to the activity are maintained.

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment (PPE) and vehicle protective equipment (VPE).

AC1.4 demonstrate and describe workplace procedures for:

- handling and disposal of electrical system components
- starting and safe running of engines in a confined space.

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property.

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship.

## Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle type
- specification
- maintenance information
- tightening torque figures
- types of electrical components used.

AC2.2 demonstrate the importance of following correct technical data for removal and replacement activities for all of the following components:

- battery
- starter motor
- alternator.

AC2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how the vehicle system operates.

## Assessment criteria

The learner can:

AC3.1 describe the concept of the engines components which are relevant to the electrical system they are working on

AC3.2 describe the basic operation and purpose of the:

- battery
- starter motor
- alternator.

## Learning outcome

The learner will:

LO4 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:

AC4.1 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:

LO5 Know how to carry out basic system checks and relevant removal, repair and replacement activities on vehicle electrical systems.

## Assessment criteria

The learner can:

AC5.1 describe the correct procedure for carrying out system checks to the vehicle electrical systems:

- battery
- alternator
- starter motor.

AC5.2 carry out removal and replacement activities to:

- battery
- alternator
- starter motor.

AC5.3 carry out a simple starter motor test with

- battery
- jump leads.

AC5.4 carry out a simple alternator charge test with a voltmeter.

AC5.5 carry out a simple battery test with a voltmeter

AC5.6 demonstrate basic examination methods which include

- aural
- visual

- functional
- measurements
- comparisons.

AC5.7 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items.

# Unit 3902-102 Skills in Vehicle Engine Cooling Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles

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

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

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

## Unit 3902-106 Skills in Vehicle Braking Systems

<b>Unit reference:</b>	D/600/4893
<b>Level:</b>	Level 1
<b>Credit value:</b>	5
<b>GLH:</b>	35
<b>Aim</b>	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:

LO1 Know legislative and organisational requirements.

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon

AC1.2 ensure the manufacturers' procedures relating to the activity are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment

AC1.4 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

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship

## Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle types
- specification
- maintenance information
- brake disc run-out
- tightening torque figures
- specification of brake fluid used
- brake pipe materials

AC2.2 demonstrate the importance of following correct technical data for removal and replacement activities for the following:

- brake caliper
- brake pads
- brake fluid

AC2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how the vehicle braking system operates

## Assessment criteria

The learner can:

AC3.1 describe the concept of the vehicles major components which are relevant to the braking system they are working on

AC3.2 describe the basic operation and purpose of the following:

- master cylinder
- brake caliper
- brake pipes
- brake pads
- brake disc
- brake fluid

## Learning outcome

The learner will:

- LO4 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:

AC4.1 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

AC4.2 demonstrate and describe how to prepare, test and use all the equipment required to carry out brake disc run out inspection.

- dial test equipment

AC4.3 demonstrate and describe how to prepare, test and use all the equipment required to carry out brake pipe manufacture.

- brake flaring tool
- brake pipe bending equipment.

## Learning outcome

The learner will:

- LO5 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:

AC5.1 describe and demonstrate the correct procedure for carrying out braking system removal and replacement activities:

- brake caliper
- brake pads
- brake disc

AC5.2 carry out a brake disc run-out inspection and use:

- dial test equipment

AC5.3 manufacture a brake pipe and use:

- brake flaring tools
- pipe bending equipment

AC5.4 check and top up brake fluid:

- hygrometer moisture content test

AC5.5 demonstrate examination methods which include

- aural
- visual
- functional
- measurements

AC5.6 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

AC5.7 describe how to identify specifications of brake fluid.

# Unit 3902-106 Skills in Vehicle Braking Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles.

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

It is important that learners 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 learners:

- 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 3902-107 Skills in Vehicle Transmission Systems

<b>Unit reference:</b>	M/600/4901
<b>Level:</b>	Level 1
<b>Credit value:</b>	5
<b>GLH:</b>	38
<b>Aim</b>	This unit is about demonstrating the skills and knowledge required to remove and refit vehicle transmission systems.

### Learning outcome

The learner will:

LO1 Know legislative and organisational requirements.

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon

AC1.2 ensure manufacturers' procedures relating to the activity are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment

AC1.4 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.

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship.

## Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle types
- specification
- maintenance information
- tightening torque figures
- specifications and types of transmission fluid used

AC2.2 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

AC2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how the vehicle transmission system operates.

## Assessment criteria

The learner can:

AC3.1 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

AC3.2 describe the basic purpose of the following:

- clutch
- torque converter
- manual gearbox
- automatic gearbox

- range change device.

## Learning outcome

The learner will:

LO4 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:

AC4.1 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:

LO5 Know how to carry out the transmission system removal and replacement activities and level checks.

## Assessment criteria

The learner can:

AC5.1 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

AC5.2 check and top up transmission lubricants

AC5.3 demonstrate basic examination methods which include

- aural
- visual
- functional
- measurements

AC5.4 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

AC5.5 describe how to identify specifications and grades of transmission lubricants.

