

## **Assessment Criteria**

**For**

## **IMI AL Level 2 Diploma in Vehicle Inspection (VRQ)**

**I.D NO: 501/1213/2**



To be used in conjunction with Candidate Assessment Summary, Practical Assessments and Written Assessments (optional)

For assessor use only: Assessor Verifier Guidance Documents

## CENTRE INFORMATION

Please be aware that any **legislation** referred to in this qualification may be subject to amendment/s during the life of this qualification. Therefore IMI Awards' Approved Centres must ensure they are aware of and comply with any amendments, e.g. to health and safety legislation and employment practices.

Please be aware that **vehicle technologies** referred to in this qualification reflect current practice, but may be subject to amendment/s, updates and replacements during the life of this qualification. Therefore IMI Awards Approved Centres must ensure they are aware of the latest developments and emerging technologies to ensure the currency of this qualification.

Please note: the relevance of the information contained in the **unit content** will vary depending upon the vehicle types being worked upon. The unit content is for guidance only and is not meant to be prescriptive.

© 2011 IMI Awards

All rights reserved. No part of this publication may be reproduced, stored in retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of IMI Awards

Requests should be made in writing and addressed to:

IMI Awards

Fanshaws, Brickendon, Hertford SG13 8PQ

## IMIAL Level 2 Diploma in Vehicle Inspection (VRQ)

This qualification consists of 4 Mandatory Units and 18 Optional Units.

All units are either Knowledge (K) or Skills (S) Units. The K and S units are combined to form a topic 'set'

In order to pass the qualification, learners must achieve a minimum of 40 credits from the following groups:

**Group A:** 21 credits from the 4 Mandatory Units. (190 GLH)

**Group B:** A minimum of 4 credits from one optional unit

**Group C:** A minimum of 15 credits from at least 3 optional 'sets' (ensuring both Knowledge and Skills units are achieved from the 'set', e.g. VF07K and VF07S).

MIN GLH=336 (Options=VF09/VF11/LV01) MAX GLH=384 (Options=VF02/VF07/VF01)

Mean GLH= (336+384)/2=360 hours

A minimum of 25 credits must be achieved at Level 2 or above.

**Please note that every knowledge unit has an online test and the test number is the same as the 'set ref'**

### Group A: Mandatory Units

Set Ref:	Unit Ref, Unit Title & I.D Number	GLH	Unit Level	Credit Value
<b>G0102</b>	G0102K - Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment (D/601/6171)	30	2	3
	G0102S - Skills in Health and Safety and Good Housekeeping in the Automotive Environment (Y/601/7254)	60	2	7
<b>G4</b>	G4K – Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment (K/601/6237)	40	2	4
	G4S –Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment (Y/601/6279)	60	2	7

### Group B: Optional Units

Set Ref:	Unit Ref, Unit Title & I.D Number	GLH	Unit Level	Credit Value
<b>L103</b>	Spark Ignition Engine Systems, Components and Operation J/600/3298	30	1	4
<b>L104</b>	Compression Ignition Engine Systems, Components and Operation L/600/3299	30	1	4

**Group C: Optional Units**

Set Ref:	Unit Ref, Unit Title & I.D Number	GLH	Unit Level	Credit Value
VF01	VF01K - Knowledge of Inspection, Repair and Replacement of Standard Light Vehicle Tyres (D/601/6025)	24	1	3
	VF01S – Skills in Inspection, Repair and Replacement of Standard Light Vehicle Tyres (H/601/6091)	20	1	5
VF02	VF02K – Knowledge of Inspection, Repair and Replacement of High Performance Light Vehicle Tyres (T/601/6032)	24	2	3
	VF02S – Skills in Inspection, Repair and Replacement of High Performance Light Vehicle Tyres (K/601/6092)	36	2	4
VF07	VF07K – Knowledge of Light Vehicle Four Wheel Alignment (F/601/6051)	24	2	3
	VF07S – Skills in Light Vehicle Four Wheel Alignment (F/601/6745)	36	2	4
VF09	VF09K – Knowledge of Inspection and Replacement of Light Vehicle Exhaust Components (Y/601/6072)	14	2	2
	VF09S – Skills in Inspection and Replacement of Light Vehicle Exhaust Components (A/601/6842)	24	2	3
VF10	VF10K – Knowledge of Inspection, Testing and Replacement of Vehicle Batteries and Related Components (F/601/6082)	18	2	2
	VF10S – Skills in Inspection, Testing and Replacement of Vehicle Batteries and Related Components (K/601/8179)	24	2	3
VF11	VF11K – Knowledge of Inspection and Replacement of Light Vehicle Suspension Dampers and Springs (J/601/6083)	14	2	2
	VF11S – Skills in Inspection and Replacement of Light Vehicle Suspension Dampers and Springs (F/601/6857)	24	2	3
VF12	VF12K – Knowledge of Inspection, Adjustment and Replacement of Light Vehicle Braking Systems and Components (L/601/6084)	18	2	2
	VF12S – Skills in Inspection, Adjustment and Replacement of Light Vehicle Braking Systems and Components (L/601/6862)	32	2	4
LV01	LV01K – Knowledge of Routine Light Vehicle Maintenance (F/601/3716)	20	2	3
	LV01S – Skills in Routine Light Vehicle Maintenance (H/601/3871)	20	2	2

<b>UNIT REF:</b> G0102K	<b>UNIT TITLE: KNOWLEDGE OF HEALTH, SAFETY AND GOOD HOUSEKEEPING IN THE AUTOMOTIVE ENVIRONMENT</b>
----------------------------	--

<b>Level: 2</b>	<b>Route: Knowledge</b>	<b>Credit Value: 3</b>	<b>GLH: 30</b>
-----------------	-------------------------	------------------------	----------------

**Mapping: This unit is mapped to the IMI NOS G1 and G2**

**Rationale:** This unit enables the learner to develop an understanding of routine maintenance and cleaning of the automotive environment and using resources economically and health and safety legislation and duties of everyone in the motor vehicle environment. It will provide an appreciation of significant risks in the automotive environment and how to identify and deal with them. Once completed the learner will be able to identify hazards and evaluate and reduce risk.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Understand the correct personal and vehicle protective equipment to be used within the automotive environment	1.1. Explain the importance of wearing the types of PPE required for a range automotive repair activities  1.2. Identify vehicle protective equipment for a range of repair activities  1.3. Describe vehicle and personal safety considerations when working at the roadside
2. Understand effective housekeeping practices in the automotive environment	2.1. Describe why the automotive environment should be properly cleaned and maintained.  2.2. Describe requirements and systems which may be put in place to ensure a clean automotive environment.  2.3. Describe how to minimise waste when using utilities and consumables  2.4. State the procedures and precautions necessary when cleaning and maintaining an automotive environment.  2.5. Describe the selection and use of cleaning equipment when dealing with general cleaning, spillages and leaks in the automotive environment.  2.6. Describe procedures for correct disposal of waste materials from an automotive environment  2.7. Describe procedures for starting and ending the working day which ensure effective housekeeping practices are followed

<p>3. Understand key health and safety requirements relevant to the automotive environment</p>	<p>3.1. List the main legislation relating to automotive environment health and safety.</p> <p>3.2. Describe the general legal duties of employers and employees required by current health and safety legislation</p> <p>3.3. Describe key, current health and safety requirements relating to the automotive environment.</p> <p>3.4. Describe why workplace policies and procedures relating to health and safety are important</p>
<p>4. Understand about hazards and potential risks relevant to the automotive environment</p>	<p>4.1. Identify key hazards and risks in an automotive environment</p> <p>4.2. Describe policies and procedures for reporting hazards, risks, health and safety matters in the automotive environment.</p> <p>4.3. State precautions and procedures which need to be taken when working with vehicles, associated materials, tools and equipment.</p> <p>4.4. Identify fire extinguishers in common use and which types of fire they should be used on</p> <p>4.5. Identify key warning signs and their characteristics that are found in the vehicle repair environment.</p> <p>4.6. State the meaning of common product warning labels used in an automotive environment.</p>
<p>5. Understand personal responsibilities</p>	<p>5.1. Explain the importance of personal conduct in maintaining the health and safety of the individual and others</p> <p>5.2. Explain the importance of personal presentation in maintaining health safety and welfare</p>

**Content:****Economic use of resources**

- a. Consumable materials e.g. grease, oils, split pins, locking and fastening devices etc.

**Requirement to maintain work area effectively**

- a. Cleaning tools and equipment to maximise workplace efficiency.
- b. Requirement to carry out the housekeeping activities safely and in a way that minimises inconvenience to customers and staff.
- c. Risks involved when using solvents and detergents.
- d. Advantages of good housekeeping.

**Spillages, leaks and waste materials**

- a. Relevance of safe systems of work to the storage and disposal of waste materials.
- b. Requirement to store and dispose of waste, used materials and debris correctly.
- c. Safe disposal of special / hazardous waste materials.
- d. Advantages of recycling waste materials.
- e. Dealing with spillages and leaks

**Basic legislative requirements**

- a. Provision and Use of Work Equipment Regulations 1992.
- b. Power Presses Regulations 1992.
- c. Pressure Systems and Transportable Gas Containers Regulations 1989.
- d. Electricity at Work Regulations 1989.
- e. Noise at Work Regulations 1989.
- f. Manual Handling Operations Regulations 1992.
- g. Health and Safety (Display Screen Equipment) Regulations 1992.
- h. Abrasive Wheel Regulations.
- i. Safe Working Loads.
- j. Working at Height Regulations (date)

**Routine maintenance of the workplace**

- a. Trainee's personal responsibilities and limits of their authority with regard to work equipment.
- b. Risk assessment of the workplace activities and work equipment.
- c. Workplace person responsible for training and maintenance of workplace equipment.
- d. When and why safety equipment must be used.
- e. Location of safety equipment.
- f. Particular hazards associated with their work area and equipment.
- g. Prohibited areas.
- h. Plant and machinery that trainees must not use or operate.
- i. Why and how faults on unsafe equipment should be reported.
- j. Storing tools, equipment and products safely and appropriately.
- k. Using the correct PPE.
- l. Following manufacturer's recommendations.
- m. Location of routine maintenance information e.g. electrical safety check log.

