

Diploma in Vehicle Body Repair & Alignment Principles at SCQF Level 6 (4391-43)

July 2018, Version 1.0





Qualification at a glance

Subject area	Vehicle Accident Repair
City & Guilds number	4391
Age group approved	16-18, 19+
Entry requirements	There are no entry requirements
Assessment	Online multiple choice tests (graded Pass, Merit, Distinction) and assignments (graded Pass)
Fast track	Not available; automatic approval applies in some cases
Support materials	Centre handbook Practical assessment workbook
Registration and certification	Consult the Walled Garden/online catalogue for last dates

Title and level	City & Guilds number	Accreditation number
Diploma in Vehicle Body Repair & Alignment Principles at SCQF Level 6	4391-43	R558 04



Contents

1	Introduction	5
	Structure	6
2	Centre requirements	8
	Approval	8
	Candidate entry requirements	9
3	Delivering the qualification	10
	Initial assessment and induction	10
	Support materials	10
4	Assessment	11
	Assessment of the qualification	11
5	Units	14
Unit 001	Skills in Health, Safety and Good Housekeeping in the Automotive Environment	15
Unit 003	Skills in Supporting Job Roles in the Automotive Work Environment	17
Unit 004	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	19
Unit 008	Skills to Identify and Agree the Motor Vehicle Customer Needs	22
Unit 051	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	24
Unit 053	Knowledge of Support for Job Roles in the Automotive Work Environment	33
Unit 054	Knowledge in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	38
Unit 058	Knowledge of how to Identify and Agree the Motor Vehicle Customer Needs	42
Unit 413	Skills in Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels	46
Unit 414	Skills in Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels	49
Unit 417	Skills in Identifying and Rectifying Motor Vehicle Body Misalignment	52
Unit 419	Skills in Motor Vehicle Body MIG/MAG Welding Operations	55
Unit 420	Skills in Carrying Out Motor Vehicle Body Resistance Spot Welding Operations	58
Unit 421	Skills in Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations	61
Unit 422	Skills in Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations	64

Unit 424	Skills in Motor Vehicle Body Mechanical Fastening Operations	67
Unit 425	Skills in Motor Vehicle Body Adhesive Bonding Operations	70
Unit 463	Knowledge of Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels	72
Unit 464	Knowledge of Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels	77
Unit 467	Knowledge of Identifying and Rectifying Motor Vehicle Body Misalignment	83
Unit 469	Knowledge of Motor Vehicle Body MIG/MAG Welding Operations	87
Unit 470	Knowledge of Carrying Out Motor Vehicle Body Resistance Spot Welding Operations	91
Unit 471	Knowledge of Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations	94
Unit 472	Knowledge of Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations	97
Unit 474	Knowledge of Motor Vehicle Body Mechanical Fastening Operations	101
Unit 475	Knowledge of Motor Vehicle Body Adhesive Bonding Operations	105
Unit 476	Knowledge of Motor Vehicle Construction and Materials	109
Unit 506	Skills in how to Make Learning Possible through Demonstration and Instruction	115
Unit 556	Knowledge of how to Make Learning Possible through Demonstration and Instruction	118
Appendix 1	Relationships to other qualifications	124
Appendix 2	Sources of general information	125



1 Introduction

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

Area	Description
Who is the qualification for?	Candidates wanting to broaden their understanding of carrying out body repairs to motor vehicles as a result of an accident. It also gives them the opportunity to learn how to develop others. Successful candidates could use their knowledge and skills in a variety of roles including specialist repair or specialist finishing in a car bodywork workshop.
What does the qualification cover?	It combines theoretical knowledge and the development of practical skills in automotive accident repair. It covers areas such as body, mechanical and electrical repairs, and paint and trim.
Is the qualification part of a framework or initiative?	This qualification is part of the Scottish Automotive Maintenance and Repair Modern Apprenticeship Framework.
Who did we develop the qualification with?	This qualification was developed in collaboration with the Institute of the Motor Industry (IMI) the sector skills council for the automotive retail industry and other awarding organisations.
What opportunities for progression are there?	Allows candidates to progress into employment or to the following City & Guilds qualifications: <ul style="list-style-type: none">• 4311-43 SVQ in Vehicle Body Repair & Alignment at SCQF Level 6• In addition, candidates who enjoy leading teams of people at work could also move onto team leader or management qualifications as offered through the Institute of Leadership and Management (ILM).

Structure

To achieve the **Diploma in Vehicle Body Repair & Alignment Principles at SCQF Level 6**, learners must achieve **17 mandatory units** (001, 051, 003, 053, 004, 054, 413, 463, 414, 464, 417, 467, 419, 469, 420, 470, 476) **plus a pair of optional units** from (506 and 556) or (008 and 058) or (421 and 471) or (422 and 472) or (424 and 474) or (425 and 475).