# Unit 3902-106 Skills in Vehicle Braking Systems

## Supporting information

### Guidance

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

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

It is important that learners 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 learners:

- 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 3902-108

## Skills in Vehicle Steering and Suspension Systems

<b>Unit reference:</b>	J/600/4905
<b>Level:</b>	Level 1
<b>Credit value:</b>	5
<b>GLH:</b>	36
<b>Aim</b>	This unit is for learners to demonstrate the skills and knowledge required to carry out removal and replacement activities to vehicle steering and suspension systems.

### Learning outcome

The learner will:

LO1 Know legislative and organisational requirements.

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon

AC1.2 ensure the manufacturers' procedures relating to the activity are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment

AC1.4 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

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship.

### Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle types
- specification
- maintenance information
- tightening torque figures
- specifications of steering and suspension fluids used

AC2.2 demonstrate the importance of following correct technical data for removal and replacement activities for steering and suspension components

AC2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how the vehicle suspension and steering systems operate

## Assessment criteria

The learner can:

AC3.1 describe the basic concept of the vehicles major components which are relevant to the steering and suspension system they are working upon

AC3.2 describe the operation and purpose of the following:

- suspension
- steering system
- steering components
- suspension components.

## Learning outcome

The learner will:

LO4 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:

AC4.1 demonstrate and describe how to prepare, test and use all the equipment required to carry out removal and replacement activities to the vehicle's steering and suspension system:

- general hand tools
- spring compressor
- alignment equipment
- torque wrench.

## Learning outcome

The learner will:

LO5 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:

AC5.1 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

AC5.2 carry out strip down procedure:

- suspension strut unit
- steering joint or bearing

AC5.3 evaluate and report on unit components:

- suspension strut unit
- steering joint or bearing

AC5.4 reassemble unit components:

- suspension strut unit
- steering joint or bearing

AC5.5 adjust and align unit components:

- suspension strut unit
- steering joint or bearing

AC5.6 demonstrate examination methods which include:

- aural
- visual
- functional
- measurements

AC5.7 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

AC5.8 describe how to identify specification and grades of steering and suspension lubricants.

# Unit 3902-106 Skills in Vehicle Braking Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles.

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

It is important that learners 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 learners:

- 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 3902-109

## Skills in Vehicle Wheel and Tyre Systems

<b>Unit reference:</b>	L/600/5120
<b>Level:</b>	Level 1
<b>Credit value:</b>	4
<b>GLH:</b>	32
<b>Aim</b>	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:

LO1 Know legislative and organisational requirements.

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to removal and replacement activities for the types of vehicles worked upon.

AC1.2 ensure manufacturers' procedures relating to the activity are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle maintenance activities including personal protective equipment

AC1.4 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.

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property.

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship.

## Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for:

- vehicle types
- specification
- maintenance information
- tightening torque figures

AC2.2 demonstrate the importance of following correct technical data for removal and replacement activities for:

- wheels
- tyres

AC2.3 demonstrate the importance of following correct technical data for tyre repair activities on:

- puncture
- balance
- air valve (schrader)

AC2.4 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how the vehicle wheels and tyre system operates

## Assessment criteria

The learner can:

AC3.1 describe the basic concept of the vehicles major components which are relevant to the wheels and tyres system they are working upon

AC3.2 describe the construction, operation and purpose of the following:

- tyres
- valves
- wheels
- balance weights

AC3.3 describe legal impacts relating to repair activities to the tyre and further use.

## Learning outcome

The learner will:

LO4 Know how to select and use the appropriate tools and equipment to carry out the activity.

## Assessment criteria

The learner can:

AC4.1 demonstrate and describe how to prepare, test and use all the equipment required when carrying out removal and replacement activities to the vehicle's 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:

LO5 Know how to carry out the relevant removal and replacement activities and checks on vehicle wheel and tyre systems

## Assessment criteria

The learner can:

AC5.1 demonstrate the correct procedure for carrying out wheels and tyres system removal and replacement activities to the types of vehicle worked upon

AC5.2 demonstrate wheel and tyre checks including examination procedures for:

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

AC5.3 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

AC5 4 demonstrate basic examination methods which include:

- visual
- functional
- measurements

AC5.5 describe how to recognise and report cosmetic damage to vehicle components and units outside normal service items

AC5.6 describe how to identify wheel and tyre types and markings.

# Unit 3902-106 Skills in Vehicle Braking Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles.

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

It is important that learners 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 learners 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 3902-112

## Skills in Vehicle Hand Skills and Manufacturing Techniques

<b>Unit reference:</b>	R/600/5121
<b>Old unit number</b>	3901-011
<b>Level:</b>	Level 1
<b>Credit value:</b>	4
<b>GLH:</b>	28
<b>Aim</b>	This unit is about demonstrating the skills and knowledge required to carry out vehicle hand skills and manufacturing techniques.

### Learning outcome

The learner will:

LO1 Know legislative and organisational requirements

### Assessment criteria

The learner can:

AC1.1 describe and demonstrate the manufacturers' requirements relating to vehicle hand skills and manufacturing techniques.