**Legislation relevant to Health and Safety**

- a. HASAWA
- b. COSHH
- c. EPA
- d. Manual Handling Operations Regulations 1992
- e. PPE Regulations 1992

**General regulations to include an awareness of:**

- a Health and Safety (Display Screen Equipment) Regulations 1992
- b Health and Safety (First Aid) Regulations 1981
- c Health and Safety (Safety Signs and Signals) Regulations 1996
- d Health and Safety (Consultation with Employees) Regulations 1996
- e Employers Liability (Compulsory Insurance) Act 1969 and Regulations 1998
- f Confined Spaces Regulations 1997
- g Noise at Work Regulations 1989
- h Electricity at Work Regulations 1989
- i Electricity (Safety) Regulations 1994
- j Fire Precautions Act 1971
- k Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1985
- l Pressure Systems Safety Regulations 2000
- m Waste Management 1991
- n Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002
- o Control of Asbestos at Work Regulations 2002

**Legislative duties:**

- a. The purpose of a Health and Safety Policy.
- b. The relevance of the Health and Safety Executive.
- c. The relevance of an initial induction to Health and Safety requirements at your workplace.
- d. General employee responsibilities under the HASAWA and the consequences of non-compliance.
- e. General employer responsibilities under the HASAWA and the consequences of non-compliance.
- f. The limits of authority with regard to Health and Safety within a personal job role.
- g. Workplace procedure to be followed to report Health and Safety matters.

**Precautions to be taken when working with vehicles, workshop materials, tools and equipment including electrical safety, pneumatics and hydraulics**

- a. Accessing and interpreting safety information
- b. Seeking advice when needed
- c. Seeking assistance when required
- d. Reporting of unsafe equipment
- e. Storing tools, equipment and products safely and appropriately
- f. Using the correct PPE
- g. Following manufacturers recommendations
- h. Following application procedures e.g. hazardous substances
- i. The correct selection and use of extraction equipment

**PPE to include:**

- a. Typical maintenance procedures for PPE equipment to include:
  - i. typical maintenance log
  - ii. cleaning procedures
  - iii. filter maintenance
  - iv. variation in glove types
  - v. air quality checks
- b. Choice and fitting procedures for masks and air breathing equipment.
- c. Typical workplace processes which would require the use of PPE to include:
  - i. welding
  - ii. sanding and grinding
  - iii. filling
  - iv. panel removal and replacement
  - v. drilling
  - vi. cutting
  - vii. chiselling
  - viii. removal of broken glass
  - ix. removal of rubber seals from fire damaged vehicles
  - x. removal of hypodermic needles
  - xi. servicing activities



- xii. roadside recovery
- d. Unserviceable PPE.
- e. PPE required for a range automotive repair activities. To include appropriate protection of:
  - i. eyes
  - ii. ears
  - iii. head
  - iv. skin
  - v. feet
  - vi. hands
  - vii. lungs

**Fire and extinguishers**

- a. Classification of fire types
- b. Using a fire extinguisher effectively.
- c. Types of Extinguishers
  - i. foam
  - ii. dry powder
  - iii. CO2
  - iv. water
  - v. fire blanket

**Action to be taken in the event of a fire to include:**

- a. The procedure as:
  - i. raise the alarm
  - ii. fight fire only if appropriate
  - iii. evacuate building
  - iv. call for assistance

**Product warning labels to include:**

- a. Reasons for placing warning labels on containers.
- b. Warning labels in common use, to include:
  - i. toxic
  - ii. corrosive
  - iii. poisonous
  - iv. harmful
  - v. irritant
  - vi. flammable
  - vii. explosive

**Warning signs and notices**

- a. Colours used for warning signs:
  - i. red
  - ii. blue
  - iii. green
- b. Shapes and meaning of warning signs:
  - i. round
  - ii. triangular
  - iii. square
- c. The meaning of prohibitive warning signs in common use.
- d. The meaning of mandatory warning signs in common use.
- e. The meaning of warning notices in common use.
- f. General design of safe place warning signs.

**Hazards and risks to include:**

- a. The difference between a risk and a hazard.
- b. Potential risks resulting from:
  - i. the use and maintenance of machinery or equipment
  - ii. the use of materials or substances
  - iii. accidental breakages and spillages
  - iv. unsafe behaviour

- v. working practices that do not conform to laid down policies
  - vi. environmental factors
  - vii. personal presentation
  - viii. unauthorised personal, customers, contractors etc entering your work premises
  - ix. working by the roadside
  - x. vehicle recovery
- c. The employee's responsibilities in identifying and reporting risks within their working environment.
- d. The method of reporting risks that are outside your limits of authority.
- e. Potential causes of:
- i. fire
  - ii. explosion
  - iii. noise
  - iv. harmful fumes
  - v. slips
  - vi. trips
  - vii. falling objects
  - viii. accidents whilst dealing with broken down vehicles

### **Personal responsibilities**

- a. The purpose of workplace polices and procedures on:
- i. the use of safe working methods and equipment
  - ii. the safe use of hazardous substances
  - iii. smoking, eating , drinking and drugs
  - iv. emergency procedures
  - v. personal appearance
- b. The importance of personal appearance in the control of health and safety.

### **Action to be taken in the event of colleagues suffering accidents**

- a. The typical sequence of events following the discovery of an accident such as:
- i. make the area safe
  - ii. remove hazards if appropriate i.e. switch off power
  - iii. administer minor first aid
  - iv. take appropriate action to re-assure the injured party
  - v. raise the alarm
  - vi. get help
  - vii. report on the accident
- b. Typical examples of first aid which can be administered by persons at the scene of an accident:
- i. check for consciousness
  - ii. stem bleeding
  - iii. keep the injured person's airways free
  - iv. place in the recovery position if injured person is unconscious
  - v. issue plasters for minor cuts
  - vi. action to prevent shock i.e. keep the injured party warm
  - vii. administer water for minor burns or chemical injuries
  - viii. wash eyes with water to remove dust or ingress of chemicals (battery acid)
  - ix. need to seek professional help for serious injuries
- c. Examples of bad practice which may result in further injury such as:
- i. moving the injured party
  - ii. removing foreign objects from wounds or eyes
  - iii. inducing vomiting
  - iv. straightening deformed limbs

<b>UNIT REF:</b> G0102S	<b>UNIT TITLE: SKILLS IN HEALTH, SAFETY AND GOOD HOUSEKEEPING IN THE AUTOMOTIVE ENVIRONMENT</b>
----------------------------	---

<b>Level: 2</b>	<b>Route: Skills</b>	<b>Credit Value: 7</b>	<b>GLH: 60</b>
-----------------	----------------------	------------------------	----------------

**Mapping: This unit is mapped to the IMI NOS G1 and G2**

**Rationale:** This unit will enable the learner to develop the skills required to carry out day to day work area cleaning, clearing away, dealing with spillages and disposal of waste, used materials and debris. Identify hazards and risks in the automotive environment and complying with relevant legislation and good practice and work safely at all times within the automotive environment, both as an individual and with others.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to use correct personal and vehicle protection within the automotive environment	1.1. Select and use personal protective equipment throughout activities. To include appropriate protection of: <ul style="list-style-type: none"> <li>a eyes</li> <li>b ears</li> <li>c head</li> <li>d skin</li> <li>e feet</li> <li>f hands</li> <li>g lungs</li> </ul> 1.2.. Select and use vehicle protective equipment throughout all activities
2. Be able to carry out effective housekeeping practices in the automotive environment	2.1. Select and use cleaning equipment which is of the right type and suitable for the task 2.2. Use utilities and appropriate consumables, avoiding waste 2.3. Use materials and equipment to carry out cleaning and maintenance duties in allocated work areas, following automotive work environment policies, schedules and manufacturer's instructions 2.4. Perform housekeeping activities safely and in a way which minimizes inconvenience to customers and staff 2.5. Keep the work area clean and free from debris and waste materials 2.6. Keep tools and equipment fit for purpose by regular cleaning and keeping tidy 2.7. Dispose of used cleaning agents, waste materials and debris to comply with legal and workplace requirements

<p>3. Be able to recognise and deal with dangers in order to work safely within the automotive workplace</p>	<p>3.1. Name and locate the responsible persons for health and safety in their relevant workplace</p> <p>3.2. Identify and report working practices and hazards which could be harmful to themselves or others</p> <p>3.3. Carry out safe working practices whilst working with equipment, materials and products in the automotive environment</p> <p>3.4. Rectify health and safety risks encountered at work, within the scope and capability of their job role</p>
<p>4. Be able to conduct themselves responsibly</p>	<p>4.1. Show personal conduct in the workplace which does not endanger the health and safety of themselves or others</p> <p>4.2. Display suitable personal presentation at work which ensures the health and safety of themselves and others at work</p>

## EVIDENCE REQUIREMENTS

1. <b>You must</b> produce evidence of use of personal and vehicle protection, cleaning the work environment and disposal of waste on <b>2</b> separate <b>occasions</b> .
2. <b>You must</b> produce evidence of identifying risks which may result from at least <b>2</b> of the items listed below:
<ul style="list-style-type: none"> <li>• the use and maintenance of machinery or equipment</li> </ul>
<ul style="list-style-type: none"> <li>• the use of materials or substances</li> </ul>
<ul style="list-style-type: none"> <li>• working practices which do not conform to laid down policies</li> </ul>
<ul style="list-style-type: none"> <li>• unsafe behaviour</li> </ul>
<ul style="list-style-type: none"> <li>• accidental breakages and spillages</li> </ul>
<ul style="list-style-type: none"> <li>• environmental factors</li> </ul>
3. <b>You must</b> produce evidence of identifying risks.
4. <b>You must</b> produce evidence of following at least <b>2</b> of the workplace policies listed below:
<ul style="list-style-type: none"> <li>• the use of safe working methods and equipment</li> </ul>
<ul style="list-style-type: none"> <li>• the safe use of hazardous substances</li> </ul>
<ul style="list-style-type: none"> <li>• smoking, eating, drinking and drugs</li> </ul>
<ul style="list-style-type: none"> <li>• what to do in the event of an emergency</li> </ul>
<ul style="list-style-type: none"> <li>• personal presentation</li> </ul>

<b>UNIT REF: G4K</b>	<b>UNIT TITLE: KNOWLEDGE OF MATERIALS, FABRICATION, TOOLS AND MEASURING DEVICES USED IN THE AUTOMOTIVE ENVIRONMENT</b>
----------------------	--

<b>Level: 2</b>	<b>Route: Knowledge</b>	<b>Credit Value: 4</b>	<b>GLH: 40</b>
-----------------	-------------------------	------------------------	----------------

**Mapping: This unit is mapped to the IMI NOS G4**

**Rationale:** This unit enables the learner to develop an understanding of the correct selection, care and use of key hand tools and measuring devices for modification, fabrication and repair in the automotive environment, the correct preparation and use of common automotive environment equipment, the correct selection and fabrication of materials used when modifying and repairing and the correct application of automotive engineering fabrication and fitting principles