City & Guilds unit	Unit title	SCQF Level	SCQF Credit value
Mandatory			
001	Skills in Health, Safety and Good Housekeeping in the Automotive Environment	5	7
003	Skills in Supporting Job Roles in the Automotive Work Environment	6	5
004	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	5	7
051	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	5	3
053	Knowledge of Support for Job Roles in the Automotive Work Environment	6	3
054	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	5	4
413	Skills in Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels	6	7
414	Skills in Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels	6	5
417	Skills in Identifying and Rectifying Motor Vehicle Body Misalignment	6	4
419	Skills in Motor Vehicle Body MIG/MAG Welding Operations	6	5
420	Skills in Carrying Out Motor Vehicle Body Resistance Spot Welding Operations	6	4
463	Knowledge of Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels	6	6
464	Knowledge of Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels	6	7
467	Knowledge of Identifying and Rectifying Motor Vehicle Body Misalignment	6	6
469	Knowledge of Motor Vehicle Body MIG/MAG Welding Operations	6	4
470	Knowledge of Carrying Out Motor Vehicle Body Resistance Spot Welding Operations	6	4
476	Knowledge of Motor Vehicle Construction and Materials	5	3

City & Guilds unit	Unit title	SCQF Level	SCQF Credit value
Optional			
506	Skills in how to Make Learning Possible through Demonstration and Instruction	7	5
556	Knowledge of how to Make Learning Possible through Demonstration and Instruction	7	5
008	Skills to Identify and Agree the Motor Vehicle Customer Needs	6	5
058	Knowledge of how to Identify and Agree the Motor Vehicle Customer Needs	6	5
421	Skills in Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations	6	5
471	Knowledge of Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations	6	4
422	Skills in Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations	6	5
472	Knowledge of Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations	6	4
424	Skills in Motor Vehicle Body Mechanical Fastening Operations	5	4
474	Knowledge of Motor Vehicle Body Mechanical Fastening Operations	5	4
425	Skills in Motor Vehicle Body Adhesive Bonding Operations	5	3
475	Knowledge of Motor Vehicle Body Adhesive Bonding Operations	6	4



2 Centre requirements

Approval

Centres already approved to offer the Level 3 Certificate/Diploma in Maintenance and Repair - Body (4101-62) will be automatically approved to register and certificate candidates on the 4391-43 Diploma in Vehicle Body Repair & Alignment Principles at SCQF Level 6 (unless the centre is already subject to sanctions).

Centres will need to gain both centre and qualification approval. Please refer to the Centre Manual - Supporting Customer Excellence for further information.

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

Physical resources and site agreements

Centres must have access to sufficient equipment in the college, training centre or workplace to ensure candidates have the opportunity to cover all of the practical activities.

Centre staffing

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

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

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

Assessors and internal verifiers

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

Continuing professional development (CPD)

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

Candidate entry requirements

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

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

Age restrictions

City & Guilds cannot accept any registrations for candidates under 16 as this qualification not approved for under 16s.



3 Delivering the qualification

Initial assessment and induction

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

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

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

Support materials

The following resources are available for this qualification:

Description	How to access
Centre handbook	www.cityandguilds.com/automotive
Practical assessment workbook	www.cityandguilds.com/automotive



4 Assessment

Assessment of the qualification

City & Guilds has written the following assessments to use with this qualification:

- Assignments (practical assessment workbooks) comprising of practical tasks and knowledge based questions to cover all learning outcomes. Graded Pass only.
- Online multiple choice tests graded as Pass, Merit, Distinction.
- Assignments can be downloaded from **www.cityandguilds.com/automotive**. These assessments are carried out in centres and must be completed to current industry standards and practice.

Assessment requirements for all skills units are shown in full in our assessment documentation.

Full details of the assessment requirements relating to these qualifications can be obtained directly from the Institute of the Motor Industry (IMI) <http://www.motor.org.uk>

Time constraints

The following must be applied to the assessment of this qualification:

- Candidates must complete their assessments within their registration period.

Test specifications

Summary test specifications for all 4391 online tests can be found in the 'Automotive online test specifications' document, downloadable from the 4391 website.