AC1.2 ensure manufacturers' procedures relating to the activity are maintained

AC1.3 demonstrate the health and safety legislation and workplace procedures relevant to vehicle hand skills and manufacturing techniques including personal protective equipment

AC1.4 demonstrate and describe workplace procedures for:

- handling and disposal of used lubricants
- handling and disposal of waste metals.

AC1.5 work in a way which minimises the risk of damage to the vehicle, its systems, other people and their property.

AC1.6 demonstrate that they have shown an awareness of education for sustainable development and global citizenship.

## Learning outcome

The learner will:

LO2 Know how to locate and use relevant sources of information

## Assessment criteria

The learner can:

AC2.1 ensure their records are accurate for

- specification
- maintenance information
- dimensions
- materials
- equipment

AC2.2 demonstrate the importance of following correct technical data for vehicle hand skills and manufacturing techniques

AC2.3 demonstrate the importance of working to agreed timescales and keeping others informed of progress.

## Learning outcome

The learner will:

LO3 Understand how to carry out vehicle hand skills and manufacturing techniques.

## Assessment criteria

The learner can:

AC3.1 describe and illustrate vehicle hand skills and manufacturing techniques for:

- joining techniques
- making threads
- cutting metals
- measuring
- filing

AC3.2 describe the importance of using correct materials for carrying out vehicle hand skills and manufacturing techniques

AC3.3 illustrate examples of understanding simple engineering drawings for

- dimensions
- materials
- joining
- threads.

## Learning outcome

The learner will:

LO4 Know how to select and use the appropriate tools and equipment to carry out the activity

## Assessment criteria

The learner can:

AC4.1 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:

LO5 Know how to carry vehicle hand skills and manufacturing techniques

## Assessment criteria

The learner can:

AC5.1 illustrate they are able to understand basic engineering drawings for:

- dimensions
- materials
- joining
- threads

AC5.2 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 3902-106 Skills in Vehicle Braking Systems

## Supporting information

### Guidance

This unit can be adapted to suit a range of vehicles.

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

It is important that learners 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.

Examples of tools which can be manufactured by learners 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 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 [Centre document library](http://www.cityandguilds.com) on [www.cityandguilds.com](http://www.cityandguilds.com) or click on the links below:

### **Centre Handbook: Quality Assurance Standards**

This document is for all approved centres and provides guidance to support their delivery of our qualifications. It includes information on:

- centre quality assurance criteria and monitoring activities
- administration and assessment systems
- centre-facing support teams at City & Guilds/ILM
- centre quality assurance roles and responsibilities.

The Centre Handbook should be used to ensure compliance with the terms and conditions of the centre contract.

### **Centre Handbook: Quality Assurance Standards**

This document sets out the minimum common quality assurance requirements for our regulated and non-regulated qualifications that feature centre-assessed components. Specific guidance will also be included in relevant qualification handbooks and/or assessment documentation.

It incorporates our expectations for centre internal quality assurance and the external quality assurance methods we use to ensure that assessment standards are met and upheld. It also details the range of sanctions that may be put in place when centres do not comply with our requirements or actions that will be taken to align centre marking/assessment to required standards. Additionally, it provides detailed guidance on the secure and valid administration of centre assessments.

### **Access arrangements: When and how applications need to be made to City & Guilds**

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

The [Centre document library](http://www.cityandguilds.com) also contains useful information on such things as:

- conducting examinations
- registering learners
- appeals and malpractice.

### **Useful contacts**

Please visit the [Contact us](#) section of the City & Guilds website.

## City & Guilds

For almost 150 years, we have worked with people, organisations and economies to help them identify and develop the skills they need to thrive. We understand the life-changing link between skills development, social mobility, prosperity and success. Everything we do is focused on developing and delivering high-quality training, qualifications, assessments and credentials that lead to jobs and meet the changing needs of industry.

We partner with our customers to deliver work-based learning programmes that build competency to support better prospects for people, organisations and wider society. We create flexible learning pathways that support lifelong employability because we believe that people deserve the opportunity to (re)train and (re)learn again and again – gaining new skills at every stage of life, regardless of where they start.

The City & Guilds community of brands includes Gen2, ILM, Intertrain, Kineo and The Oxford Group.

## Copyright

The content of this document is, unless otherwise indicated, © City & Guilds Limited and may not be copied, reproduced or distributed without prior written consent. However, approved City & Guilds centres and learners studying for City & Guilds qualifications may photocopy this document free of charge and/or include a PDF version of it on centre intranets on the following conditions:

- centre staff may copy the material only for the purpose of teaching learners working towards a City & Guilds qualification, or for internal administration purposes
- learners may copy the material only for their own use when working towards a City & Guilds qualification.

The Standard Copying Conditions (see the City & Guilds website) also apply.

Contains public sector information licensed under the Open Government Licence v3.0.

Published by City & Guilds Limited, a company registered in England and Wales (company number 16513878).

City & Guilds Limited  
Giltspur House  
5–6 Giltspur Street  
London  
EC1A 9DE

**[cityandguildsgroup.com](http://cityandguildsgroup.com)**