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Understand how to select, use and care for hand tools and measuring devices in the automotive environment	1.1. Identify and explain the use of common types of hand tools used for fabricating and fitting in the automotive environment  1.2. Identify and explain the use of common measuring devices used for fabrication and fitting in the automotive environment  1.3. Describe, within the scope of their responsibilities, how to select, prepare and maintain hand tools, measuring devices and PPE used for fabrication, repair and fitting in the automotive environment  1.4. State the limitations of common hand tools and measuring devices used for fabricating, repair and fitting in the automotive workplace  1.5. Explain how common hand tools and measuring devices used for fabricating, repair and fitting in the automotive environment should be stored and maintained  1.6. Identify common electrical measuring tools used in the repair of vehicles and components  1.7. Explain the preparation and safe and correct use of common electrical tools when measuring voltage, current and resistance
2. Understand how to prepare and use common workshop equipment	2.1. Describe the preparation and safe use of workshop equipment  2.2. Explain the term: safe working load

<p>3. Understand how to select materials when fabricating, modifying and repairing vehicles and fitting components</p>	<p>3.1. Describe the properties, application and limitations of ferrous and non-ferrous metals, including their safe use.</p> <p>3.2. Describe the properties, application and limitations of common non-metallic materials, including their safe use</p> <p>3.3. Define common terms relating to the properties of materials</p>
<p>4. Understand how to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components</p>	<p>4.1. Describe how to tap threads, file, cut and drill plastics and metals when modifying or repairing vehicles</p> <p>4.2. Describe how to measure, mark out, shape and join materials when fabricating</p> <p>4.3. Describe the selection and fitting procedures of the following:</p> <ul style="list-style-type: none"> <li>a. gaskets and seals</li> <li>b. sealants and adhesives</li> <li>c. fittings and fasteners</li> <li>d. electrical circuit components</li> </ul> <p>4.4. Identify locking, fastening and fixing devices</p> <p>4.5. State the importance of correct operating specifications for limits, fits and tolerances in the automotive environment</p>

<b>UNIT REF: G4S</b>	<b>UNIT TITLE: SKILLS IN MATERIALS, FABRICATION, TOOLS AND MEASURING DEVICES USED IN THE AUTOMOTIVE ENVIRONMENT</b>
----------------------	---

<b>Level: 2</b>	<b>Route: Skills</b>	<b>Credit Value: 7</b>	<b>GLH: 60</b>
-----------------	----------------------	------------------------	----------------

**Mapping: This unit is mapped to the IMI NOS G4**

**Rationale:** This unit helps the learner to develop the skills required for the correct selection, care and use of key hand tools and measuring devices for modification, fabrication and repair in the automotive environment. The correct preparation and use of common work environment equipment. The correct selection and fabrication of materials used when modifying and repairing and the correct application of automotive engineering fabrication and fitting principle

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to select, maintain and use and hand tools and measuring devices in the automotive environment	1.1. Select, maintain and use suitable hand tools safely when fabricating and fitting in the automotive workplace  1.2. Select, maintain and use suitable measuring devices safely when fabricating and fitting in the automotive environment  1.3. Select, maintain and use suitable PPE for fabrication, repair and fitting in the automotive environment.  1.4. Select, maintain and use suitable electrical measuring tools safely when repairing vehicles and components
2. Be able to prepare and use common workshop equipment	2.1. Use suitably maintained workshop equipment safely  2.2. Use correct interpretation of 'safe working load' on lifting and supporting equipment.  2.3. Report any faulty or damaged tools and equipment to the relevant persons clearly and promptly.  2.4. Store work tools and equipment in a safe manner which permits ease of access and identification for use.
3. Be able to select materials when fabricating, modifying and repairing vehicles and fitting components	3.1. Select and use appropriate materials whilst constructing, fitting, modifying or repairing vehicles and components.



<p>4. Be able to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components</p>	<p>4.1. Use correct procedures when:</p> <ol style="list-style-type: none"> <li>a. filing,</li> <li>b. tapping threads</li> <li>c. cutting plastics and metals</li> <li>d. drilling plastics and metals.</li> <li>e. fitting</li> </ol> <p>4.2. Use appropriate techniques when fabricating, repairing and modifying vehicles and components</p> <p>4.3. Select and use:</p> <ol style="list-style-type: none"> <li>a. gaskets</li> <li>b. seals</li> <li>c. sealants</li> <li>d. fittings and fasteners</li> </ol> <p>4.4. Apply modification and repair techniques to automotive electrical circuits</p> <p>4.5. Select and use locking, fixing and fastening devices</p>
--	---

## EVIDENCE REQUIREMENTS

<p>1. <b>You must</b> produce evidence of undertaking basic routine checks of hand tools, measuring devices and workshop equipment covering all of those listed below:</p>
<ul style="list-style-type: none"> <li>• electrical</li> </ul>
<ul style="list-style-type: none"> <li>• mechanical</li> </ul>
<ul style="list-style-type: none"> <li>• pneumatic</li> </ul>
<ul style="list-style-type: none"> <li>• hydraulic</li> </ul>
<p>2. <b>You must</b> produce evidence of fabricating <b>at least 1 item</b> from suitable materials to known tolerances, which includes the following processes</p>
<ul style="list-style-type: none"> <li>• filing</li> </ul>
<ul style="list-style-type: none"> <li>• tapping threads</li> </ul>
<ul style="list-style-type: none"> <li>• cutting</li> </ul>
<ul style="list-style-type: none"> <li>• drilling</li> </ul>
<ul style="list-style-type: none"> <li>• joining</li> </ul>
<p>3. <b>You must</b> be observed by your assessor carrying out routine checks and during stages of fabrication</p>

<b>UNIT REF: L103</b>	<b>UNIT TITLE: SPARK IGNITION ENGINE SYSTEMS, COMPONENTS AND OPERATION</b>
-----------------------	--

<b>Level: 1</b>	<b>Route: Foundation Learning</b>
<b>Credit Value: 4</b>	
<b>Guided Learning Hours: 30</b>	
<b>Rationale:</b> This unit introduces learners to the principles of SI engine systems, components and operation and includes the requirements for carrying out routine engine maintenance	

<p><b>LEARNING OUTCOMES</b></p> <p><b>The learner will:</b></p> <ol style="list-style-type: none"> <li><b>1. Be able to work safely on SI engines</b></li> <li><b>2. Know SI engine systems and components</b></li> <li><b>3. Understand how SI engines operate</b></li> <li><b>4. Be able to remove and refit SI engine components</b></li> </ol>
--

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely on SI engines	1.1 Use appropriate PPE and VPE when working on SI engines  1.2 Use appropriate and safe working practices when working on SI engine mechanical systems
2. Know SI engine systems and components	2.1 Identify the main components used in SI engines  2.2 State the purpose of the main components used in SI engines  2.3 Outline the purpose of the main systems used in SI engines
3. Understand how SI engines operate	3.1 State the operating cycle of the 2 and 4 stroke SI engines  3.2 Give examples of the valve and ignition timing requirements for 4 stroke SI engines  3.3 State the correct air/fuel mixture for SI engines during different situations  3.4 Identify the constituents of SI exhaust gas emissions and their effects on the environment.

<p>4. Be able to safely and correctly carryout routine SI engine maintenance</p>	<p>4.1 Select the correct technical data for SI engine maintenance</p> <p>4.2 Demonstrate the correct procedures when removing and refitting an SI engine cylinder head from a fully equipped non running stand engine</p> <p>4.3 Demonstrate the correct procedures for reinstating the engine and vehicle after SI engine maintenance</p>
--	---

**Content to include:**

1.1. PPE to include:

- a. overalls
- b. protective and safety gloves
- c. protective footwear
- d. goggles

VPE protection to include:

- a. wing covers
- b. seat covers
- c. carpet protection

1.2 Appropriate and safe working practices to include:

- a removal and/or storage of owners property from vehicle
- b immobilising engine
- c ensuring handbrake is applied
- d follow logical sequence of working
- e use safe working practices
- f select and use correct tools and equipment

2.1 The main engine components to include:

- a. cylinder block
- b. cylinder head
- c. engine sump
- d. crankshaft
- e. connecting rods
- f. pistons and rings
- g. camshaft
- h. valves
- i. inlet and exhaust manifolds
- j. flywheel
- k. front drive pulley
- l. gaskets and seals

2.2 Purpose and function of main components to include:

- a. cylinder block
- b. cylinder head
- c. engine sump
- d. crankshaft
- e. piston and rings
- f. connecting rod
- g. flywheel
- h. camshaft
- i. inlet and exhaust valves
- j. inlet and exhaust manifolds
- k. gaskets and seals

2.3 Purpose of main SI engine systems include:

- a. induction and fuel system
- b. exhaust system
- c. lubrication system
- d. cooling system
- e. ignition system
- f. starting system
- g. charging system

3.1 The operating cycles for 2 and 4 stroke engines to include to include:

- a. stages of operation - induction, compression, power and exhaust
- b. piston position and movement
- c. firing orders for 4 cylinder engine
- d. engine terminology – bore, stroke, capacity, TDC, BDC, compression ratio
- e. mixing of fuel and air

3.2 Valve and ignition timing to include:

- a. piston position when opening and closing valves
- b. piston position for timing of spark
- c. need to vary ignition timing with increase in engine speed

3.3 Air fuel mixture to include:

- a. stoichiometric air/fuel ratio
- b. weak mixture
- c. rich mixture
- d. lambda

3.4 Exhaust emission to include

- a. environmental and health concerns for exhaust emissions
- b. exhaust gas emissions – H<sub>2</sub>O, N, CO<sub>2</sub>, CO, HC, NO<sub>x</sub>

4.1. The data used for SI engine maintenance to include:

- a. vehicle manufacturer's repair instructions
- b. vehicle manufacturer's engine specifications
- c. torque settings
- d. fluid types and quantities

4.2. Correct procedures when removing and refitting SI cylinder head to include:

- a. using appropriate PPE and VPE
- b. storage and protection of components
- c. disabling engine when appropriate
- d. logical working sequence
- e. correct selection and use of tools and equipment
- f. locating and using correct information and data
- g. correct setting and adjustment of components
- h. awareness of others
- i. care of vehicle

4.3 Procedure for reinstatement of engine to include:

- a. reinstate vehicle owners property
- b. removal of VPE
- c. adjustments following refitting
- d. cleaning vehicle of grease and oil marks
- e. check function of engine operation(rotation of engine by hand)
- f. check for engine for leaks

<b>UNIT REF: L104</b>	<b>UNIT TITLE: COMPRESSION IGNITION ENGINE SYSTEMS, COMPONENTS AND OPERATION</b>
-----------------------	--

<b>Level: 1</b>	<b>Route: Foundation Learning</b>
<b>Credit Value: 4</b>	
<b>Guided Learning Hours: 30</b>	
<b>Rationale:</b> This unit introduces learners to the principles of CI engine systems, components and operation and includes the requirements for carrying out routine engine maintenance.	