Diploma in Vehicle Body Repair & Alignment Principles at SCQF Level 6

City & Guilds unit	Unit title	Assessment method
001	Skills in Health, Safety and Good Housekeeping in the Automotive Environment	Assignment
003	Skills in Supporting Job Roles in the Automotive Work Environment	Assignment
004	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	Assignment
051	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	Assignment
053	Knowledge of Support for Job Roles in the Automotive Work Environment	Assignment
054	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	Assignment
413	Skills in Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels	Assignment
414	Skills in Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels	Assignment
417	Skills in Identifying and Rectifying Motor Vehicle Body Misalignment	Assignment
419	Skills in Motor Vehicle Body MIG/MAG Welding Operations	Assignment
420	Skills in Carrying Out Motor Vehicle Body Resistance Spot Welding Operations	Assignment
463	Knowledge of Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels	Multiple choice test
464	Knowledge of Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels	Multiple choice test
467	Knowledge of Identifying and Rectifying Motor Vehicle Body Misalignment	Multiple choice test
469	Knowledge of Motor Vehicle Body MIG/MAG Welding Operations	Multiple choice test
470	Knowledge of Carrying Out Motor Vehicle Body Resistance Spot Welding Operations	Multiple choice test
476	Knowledge of Motor Vehicle Construction and Materials	Multiple choice test
506	Skills in how to Make Learning Possible through Demonstration and Instruction	Assignment
556	Knowledge of how to Make Learning Possible through Demonstration and Instruction	Assignment
008	Skills to Identify and Agree the Motor Vehicle Customer Needs	Assignment

City & Guilds unit	Unit title	Assessment method
058	Knowledge of how to Identify and Agree the Motor Vehicle Customer Needs	Assignment
421	Skills in Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations	Assignment
471	Knowledge of Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations	Multiple choice test
422	Skills in Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations	Assignment
472	Knowledge of Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations	Multiple choice test
424	Skills in Motor Vehicle Body Mechanical Fastening Operations	Assignment
474	Knowledge of Motor Vehicle Body Mechanical Fastening Operations	Multiple choice test
425	Skills in Motor Vehicle Body Adhesive Bonding Operations	Assignment
475	Knowledge of Motor Vehicle Body Adhesive Bonding Operations	Multiple choice test



5 Units

Structure of units

These units each have the following:

- City & Guilds reference number
- title
- SCQF level
- credit value
- unit aim
- relationship to NOS, other qualifications and frameworks
- endorsement by a sector or other appropriate body
- information on assessment
- learning outcomes which are comprised of a number of assessment criteria
- supporting information - range.

Unit 001

Skills in Health, Safety and Good Housekeeping in the Automotive Environment

Level:	5
Credit value:	7
Relationship to NOS:	This unit is linked to NOS G1 - Contribute to Housekeeping in Motor Vehicle Environment and G2 - Reduce Risks to Health and Safety in the Motor Vehicle Environment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	<p>This unit will enable the learner to develop the skills required to:</p> <ul style="list-style-type: none">• 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• work safely at all times within the automotive environment, both as an individual and with others.

Learning outcome
The learner will: 1. be able to use correct personal and vehicle protection within the automotive environment
Assessment criteria
The learner can: 1.1 select and use personal protective equipment throughout activities. To include appropriate protection of a. eyes b. ears c. head d. skin e. feet f. hands g. lungs

1.2 select and use vehicle protective equipment throughout all activities.

Learning outcome

The learner will:

2. be able to carry out effective housekeeping practices in the automotive environment

Assessment criteria

The learner can:

- 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 minimises 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.

Learning outcome

The learner will:

3. be able to recognise and deal with dangers in order to work safely within the automotive workplace

Assessment criteria

The learner can:

- 3.1 name and locate the responsible persons for health and safety in their relevant workplace
- 3.2 identify and report working practices and hazards which could be harmful to themselves or others
- 3.3 carry out safe working practices whilst working with equipment, materials and products in the automotive environment
- 3.4 rectify health and safety risks encountered at work, within the scope and capability of their job role.

Learning outcome

The learner will:

4. be able to conduct themselves responsibly

Assessment criteria

The learner can:

- 4.1 show personal conduct in the workplace which does not endanger the health and safety of themselves or others
- 4.2 display suitable personal presentation at work which ensures the health and safety of themselves and others at work.

Unit 003

Skills in Supporting Job Roles in the Automotive Work Environment

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to NOS G3 - Maintain Working Relationships in the Motor Vehicle Environment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit is about the skills needed to develop and keep good working relationships with all colleagues in the workplace by using effective communication and support skills.

Learning outcome	The learner will:
1.	be able to work effectively within the organisational structure of the automotive work environment
Assessment criteria	
The learner can:	
1.1	respond promptly and willingly to requests for assistance from customers and colleagues
1.2	refer customers and colleagues to the correct person should requests fall outside their responsibility and capability.

Learning outcome	The learner will:
2.	be able to obtain and use information in order to support their job role within the automotive work environment
Assessment criteria	
The learner can:	
2.1	select and use legal and technical information, in an automotive work environment.