<p><b>LEARNING OUTCOMES</b></p> <p><b>The learner will:</b></p> <ol style="list-style-type: none"> <li>1. Be able to work safely on CI engines</li> <li>2. Know CI engine systems and components</li> <li>3. Understand how CI engines operate</li> <li>4. Be able to remove and refit a CI engine cylinder head</li> </ol>
---

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely on CI engines	1.1 Use appropriate PPE and VPE when working on CI engines  1.2 Use appropriate and safe working practices when working on CI engine mechanical systems
2. Know CI engine systems and components	2.1 Identify the main components used in CI engines  2.2 State the purpose and function of the main components used in CI engines  2.3 Outline the purpose of the systems used in CI engines
3. Understand how CI engines operate	3.1 State the operating cycles of the 2 and 4 stroke CI engine  3.2 Give examples of the valve and injection timing requirements for 4 stroke CI engines  3.3 State how air to fuel ratios differ from SI engines during different situations  3.4 Identify the constituents of CI exhaust gas emissions and their effects on the environment

4. Be able to remove and refit a CI engine cylinder head	4.1 Select the correct technical data for CI engine maintenance  4.2 Demonstrate the correct procedures when removing and refitting an CI engine cylinder head from a non running stand engine  4.3 Demonstrate the correct procedures for reinstating the engine and vehicle after CI engine maintenance
--	---

**Content to include:**

1.1. PPE to include:

- a. overalls
- b. protective and safety gloves
- c. protective footwear
- d. goggles

VPE protection to include:

- a wing covers
- b seat covers
- c carpet protection

1.2. Appropriate and safe working practices to include:

- a removal and/or storage of owners property from vehicle
- b immobilising engine
- c ensuring handbrake is applied
- d follow logical sequence of working
- e use safe working practices
- f select and use correct tools and equipment

1.3. Disposal of waste materials to include:

- a. disposal of waste oil
- b. disposal of waste materials – filters, rags
- c. disposal of old engine components

2.1. The main engine components to include:

- a cylinder block
- b cylinder head
- c engine sump
- d crankshaft
- e connecting rods
- f pistons and rings
- g camshaft
- h valves
- i inlet and exhaust manifolds
- j turbocharger
- k flywheel
- l front drive pulley
- m gaskets and seals

2.2. Purpose and function of main components to include:

- a cylinder block
- b cylinder head
- c engine sump
- d crankshaft
- e piston and rings
- f connecting rod
- g flywheel
- h camshaft

- i inlet and exhaust valves
- j inlet and exhaust manifolds
- k turbocharger
- l gaskets and seals

2.3. Function of main CI engine systems include:

- a. induction system and turbocharger
- b. low and high pressure fuel system
- c. exhaust system
- d. lubrication system
- e. cooling system
- f. starting system
- g. charging system

3.1. The operating cycles for 2 and 4 stroke CI engines to include to include:

- a stages of operation - induction, compression, power and exhaust
- b piston position and movement
- c firing orders for 4 cylinder engine
- d engine terminology – bore, stroke, capacity, TDC, BDC, compression ratio, direct injection, indirect injection
- e mixing of fuel and air

3.2. Valve and injection timing to include:

- a piston position when opening and closing valves
- b piston position for timing of injection

3.3. Air to fuel ratios differ from SI engine to include:

- a. creation of swirl, squish and turbulence of air
- b. atomising of fuel, high pressure fuel injection
- c. basic action of turbocharger
- d. wider range of air/fuel ratios

3.4 Exhaust emissions to include

- a. environmental and health concerns for vehicle exhaust emissions
- b. exhaust gas emissions – H<sub>2</sub>O, O, N, CO<sub>2</sub>, CO, HC, NO<sub>x</sub>, particulates

4.1. The data used for CI engine maintenance to include:

- a. vehicle manufacturer's repair instructions
- b. vehicle manufacturer's repair instructions
- c. torque settings
- d. fluid types and quantities

4.2. Correct procedures when removing and refitting CI cylinder head to include:

- a. using appropriate PPE and VPE
- b. storage and protection of components
- c. disabling engine when appropriate
- d. logical working sequence
- e. correct selection and use of tools and equipment
- f. locating and using correct information and data
- g. correct setting and adjustment of components
- h. awareness of others
- i. care of vehicle

4.3. Procedure for reinstatement of engine to include:

- a. reinstate vehicle owners property
- b. removal of VPE
- c. adjustments following refitting
- d. cleaning vehicle of grease and oil marks
- e. check function of engine operation (rotation of engine by hand)
- f. check for engine for leak

<b>UNIT REF: VF01K</b>	<b>UNIT TITLE: KNOWLEDGE IN INSPECTION, REPAIR AND REPLACEMENT OF STANDARD LIGHT VEHICLE TYRES</b>
------------------------	--

<b>Level: 1</b>	<b>Route: Knowledge</b>	<b>Credit Value: 3</b>	<b>GLH: 24</b>
-----------------	-------------------------	------------------------	----------------

**Mapping:** This unit is mapped to the IMI NOS VF01

**Rationale:** This unit will help the learner to develop knowledge of inspecting, fitting, repairing and maintaining standard light vehicle tyres and wheels.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Know about light vehicle standard tyre's, legislation and special workplace procedures	1.1. State the main purpose of tyres 1.2. Identify the different types of standard light vehicle wheel and rim construction 1.3. Identify the types and application of light vehicle tyre construction. 1.4. State the legal requirements for light vehicle tyres. 1.5. State the relevant parts of the British and European Standard for the repair of light vehicle tyres 1.6. Give examples of how to deal with specialist waste materials in their workplace.
2. Know about the tools and equipment used when working with light vehicle tyres	2.1. List the tools and equipment used when working with standard light vehicle tyres. 2.2. State specialist maintenance requirements of wheel balancing and tyre removal and refitting machinery
3. Know about materials used in the repair of light vehicle tyres	3.1. State the types of repair materials available and when they would be used.
4. Know about the inspection, removal and replacement of light vehicle tyres	4.1. State the meaning of markings on standard light vehicle tyres. 4.2. State the inspection and fault identification methods and procedures associated with light vehicle tyres. 4.3. Give examples of the common faults associated with standard light vehicle tyres and wheels. 4.4. Describe standard light vehicle tyre, wheel and valve removal and refitting methods and procedures. 4.5. Outline the principles of interchanging tyres or wheels 4.6. Outline the principles of wheel balancing. To include: <ul style="list-style-type: none"> <li>a. static balancing</li> <li>b. dynamic balancing</li> </ul>



**Content****Types of tyre construction to include:**

- a. Radial
- b. Cross ply
- c. Bias belted
- d. Directional
- e. Asymmetric

**Main purpose of tyres**

- a. Interaction between tyres, other components and vehicle handling
- b. Steering, drive and suspension
- c. Passenger comfort

**Types of standard light vehicle wheel and rim construction**

- a. Light alloy, pressed steel and wire wheels
- b. Standard and safety rims

**Markings on standard light vehicle tyres.**

- a. Speed rating
- b. Size Markings
- c. Aspect ratio
- d. Load handling
- e. Ply rating
- f. Tread wear indicators
- g. EC markings and specialist application markings e.g. 'M&S'

**Inspection and fault identification methods and procedures**

- a. Inspection:
  - i. on the rim visual (external)
  - ii. removed from wheel (internal)
- b. Use of tread depth indicators, tyre probes and pressure gauges
- c. Information sources including tyre and vehicle manufacturers' technical data

**Limits of standard light vehicle tyre wear and serviceability.**

- a. Tread depth and tyre damage
- b. Limitations under BS159 and Construction & Use Regulations
- c. Tyre pressure and maintenance requirements
- d. Suitability for minor repairs

**Common faults associated with standard light vehicle tyres and wheels.**

- a. Excessive tyre wear and abnormal tread wear patterns (centre, outer edges, worn patches)
- b. Damage to tread or side walls
- c. Bulging, separation of tread, carcass distortion,
- d. Impact damage, wheels running out of true, buckled wheels
- e. Incorrect tyre pressure
- f. Wrong tyre for vehicle or run flat

**Content contd****Methods and materials used in the repair of standard light vehicle tyres.**

- a. Tyre inspection
- b. Damage limitation
- c. Accurate measurement
- d. Repair techniques and methods:
  - i. preparation of tyre
  - ii. mechanical and chemical buffing
- e. Repair materials:
  - i. plug patch
  - ii. patch and filler
  - iii. solutions and chemicals.
- e. Economic use of materials
- f. Correct storage of materials (including shelf life)
- g. Repair Materials:
  - i. rubber only plug patch
  - ii. rubber only patch and filler material
  - iii. solutions and chemicals

**Tools and equipment used to include:**

- a. Lifting and supporting equipment
- b. Tyre fitting and removal tools and machinery
- c. Hand tools
- d. Tyre repair tools
- e. Measuring equipment
- f. Wheel balancing equipment
- g. Tyre inflation equipment

**Principles of interchanging tyres/wheels**

- a. Over sizing tyre/wheel fitment
- b. Longitudinal and diagonal
- c. Mixing radial, cross-ply and bias-belted tyres on same axle or different axles

**Removal and fitting methods to include:**

- a. Tyre sidewall fitting instructions
- b. Vehicle protection
- c. Use of hand and impact tools
- d. Correct tyre inflation
- e. Final inspection

**Dealing with waste materials including:**

- a Scrapped tyres
- b Repair materials
- c Wheel weights

**Legal Requirements to include:**

- a. Tread depth
- b. Tyre wall and casing damage
- c. Tyre pressure
- d. Mixing of tyre types
- e. Re-grooving legislation

<b>UNIT REF: VF01S</b>	<b>UNIT TITLE: SKILLS IN INSPECTION, REPAIR AND REPLACEMENT OF STANDARD LIGHT VEHICLE TYRES</b>
------------------------	---

<b>Level: 1</b>	<b>Route: Skills</b>	<b>Credit Value: 46</b>	<b>GLH: 5</b>
<b>Mapping: This unit is mapped to the IMI NOS VF01</b>			
<b>Rationale:</b> This unit will enable the learner to develop the skills required to inspect, fit, repair and maintain standard light vehicle tyres.			

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely when carrying out removal and replacement activities	1.1 Use suitable personal protective equipment and vehicle coverings when working on vehicles  1.2. Work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
2. Be able to use light vehicle tyre inspection techniques	2.1. Carry out inspection of wheels and tyres using appropriate techniques, suitable tools, equipment and manufacturers instructions where relevant. To include: a visual inspection b measurement of tread depth c tyre pressures d balance
3. Be able to carry out the repair and replacement of standard light vehicle tyres	3.1. Carry out tyre repair activities within appropriate timescales, using: a suitable tools and equipment b correct repair and replacement techniques c correct type and size of replacement components d correct materials  3.2. Carry out tyre replacement activities within appropriate timescales
4. Be able to balance wheels and carry out final checks on the vehicle	4.1. Carry out wheel balancing to within acceptable limits  4.2. Carry out final vehicle safety checks in the workshop, prior to releasing the vehicle to the customer
5. Be able to record information and make suitable recommendations	5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required  5.2. Make suitable and justifiable recommendations for cost effective repairs  5.3. Record and report any additional faults noticed during the course of their work promptly in the format required

## EVIDENCE REQUIREMENTS

1. <b>You must</b> produce evidence of inspecting wheel, tyre and valve assemblies and the removal and replacement or refitting of <b>at least 1 of the 3 types of tyre</b> listed below on <b>at least 2</b> occasions
<ul style="list-style-type: none"><li>• radial</li><li>• cross ply</li><li>• bias belted</li></ul>
2. <b>You must</b> produce evidence of repairing <b>at least 1 of the 3 types of tyre</b> listed above.
3. <b>You must</b> produce evidence of balancing <b>at least 2</b> wheels to manufacturers' tolerances
4. <b>You must</b> produce evidence of carrying out final safety checks on a vehicle prior to release

<b>UNIT REF: VF02K</b>	<b>UNIT TITLE: KNOWLEDGE OF INSPECTION, REPAIR AND REPLACEMENT OF HIGH PERFORMANCE LIGHT VEHICLE TYRES</b>
------------------------	--

<b>Level: 2</b>	<b>Route: Knowledge</b>	<b>Credit Value: 3</b>	<b>GLH: 24</b>
-----------------	-------------------------	------------------------	----------------

**Mapping:** This unit is mapped to the IMI NOS VF02

**Rationale:** This unit enables the learner to develop knowledge of inspection, fitting, repairing and maintaining high performance light vehicle tyres.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Understand high performance light vehicle wheel and tyre construction, legislation and special workplace procedures	1.1. Describe the purpose, function and construction of high performance light vehicle wheels and tyres.  1.2. Describe the types and functions of pressure monitoring systems  1.3. Describe the current legal requirements for high performance light vehicle tyres.  1.4. Describe the relevant parts of the British and European Standard for the repair of high performance light vehicle tyres  1.5. Give examples of how to deal with specialist waste materials in their workplace.
2. Understand the tools and equipment used when working with high performance light vehicle tyres	2.1. Give examples of how to select, prepare, and use tools and equipment appropriate to working with high performance light vehicle tyres  2.2. Describe specialist maintenance requirements of wheel balancing and tyre removal and refitting machinery
3. Understand the materials used in the repair of high performance light vehicle tyres	3.1. Describe the types of repair materials available and when it is permissible for them to be used.

<p>4. Understand how to inspect, remove, repair and replace high performance light vehicle tyres</p>	<p>4.1. Describe the different types of valve construction used with high performance light vehicle tyres and their installation techniques</p> <p>4.2. Give examples of the meanings of markings used on standard and high performance light vehicle tyres and where these can be found.</p> <p>4.3. Describe the inspection and fault identification methods and procedures associated with high performance light vehicle tyres.</p> <p>4.4. Give examples of the common faults associated with high performance light vehicle tyres and wheels.</p> <p>4.5. Describe high performance light vehicle tyre and wheel removal, replacement and refitting methods and procedures.</p> <p>4.6. Describe the principles of wheel balancing. To include:</p> <ul style="list-style-type: none"><li>i. static balancing</li><li>ii. dynamic balancing</li></ul>
--	---

**Content:****Tyres are**

- a Directional tread
- b Asymmetric tread
- c Composite tread
- d High speed ratings (V,W,Y or ZR ratings)
- e An aspect ratio of 55% or below
- f Run flat capability

**Main function of tyres**

- a. Interaction between tyres, other components and vehicle handling
- b. Steering, drive and suspension
- c. Passenger comfort

**Types of standard and high performance light vehicle wheel and rim construction**

- a. Light alloy, pressed steel and wire wheels
- b. Standard and safety rims (runflat)
- c. Asymmetric rims
- d. Space saver rims

**Markings on standard light vehicle tyres.**

- a. Speed rating
- b. Size Markings
- c. Aspect ratio
- d. Load handling
- e. Ply rating
- f. Tread wear indicators
- g. EC markings and specialist application markings e.g. 'M&S'

**Inspection and fault identification methods and procedures**

- a. Inspection:
  - i. on the rim visual (external)
  - ii. removed from wheel (internal)
- b. Use of tread depth indicators, tyre probes and pressure gauges
- c. Information sources including tyre and vehicle manufacturers' technical data and the importance of accurate measurements
  - i. the importance of accurate fault identification
  - ii. the importance of accurate adjustments

**Limits of standard light vehicle tyre wear and serviceability.**

- a. Tread depth and tyre damage
- b. Limitations under BS159 and Construction & Use Regulations
- c. Tyre pressure and maintenance requirements
- d. Suitability for minor repairs

**Common faults associated with standard light vehicle tyres and wheels.**

- a Excessive tyre wear and abnormal tread wear patterns (centre, outer edges, worn patches)
- b Damage to tread or side walls
- c Bulging, separation of tread, carcass distortion,
- d Impact damage, wheels running out of true, buckled wheels
- e Incorrect tyre pressure
- f Wrong tyre for vehicle or run flat

**Content: contd****Methods and materials used in the repair of standard light vehicle tyres.**

- a. Tyre inspection
- b. Damage limitation
- c. Accurate measurement
- d. Repair techniques and methods:
  - i. preparation of tyre
  - ii. mechanical and chemical buffing
- e. Repair materials:
  - i. plug patch
  - ii. patch and filler
  - iii. solutions and chemicals.
- f. Economic use of materials
- g. Correct storage of materials (including shelf life)

**Principles of interchanging tyres/wheels**

- a. Over sizing tyre and wheel fitment
- b. Longitudinal and diagonal
- c. Mixing radial, cross-ply and bias-belted tyres on same axle or different axles
  - i. lifting and supporting equipment
  - ii. tyre fitting and removal tools and machinery
  - iii. hand tools
  - iv. tyre repair tools
  - v. measuring equipment
  - vi. wheel balancing equipment
  - vii. tyre inflation equipment

**Dealing with waste materials including**

- a Scrapped tyres
- b Wheel weights
- c Waste repair materials

**Removal and fitting methods**

To include:

- a. Tyre sidewall fitting instructions
- b. Vehicle protection
- c. Use of hand and impact tools
- d. Correct tyre inflation
- e. Final inspection

**Legal requirements to include:**

- a Tread depth
- b Tyre wall and casing damage
- c Tyre pressure
- d Mixing of tyre types
- e Correct fitting



<b>UNIT REF: VF02S</b>	<b>UNIT TITLE: SKILLS IN INSPECTION, REPAIR AND REPLACEMENT OF HIGH PERFORMANCE LIGHT VEHICLE TYRES</b>
------------------------	---

<b>Level: 2</b>	<b>Route: Skills</b>	<b>Credit Value: 4</b>	<b>GLH: 36</b>
<b>Mapping: This unit is mapped to the IMI NOS VF02</b>			
<b>Rationale:</b> This unit will enable the learner to develop the skills required to inspect, fit, repair and maintain high performance light vehicle tyres.			

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely when carrying out removal and replacement activities	1.1. Use suitable personal protective equipment and vehicle coverings when working on vehicles 1.2. Work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
2. Be able to inspect high performance light vehicle tyres	2.1. Inspect light vehicle wheels and tyres using suitable tools, sources of information, and equipment. To include: a visual inspection b measurement of tread depth c tyre pressures d balance
3. Be able to repair and replace high performance light vehicle tyres	3.1. Carry out tyre repair activities within appropriate timescales, using: a suitable tools and equipment b correct repair and replacement techniques c correct type and size of replacement components d correct materials 3.2. Carry out tyre replacement activities within appropriate timescales
4. Be able to balance wheels and tyres and carry out final checks on high performance light vehicles	4.1. Carry out wheel balancing to within acceptable limits 4.2. Carry out final vehicle safety checks in the workshop, prior to releasing the vehicle to the customer
5. Be able to record information and make suitable recommendations	5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required 5.2. Make suitable and justifiable recommendations for cost effective repairs 5.3. Record and report any additional faults noticed during the course of their work promptly in the format required

## EVIDENCE REQUIREMENTS

1. <b>You must</b> produce evidence of inspecting wheel, tyre and valve assemblies and the removal and replacement or refitting of <b>at least 2 of the 5 types of tyre</b> listed below. Those:
• with high speed ratings, for example V, W, Y, or Z.(nb as before in k)
• having and aspect ratio of 55% or below
• with run flat capability
• with directional and asymmetric tread patterns
• with composite tread patterns
2. <b>You must</b> produce evidence of repairing <b>at least 1 of the 5 types of tyre</b> listed above.
3. <b>You must</b> produce evidence of balancing a wheel and tyre assembly to manufacturers' tolerances.

<b>UNIT REF: VF07K</b>	<b>UNIT TITLE: KNOWLEDGE OF LIGHT VEHICLE FOUR WHEEL ALIGNMENT</b>
------------------------	--

Level: 2	Route: Knowledge	Credit Value: 3	GLH: 24
----------	------------------	-----------------	---------

**Mapping:** This unit is mapped to the IMI NOS VF07

**Rationale:** This unit enables the learner to develop knowledge of testing and adjusting light vehicle four wheel alignment

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Understand steering and suspension system principles	1.1. Describe the Ackerman principle 1.2. Describe the principles of steering and suspension and their effects on tyre wear and vehicle handling 1.3. Describe the purpose, function and location of steering and suspension components and how wear can affect wheel alignment 1.4. Give examples of abnormal tyre wear associated with misalignment
2. Understand how to measure four wheel alignment	2.1. Describe appropriate specialist tools, their selection and calibration when measuring four wheel alignment 2.2. Describe pre-checks to be applied to the vehicle prior to measuring four wheel alignment 2.3. Describe how to find and use vehicle data relating to working tolerances on four wheel alignment 2.4. Explain the importance of and how to take and record accurate measurements
3. Understand how to adjust four wheel alignment	3.1. Describe the use of appropriate specialist tools, when adjusting four wheel alignment. 3.2. Describe four wheel alignment adjustment techniques, including the use of weights, how to apply them and record adjustments 3.3. Describe the importance of ensuring any adjustments are within acceptable tolerances for the vehicle and the possible consequences of inaccurate adjustment
4. Understand the importance of testing completed adjustments	4.1. Describe how to check that the adjusted items function correctly 4.2. Explain the importance of checking the operation of adjusted items prior to return to the customer and the implications for safety and customer satisfaction 4.3. Describe the impact of adjustment on electronic systems

**Content:****Principles of steering and suspension and their effects on tyre wear and vehicle handling including:**

- a Caster
- b Camber
- c King pin or swivel axis inclination
- d Toe out on turns
- e Thrust angle
- f Set back
- g Wheel run out
- h Axle alignment

**Four wheel alignment pre-checks cover:**

- a Tyre pressures
- b Wheel bearing and ball joint condition
- c Suspension condition and ride height
- d Vehicle loading
- e Tyre size and condition

**Four wheel alignment covers:**

- a Individual toe
- b Combined toe
- c Steering wheel position
- d Thrust angle

**Abnormal tyre wear**

- a Edge wear
- b Feathering
- c Tread wear pattern due to incorrect inflation pressures

**Equipment and tools**

- a. Hand tools
- b. Lifting and supporting equipment
- c. Specialist alignment measuring equipment
- d. Turn plates (turntables)
- e. Steering clamp

**The impact of adjustment on electronic systems to include:**

- a Tyre pressure monitoring systems (tpms)
- b Steering wheel angle sensor
- c Electronic stability programme

<b>UNIT REF: VF07S</b>	<b>UNIT TITLE: SKILLS IN LIGHT VEHICLE FOUR WHEEL ALIGNMENT</b>
------------------------	---

Level: 2	Route: Skills	Credit Value: 4	GLH: 36
----------	---------------	-----------------	---------

**Mapping:** This unit is mapped to the IMI NOS VF07

**Rationale:** This unit will enable the learner to develop the skills required to carry out testing and adjustment of four wheel alignment on light vehicles.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely when carrying out testing and adjustment activities	1.1. Use suitable personal protective equipment and vehicle coverings when working on vehicles  1.2. Work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
2. Be able to check light vehicle four wheel alignment	2.1. Perform four wheel alignment pre-checks to vehicle and equipment prior to testing  2.2. Carry out light vehicle four wheel alignment using suitable tools and equipment, carrying out calibration as appropriate  2.3. Use vehicle data relating to working tolerances. To include: a technical information b manufacturers instructions where relevant
3. Be able to adjust light vehicle four wheel alignment	3.1. Carry out adjustment activities within appropriate timescales. To include: a suitable tools and equipment b correct adjustment techniques c calibration of equipment as appropriate  3.2. Carry out final checks to ensure that adjustments and settings are within the tolerances allowed for the vehicle and conform to legal requirements, prior to releasing the vehicle to the customer
4. Be able to record information and make suitable recommendations	4.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required  4.2. Make suitable and justifiable recommendations for cost effective repairs  4.3. Record and report any additional faults noticed during the course of their work promptly in the format required

## EVIDENCE REQUIREMENTS

1. **You must** produce evidence of carrying out **checks** and **adjustments** of **four** wheel alignment on **1** vehicle.

<b>UNIT REF: VF09K</b>	<b>UNIT TITLE: KNOWLEDGE OF INSPECTION AND REPLACEMENT OF LIGHT VEHICLE EXHAUST COMPONENTS</b>
------------------------	--

<b>Level: 2</b>	<b>Route: Knowledge</b>	<b>Credit Value: 2</b>	<b>GLH: 14</b>
-----------------	-------------------------	------------------------	----------------

**Mapping: This unit is mapped to the IMI NOS VF09**

**Rationale:** This unit enables the learner to develop knowledge of the inspecting exhaust components for replacement or continued serviceability and removing replacing components identified as being faulty, damaged, deteriorated or where the customer has requested replacement.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Understand the specialist tools and equipment used when inspecting and replacing exhaust components	1.1. Describe the types, selection, safety checks and safe use of tools and equipment for the removal and replacement of exhausts  1.2. Describe how to use oxy-acetylene equipment when working on exhausts
2. Understand about exhaust system components	2.1. Describe the purpose, function, construction and layout of exhaust system components  2.2. Describe exhaust related emission control systems  2.3. Describe the legal requirements relating to exhaust systems
3. Understand how to inspect and replace exhaust systems	3.1. Describe inspection techniques for exhaust system faults and how to carry them out  3.2. Describe common faults associated with exhaust systems.  3.4. Describe the effective sequence of working when removing and replacing exhaust systems  3.5. Describe how to remove, replace or re-thread broken, damaged or seized exhaust fixings.  3.6. Describe how to check exhaust system components are functioning correctly after refitting or replacement

**Content****Tools and equipment.**

- a Oxy-acetylene cutting equipment
- b Lifting and supporting equipment
- c Hand tools
- d Special purpose tools – exhaust chain cutter, exhaust flaring dolly, thread cutting taps and dies, stud removal tools
- e Steering clamp

**Exhaust system components**

- a Front pipe and fittings
- b Silencers - composite, absorption, expansion, baffles
- c Intermediate and tail pipe - materials used in exhaust system construction: mild steel, aluminium coated, stainless steel. packing materials, joints, flexible, rigid, welded, fixings, studs, brackets, mountings.
- d Catalytic converter
- e Lambda sensor materials used in exhaust system construction: mild steel, aluminium coated, stainless steel. packing materials
- f Exhaust mountings and clamps
- g Heat shields

**Legal requirements associated with vehicle exhaust systems**

- a MOT test requirements
- b Emissions
- c Noise

**Use of oxy-acetylene equipment when working on exhausts, to include:**

- a. Straight through cuts
- b. Female from male cuts
- c. Male from female cuts
- d. Removal of seized components

**The purpose, function, construction and layout of exhaust system components, to include:**

- a. Exhaust system as a complete unit
- b. Individual components
- c. Catalytic converter
- d. Lambda sensor

**Inspection techniques for exhaust systems to include:**

- a. Visual
- b. Aural
- c. Functional test

**Check exhaust system components functionality after refitting or replacement to include the importance of:**

- a. Doing so before release to the customer
- b. Ensuring customers are advised of any running in procedures for new exhausts
- c. Checking that replacement components are of the correct type and quality for the vehicle and conform to legal requirements where relevant



<b>UNIT REF: VF09S</b>	<b>UNIT TITLE: SKILLS IN INSPECTION AND REPLACEMENT OF LIGHT VEHICLE EXHAUST COMPONENTS</b>
------------------------	---

<b>Level: 2</b>	<b>Route: Skills</b>	<b>Credit Value: 3</b>	<b>GLH: 24</b>
-----------------	----------------------	------------------------	----------------

**Mapping: This unit is mapped to the IMI NOS VF09**

**Rationale:** This unit will enable the learner to develop the skills required to inspect exhaust components for replacement or continued serviceability and removing and replacing components identified as being faulty, damaged, deteriorated or where the customer has requested replacement.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely when carrying out removal and replacement activities	1.1. Use suitable personal protective equipment and vehicle coverings when working on vehicle exhaust systems and components  1.2. Work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
2. Be able to inspect exhaust components	2.1. Inspect exhaust systems and components to identify faults using suitable tools, sources of information and equipment
3. Be able to repair and replace exhaust components	3.1. Carry out repair and replacement of exhaust components within appropriate timescales, using: <ul style="list-style-type: none"> <li>a suitable equipment and technical information</li> <li>b suitable repair and replacement techniques</li> <li>c suitable type and size of replacement components and fixings</li> <li>d suitable materials</li> </ul> 3.2. Carry out final adjustments and checks in the workshop, prior to releasing the vehicle to the customer. To include: <ul style="list-style-type: none"> <li>a correct fitment</li> <li>b correct alignment</li> <li>c leakage</li> </ul>
4. Be able to record information and make suitable recommendations	4.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required  4.2. Make suitable and justifiable recommendations for cost effective repairs  4.3. Record and report any additional faults noticed during the course of their work promptly in the format required

## EVIDENCE REQUIREMENTS

1. <b>You must</b> produce evidence of inspecting and replacing 4 out of the 6* types of exhaust components or systems listed below.
• complete exhaust system
• part exhaust system
• catalytic converter
• lambda sensor
• studs and nuts
• mountings and clamps
2. <b>You must</b> produce evidence of using 2 of the 4* types of tools or equipment listed below.
• hand tools
• special purpose tools
• lifting and supporting equipment
• cutting or heating equipment

<b>UNIT REF: VF10K</b>	<b>UNIT TITLE: KNOWLEDGE OF INSPECTION, TESTING AND REPLACEMENT OF VEHICLE BATTERIES AND RELATED COMPONENTS</b>
------------------------	---

<b>Level: 2</b>	<b>Route: Knowledge</b>	<b>Credit Value: 2</b>	<b>GLH: 18</b>
-----------------	-------------------------	------------------------	----------------

<p><b>Mapping:</b> This unit is mapped to the IMI NOS VF10</p> <p><b>Rationale:</b> This unit enables the learner to develop knowledge of carrying out tests which identify faulty batteries, and then the removal and replacement of them. This can be on light vehicles, medium and large goods vehicles, motorcycles, mopeds and scooters.</p>
---

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<p><b>The Learner will:</b></p>	<p><b>The Learner can:</b></p>
<p>1. Understand the tools and equipment used when inspecting, testing and replacing vehicle batteries</p>	<p>1.1. Explain the selection, function and safe use of battery testing equipment</p> <p>1.2. Describe code saving devices and how and when to use them</p>
<p>2. Understand the different types of vehicle battery and charging system</p>	<p>2.1. Describe the purpose, function and layout of automotive batteries and charging systems.</p> <p>2.2. Describe battery ratings and the circumstances in which differently rated batteries should be fitted</p> <p>2.3. Describe legal requirements relating to storage, selection and disposal of vehicle batteries and components</p>
<p>3. Understand how to inspect, test and replace light vehicle batteries</p>	<p>3.1. Describe fault identification methods and procedures and safe testing techniques associated with batteries and components</p> <p>3.2. Describe the common faults associated with batteries and charging systems</p> <p>3.3. Describe safe removal and replacement procedures associated with batteries and components.</p> <p>3.4. Describe how to check drive belt adjustment</p> <p>3.5. Describe how to check that batteries and components are:</p> <ul style="list-style-type: none"> <li>a functioning correctly after refitting or replacement.</li> <li>b of the correct type and quality for the vehicle and conform to legal requirements where relevant</li> </ul>

**Content**

**The selection, function and safe use of battery testing equipment, to include:**

- a. Voltmeter
- b. Multi-meter
- c. Hydrometer
- d. Battery condition tester

**Batteries and components are:**

- a. Automotive batteries
- b. Battery connections
- c. Battery supports
- d. Battery hold down devices
- e. Generators
- f. Drive belts

**Types of batteries are:**

- a. Standard batteries
- b. Low maintenance batteries
- c. Maintenance free batteries
- d. Gel filled batteries
- e. Smart charging

**Generators can be:**

- a. Alternators
- b. Dynamos
- c. Magnetos

**Tools used for testing and maintenance to include:**

- a. Hydrometer
- b. Volt meter
- c. Ammeter
- d. High rate discharge meter
- e. Battery chargers
- f. Battery savers

**Testing of batteries and charging systems**

- a. Electrolyte level low
- b. Terminal connections loose or corroded
- c. Drive belt slipping
- d. Alternator or generator not charging at the correct output (meter check )
- e. Faulty alternator or voltage regulator
- f. Specific gravity low or high

- a. Health and safety equipment Personal protection
- b. Electrolyte filling and health and safety requirements
- c. Correct disposal of waste
- d. Working to agreed timescales
- e. Keeping others informed of progress and referral of problems
- f. Storage and maintenance of battery stock
- g. Logical sequence for disconnecting and connecting

**Fault identification methods and procedures for batteries and components, to include:**

- a. Visual
- b. Aural
- c. Use of hand held test equipment
- d. Use of battery manufacturer's test equipment

**Common faults associated with batteries and charging systems, to include:**

- a. Internal battery faults
- b. Charging faults
- c. Drive belt faults
- d. Wiring or connection faults
- e. Battery mounting faults
- f. Battery terminal and casing faults

<b>UNIT REF: VF10S</b>	<b>UNIT TITLE: SKILLS IN INSPECTION, TESTING AND REPLACEMENT OF VEHICLE BATTERIES AND RELATED COMPONENTS</b>
------------------------	--

<b>Level: 2</b>	<b>Route: Skills</b>	<b>Credit Value: 3</b>	<b>GLH: 24</b>
-----------------	----------------------	------------------------	----------------

**Mapping: This unit is mapped to the IMI NOS VF10**

**Rationale:** This unit will enable the learner to develop the skills required to carry out tests which identify faulty batteries, and then the removal and replacement of them. This can be on light vehicles, medium and large goods vehicles, motorcycles, mopeds and scooters.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely when carrying out testing and replacement activities	1.1. Use suitable personal protective equipment and vehicle coverings when working on vehicles  1.2. Work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
2. Be able to inspect and test batteries and components	2.1. Inspect and test batteries, charging systems and associated components using suitable tools, sources of information and equipment
3. Be able to remove and replace batteries and components	3.1. Perform battery removal and replacement activities within appropriate timescales, using: <ul style="list-style-type: none"> <li>a suitable equipment and technical information</li> <li>b suitable removal and replacement techniques</li> <li>c suitable type and size of replacement components and fixings</li> </ul> 3.2. Perform final battery and component checks in the workshop, prior to releasing the vehicle to the customer.
4. Be able to record information and make suitable recommendations	4.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required  4.2. Make suitable and justifiable recommendations for cost effective repairs  4.3 Record and report any additional faults noticed during the course of their work promptly in the format required

## EVIDENCE REQUIREMENTS

1. <b>You must</b> produce evidence of inspection and test activities on <b>1 occasion</b> to cover <b>all</b> of the battery and component items listed below, using <b>2</b> out of the <b>3*</b> types of inspection and testing techniques shown:
<ul style="list-style-type: none"> <li>• automotive batteries</li> </ul>
<ul style="list-style-type: none"> <li>• battery connections</li> </ul>
<ul style="list-style-type: none"> <li>• battery supports</li> </ul>
<ul style="list-style-type: none"> <li>• battery hold down devices</li> </ul>
<ul style="list-style-type: none"> <li>• generators</li> </ul>
<ul style="list-style-type: none"> <li>• drive belts</li> </ul>
<b>Inspection and Testing techniques – use of:</b>
<ul style="list-style-type: none"> <li>• visual / aural methods</li> </ul>
<ul style="list-style-type: none"> <li>• hand held diagnostic equipment</li> </ul>
<ul style="list-style-type: none"> <li>• battery testing equipment</li> </ul>
2. <b>You must</b> produce evidence of replacing a battery on <b>at least 1 occasion</b>
3. <b>You must</b> produce evidence of inspecting and testing a <b>generator</b> .

<b>UNIT REF: VF11K</b>	<b>UNIT TITLE: KNOWLEDGE OF INSPECTION AND REPLACEMENT OF LIGHT VEHICLE SUSPENSION DAMPERS AND SPRINGS</b>
------------------------	--

<b>Level: 2</b>	<b>Route: Knowledge</b>	<b>Credit Value: 2</b>	<b>GLH: 14</b>
<b>Mapping: This unit is mapped to the IMI NOS VF11</b>			
<b>Rationale:</b> This unit enables the learner to develop knowledge of the inspection and replacement of suspension dampers and springs using a variety of equipment and testing techniques.			

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Understand the tools and equipment used when inspecting and replacing light vehicle suspension dampers and springs	1.1. Describe the selection, safety checks and safe use of tools and equipment for the replacement of suspension dampers and springs
2. Understand the different types of suspension dampers and springs	2.1. Describe the types, purpose, function and location of light vehicle suspension dampers and springs. 2.2. Describe legal requirements relating to light vehicle dampers and springs
3. Understand how to inspect, test and replace suspension dampers and springs	3.1. Describe safe testing techniques and procedures associated with suspension dampers and springs 3.2. Describe the common faults associated with light vehicle suspension dampers and springs 3.3. Describe safe removal and replacement procedures associated with light vehicle suspension dampers and springs. 3.4. Describe how to check camber setting and road wheel alignment 3.5. Describe how to check that components are: a functioning and adjusted correctly after refitting or replacement. b of the correct type and quality for the vehicle and conform to legal requirements where relevant

**Content****Tools and equipment:**

- a. Hand tools
- b. Lifting and supporting equipment
- c. Specialist tools

**Fault identification methods and procedures for suspension dampers and springs, to include:**

- a. Visual
- b. Aural
- c. Damper operation (bounce test)

**Suspension may include:**

- a. Telescopic,
- b. Lever arm
- c. Semi strut and MacPherson strut
- d. Gas assisted
- e. Coil spring
- f. Leaf spring
- g. Torsion bar
- h. Rubber
- i. Hydragas
- j. Torsion bar
- k. Hydromatic

**Special purpose tools may include:**

- a. Spring compressors
- b. Strut guide
- c. Strut insert retainer tools
- d. Ball joint separators

**Purpose and function of light vehicle suspension dampers.**

- a. Damping effect.
  - b. Passenger comfort.
  - c. Road holding.
- 
- a. Personal protection
  - b. Dangers and precautions to be taken when using spring compressors
  - c. Correct disposal of waste
  - d. Working to agreed timescales
  - e. Keeping others informed of progress and referral of problems
  - f. Priming of dampers

**Common faults associated with light vehicle suspension dampers and springs, including:**

- a. Wear
- b. Leakage
- c. Damage
- d. Corrosion
- e. Deterioration (rubber components)



<b>UNIT REF: VF11S</b>	<b>UNIT TITLE: SKILLS IN INSPECTION AND REPLACEMENT OF LIGHT VEHICLE SUSPENSION DAMPERS AND SPRINGS</b>
------------------------	---

<b>Level: 2</b>	<b>Route: Skills</b>	<b>Credit Value: 3</b>	<b>GLH: 24</b>
-----------------	----------------------	------------------------	----------------

**Mapping:** This unit is mapped to the IMI NOS VF11

**Rationale:** This unit will enable the learner to develop the skills required to carry out the inspection, testing and replacement of suspension dampers and springs using a variety of equipment and testing techniques.

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely when carrying out removal and replacement activities	1.1. Use suitable personal protective equipment and vehicle coverings when working on vehicle suspension systems and components  1.2. Work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
2. Be able to inspect and test light vehicle suspension dampers and springs	2.1. Inspect and test suspension dampers and springs using suitable tools, sources of information and equipment
3. Be able to remove and replace light vehicle suspension dampers and springs	3.1. Perform removal and replacement activities within appropriate timescales, using: <ul style="list-style-type: none"> <li>a suitable equipment and technical information</li> <li>b suitable removal and replacement techniques</li> <li>c suitable type and size of replacement components and fixings</li> </ul> 3.2. Carry out wheel alignment checks and adjustments as appropriate before release to the customer  3.3. Perform final suspension damper and spring function checks in the workshop, prior to releasing the vehicle to the customer.
4. Be able to record information and make suitable recommendations	4.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required  4.2. Make suitable and justifiable recommendations for cost effective repairs  4.3. Record and report any additional faults noticed during the course of their work promptly in the format required

## EVIDENCE REQUIREMENTS

1. <b>You must</b> produce evidence of inspecting, testing and replacing <b>2</b> out of the <b>8</b> types of suspension dampers and springs listed below on at least <b>1</b> occasion.
• Telescopic,
• Lever arm
• Semi / MacPherson strut
• Gas assisted
• Coil spring
• Leaf spring
• Torsion bar
• Rubber
2. <b>You must</b> be observed on completing the inspection, removal and replacement of a suspension damper and spring using specialist tools and equipment as appropriate.

<b>UNIT REF: VF12K</b>	<b>UNIT TITLE: KNOWLEDGE OF INSPECTION, ADJUSTMENT AND REPLACEMENT OF LIGHT VEHICLE BRAKING SYSTEMS AND COMPONENTS</b>
------------------------	--

<b>Level: 2</b>	<b>Route: Knowledge</b>	<b>Credit Value: 2</b>	<b>GLH: 18</b>
<b>Mapping: This unit is mapped to the IMI NOS VF12</b>			
<b>Rationale:</b> This unit enables the learner to develop knowledge of the inspection, adjustment and replacement of light vehicle braking systems			

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Understand the tools and equipment used when inspecting, adjusting and replacing light vehicle braking system components	1.1. Describe the selection, safety checks and safe use of tools and equipment for the inspection, adjustment and replacement of light vehicle braking system components
2. Understand the different types of light vehicle braking systems and components	2.1. Describe the purpose, function and layout of typical light vehicle braking systems. 2.2. Describe legal requirements relating to light vehicle braking systems 2.3. Describe how to identify electronic braking systems.
3. Understand how to inspect, test, adjust and replace light vehicle braking systems and components	3.1. Describe safe inspection and testing techniques and procedures associated with braking systems 3.2. Describe the common faults associated with light vehicle braking systems 3.3. Describe safe removal and replacement procedures associated with light vehicle braking system components referral of problems 3.4. Describe how to make adjustments to braking systems 3.5. Describe how to check that components are: <ul style="list-style-type: none"> <li>a functioning and adjusted correctly after refitting or replacement.</li> <li>b of the correct type and quality for the vehicle and conform to legal requirements where relevant</li> </ul>

**Content****Tools and equipment**

- a. Hand tools
- b. Special purpose tools
- c. Lifting and supporting equipment
- d. Brake bleeding equipment
- e. Measuring equipment

**Inspection and testing techniques for braking systems**

- a. Visual
- b. Aural
- c. Measurement
- d. Functional

**Common Faults with light vehicle braking systems, to include:**

- a. Wear
- b. Leakage
- c. Damage
- b. Corrosion

**Removal and replacement of light vehicle braking systems and components, to include:**

- a. Dangers and precaution to be taken when working with brake dust
- b. Correct disposal of waste
- c. Working to agreed timescales
- d. Keeping others informed of progress

**Function and layout of braking systems**

- a Hydraulic braking circuit
- b Types of braking systems: disc/pad, drum/shoe, servo assisted, shoe/shoe, twin leading and leading trailing
- c Components: master cylinders, servos, brake pads and shoes, calipers, wheel cylinders and backing plates
- d Pipes, cables and servos
- e Brake fluid (including testing)
- f Equalising valves, load sensing valves and vacuum/pressure pumps
- g Warning lights
- h How to identify ABS braking systems

**Hydraulic systems.**

- a Single line
- b Multi line (diagonal, triangular and 'H')

**Electronic braking systems:**

- a Anti-skid (lock) braking systems
- b Electronic brake distribution
- c Parking brakes

**Special purpose tools:**

- a. Piston retracting tools
- b. Wind back tools
- c. Brake shoe horn (lifter)
- d. Brake shoe clip remover
- e. Brake fluid testers
- f. Brake hose clamps
- g. Brake adjusting tools
- h. Brake bleeding equipment

**Content****Braking system faults**

- a Excessive pedal travel
- b Brake judder
- c Excessive pedal pressure
- d Imbalance/pull
- e Premature deterioration
- f Brakes binding
- g Brake fade.
- h Failed servo
- i Air in system

**Fault identification**

- a Inspection-visual, aural and measurement
- b Test drive/roller brake test
- c Questioning
- d Dismantling
- e Information sources (including manufacturers' technical data)
- f Limits of wear and serviceability

<b>UNIT REF: VF12S</b>	<b>UNIT TITLE: SKILLS IN INSPECTION AND REPLACEMENT OF LIGHT VEHICLE BRAKING SYSTEMS AND COMPONENTS</b>
------------------------	---

<b>Level: 2</b>	<b>Route: Skills</b>	<b>Credit Value: 4</b>	<b>GLH: 32</b>
<b>Mapping: This unit is mapped to the IMI NOS VF12</b>			
<b>Rationale:</b> This unit will enable the learner to develop the skills required to carry out the inspection of light vehicle braking systems and the replacement and adjustment of braking system components.			

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely when carrying out removal and replacement activities	1.1. Use suitable personal protective equipment and vehicle coverings when working on vehicles  1.2. Work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
2. Be able to inspect and test light vehicle braking systems	2.1. Inspect and test braking systems using suitable tools, sources of information and equipment
3. Be able to replace light vehicle braking system components	3.1. Carry out removal and replacement activities within appropriate timescales, using: a suitable equipment and technical information b suitable removal and replacement techniques c suitable type and size of replacement components and fixings  3.3. Carry out final braking system function checks in the workshop, prior to releasing the vehicle to the customer.
4. Be able to record information and make suitable recommendations	4.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required  4.2. Make suitable and justifiable recommendations for cost effective repairs  4.3. Record and report any additional faults noticed during the course of their work promptly in the format required  4.4. Give advice on procedures for bedding in new brakes before release to the customer

## EVIDENCE REQUIREMENTS

1. <b>You must</b> produce evidence of inspecting, replacing, testing and adjusting where appropriate, <b>5 different components</b> out of the 13 shown below.
• components
• master cylinders
• servos
• brake pads
• brake shoes
• calipers
• disc
• drum
• wheel cylinders
• backing plates
• parking brake mechanisms, adjusters or cables
• pipes
• load sensing / equalizing valves
• electronic sensors / actuators
The evidence must include at least <b>1</b> of each: mechanical and/or electronic and hydraulic units or components. <b>1</b> piece of evidence <b>must</b> include <b>brake bleeding</b> .
2. Carry out the replacement of components and bleed brakes.

<b>UNIT REF: LV01K</b>	<b>UNIT TITLE: KNOWLEDGE OF ROUTINE LIGHT VEHICLE MAINTENANCE</b>
------------------------	---

Level: 2	Route: Knowledge	Credit Value: 2	GLH: 20
----------	------------------	-----------------	---------

**Mapping:** This unit is mapped to the IMI NOS LV01

**Rationale:** This unit enables the learner to develop an understanding of conducting routine maintenance, adjustment and replacement activities as part of the periodic servicing of light vehicles

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Understand how to carry out routine light vehicle maintenance	1.1. Explain how to conduct a scheduled light vehicle routine examination and assessment against the vehicle manufacturers specification  1.2. Identify the assessment methods used to check for conformity  1.3. Identify the different systems to be inspected while carrying out light vehicle routine maintenance <ul style="list-style-type: none"> <li>a engine</li> <li>b chassis</li> <li>c wheels and tyres</li> <li>d transmission and driveline</li> <li>e electrical and electronic</li> <li>f exterior vehicle body</li> <li>g vehicle interior</li> </ul> 1.3. Describe the procedures used for checking the condition and serviceability of light vehicle units and components  1.4. Describe the procedures for checking and replenishing fluid levels  1.5. Describe the procedures for checking and replacing lubricants  1.6. Identify adjustments that need to be carried out on a light vehicle routine maintenance  1.7. Explain the procedure for reporting cosmetic damage to vehicle components and units outside normal service items  1.9. Identify the operating specifications for the systems being checked while carrying out light vehicle routine maintenance
2. Understand the importance of carrying out light vehicle maintenance	2.1. Describe the requirements of correct maintenance in order to maintain the vehicle in a roadworthy and legal condition  2.2. Describe the importance of correct maintenance for warranty purposes



**Content:**

- a Vehicle maintenance, inspection and adjustment and record findings
- b Vehicle inspection techniques used in routine maintenance including:
  - i. aural
  - ii. visual and functional assessments on engine
  - iii. engine systems
  - iv. chassis systems
  - v. wheels and tyres
  - vi. transmission system
  - vii. electrical and electronic systems
  - viii. exterior vehicle body
  - ix. vehicle interior
- c The procedures used for inspecting the condition and serviceability of the following:
  - i. filters
  - ii. drive belts
  - iii. wiper blades
  - iv. brake linings
  - v. pads
  - vi. tyres
  - vii. lights
- d Preparation and use appropriate use of equipment to include:
  - i. test instruments
  - ii. emission equipment
  - iii. wheel alignment
  - iv. beam setting equipment
  - v. tyre tread depth gauges
- e Procedures for checking and replenishing fluid levels:
  - i. oil
  - ii. water
  - iii. hydraulic fluids
- f Procedures for checking and replacement of lubricants:
  - i. replace oil filters
  - ii. check levels
  - iii. types of oil
  - iv. cleanliness
  - v. disposal of old oil and filters
- g Procedures for carrying out adjustments on vehicle systems or components:
  - i. clearances
  - ii. settings
  - iii. alignment
  - v. operational performance (engine idle, exhaust gas)
- h Procedures for checking electrical systems:
  - i. operation
  - ii. security
  - iii. performance
- i Importance and process of detailed inspection procedures:
  - i. following inspection checklists
  - ii. checking conformity to manufacturer's specifications
  - iii. UK and European legal requirements
- j Importance and process of completing all relevant documentation relating to routine maintenance:
  - i. inspection records
  - ii. job cards
  - iii. vehicle repair records
  - iv. in-vehicle service history

**Content: contd****Requirements and methods used for protecting**

- a. The need to use vehicle protection prior to repair
  - i. vehicle body panels
  - ii. paint surfaces
  - iii. seats
  - iv. carpets and floor mats
- a. The need to check the vehicle following routine maintenance
- b. The need to inspect the vehicle following routine maintenance:
  - i. professional presentation of vehicle
  - ii. customer perceptions
- c. The checks of vehicle following routine maintenance:
  - i. removal of oil and grease marks
  - ii. body panels
  - iii. paint surfaces
  - iv. seats
  - v. carpets and floor mats
  - vi. re-instatement of components

<b>UNIT REF: LV01S</b>	<b>UNIT TITLE: SKILLS IN ROUTINE LIGHT VEHICLE MAINTENANCE</b>
------------------------	--

<b>Level: 2</b>	<b>Route: Skills</b>	<b>Credit Value: 2</b>	<b>GLH: 20</b>
<b>Mapping: This unit is mapped to the IMI NOS LV01</b>			
<b>Rationale:</b> This unit allows the learner to develop skills they can carry out light vehicle routine maintenance, adjustments and replacement activities as part of the periodic servicing of vehicles.			

<b>LEARNING OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>The Learner will:</b>	<b>The Learner can:</b>
1. Be able to work safely when carrying out light vehicle routine maintenance	1.1. Use suitable personal protective equipment and vehicle coverings throughout all light vehicle routine maintenance activities  1.2. Work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
2. Be able to use relevant information to carry out the task	2.1. Select suitable sources of technical information to support light vehicle routine maintenance activities including: <ul style="list-style-type: none"> <li>a. vehicle technical data</li> <li>b. maintenance procedures</li> <li>c. legal requirements</li> </ul> 2.2. Use technical information to support light vehicle inspection activities
3. Be able to use appropriate tools and equipment	3.1. Select the appropriate tools and equipment necessary for carrying out routine maintenance  3.2. Ensure that equipment has been calibrated to meet manufacturers' and legal requirements  3.3 Use the correct tools and equipment in the way specified by manufacturers when carrying out routine maintenance

<p>4. Be able to carry out light vehicle routine maintenance</p>	<p>4.1. Carry out light vehicle maintenance using prescribed methods, adhering to the correct specifications and tolerances for the vehicle and following:</p> <ul style="list-style-type: none"> <li>a. the manufacturer's approved inspection methods</li> <li>b. recognised researched inspection methods</li> <li>c. health and safety requirements</li> </ul> <p>4.2. Carry out adjustments, replacement of vehicle components and replenishment of consumable materials following the manufacturer's current specification</p> <p>4.3. Ensure the examination methods identify accurately any vehicle system and or component problems falling outside the maintenance schedule are specified.</p> <p>4.4. Ensure any comparison of the vehicle against specification accurately identifies any:</p> <ul style="list-style-type: none"> <li>a. differences from the vehicle specification</li> <li>b. vehicle appearance and condition faults</li> <li>c. variation from legal requirements</li> </ul> <p>4.5. Use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately</p>
<p>5. Be able to record information and make suitable recommendations</p>	<p>5.1. Produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</p> <p>5.2. Make suitable and justifiable recommendations for cost effective repairs</p> <p>5.3. Record and report any additional faults noticed during the course of their work promptly in the format required</p>

## EVIDENCE REQUIREMENTS

1. **You must** be observed by your assessor successfully carrying out servicing activities on **at least 1 vehicle** which collectively covers the Learning Outcomes.