Learning outcome	The learner will:
3.	be able to communicate with and support colleagues and customers effectively within the automotive work environment
Assessment criteria	
The learner can:	
3.1	use methods of communication with customers and colleagues which meet their needs
3.2	give customers and colleagues accurate information
3.3	make requests for assistance from or to customers and colleagues clearly and courteously.

Learning outcome	The learner will:
4.	be able to develop and keep good working relationships in the automotive work environment
Assessment criteria	
The learner can:	
4.1	contribute to team work by initiating ideas and co-operating with customers and colleagues
4.2	treat customers and colleagues in a way which shows respect for their views and opinions
4.3	make and keep achievable commitments to customers and colleagues
4.4	inform colleagues promptly of anything likely to affect their own work.

Unit 004

Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

Level:	5
Credit value:	7
Relationship to NOS:	This unit is linked to NOS G4 - Use of Hand Tools and Equipment in Motor Vehicle Engineering.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	<p>This unit helps the learner to develop the skills required for:</p> <ul style="list-style-type: none">• 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• the correct application of automotive engineering fabrication and fitting principles.

Learning outcome	The learner will:
1.	be able to select, maintain and use hand tools and measuring devices in the automotive environment
Assessment criteria	
The learner can:	
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.

Learning outcome	The learner will:
2.	be able to prepare and use common workshop equipment
Assessment criteria	
The learner can:	
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.

Learning outcome	The learner will:
3.	be able to select materials when fabricating, modifying and repairing vehicles and fitting components
Assessment criteria	
The learner can:	
3.1	select and use appropriate materials whilst constructing, fitting, modifying or repairing vehicles and components.

Learning outcome	The learner will:
4.	be able to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components
Assessment criteria	
The learner can:	
4.1	use correct procedures when: <ul style="list-style-type: none"> a. filing b. tapping threads c. cutting plastics and metals d. drilling plastics and metals e. fitting
4.2	use appropriate techniques when fabricating, repairing and modifying vehicles and components
4.3	select and use: <ul style="list-style-type: none"> a. gaskets b. seals c. sealants d. fittings and fasteners
4.4	apply modification and repair techniques to automotive electrical circuits
4.5	select and use locking, fixing and fastening devices.

Evidence Requirements

1. You must be observed by your assessor successfully undertaking basic routine checks of hand tools, measuring devices and workshop equipment covering all of those listed below:
 - electrical
 - mechanical
 - pneumatic
 - hydraulic

2. You must be observed by your assessor fabricating at least 1 item from suitable materials to known tolerances, which includes the following processes
 - filing
 - tapping threads
 - cutting
 - drilling

Unit 008

Skills to Identify and Agree the Motor Vehicle Customer Needs

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to NOS G8 - Identify and Agree the Motor Vehicle Customer Needs.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit helps the learner to develop the skills required to: gain information from customers on their perceived needs; give advice and information and agree a course of action; contract for the agreed work and complete all necessary records and instructions.

Learning outcome
The learner will: 5. be able to obtain relevant information from the customer
Assessment criteria
The learner can: 5.1 obtain and interpret sufficient, relevant information, from the customer to make an assessment of their needs 5.2 clarify customer and vehicle needs by referring to vehicle data and operating procedures.

Learning outcome
The learner will: 6. be able to provide relevant information to the customer
Assessment criteria
The learner can: 6.1 provide customers with accurate, current and relevant advice and information, in a form that the customer will understand 6.2 demonstrate techniques which encourage customers to ask questions and seek clarification during conversation.

Learning outcome
The learner will: 7. be able to agree work undertaken with the customer
Assessment criteria
The learner can: 7.1 summarise and record work agreed with the customer, before accepting the vehicle 7.2 implement confirmation of the agreement by ensuring customer understanding.

Learning outcome
The learner will: 8. be able to ensure recording systems are implemented correctly
Assessment criteria
The learner can: 8.1 use recording systems which are accurate and complete, in the required format and signed by the customer where necessary 8.2 perform the next stage in the process by passing on completed records to the correct person promptly 8.3 demonstrate correct procedures for customer approval where the contracted agreement is likely to be exceeded.

Unit 051

Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment

Level:	5
Credit value:	3
Relationship to NOS:	This unit is linked to NOS G1 - Contribute to Housekeeping in Motor Vehicle Environment and G2 - Reduce Risks to Health and Safety in the Motor Vehicle Environment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	<p>This unit enables the learner to develop an understanding of:</p> <ul style="list-style-type: none">• routine maintenance and cleaning of the automotive environment and using resources economically• health and safety legislation and duties of everyone in the motor vehicle environment. <p>It will provide an appreciation of significant risks in the automotive environment and how to identify and deal with them.</p> <p>Once completed the learner will be able to identify hazards and evaluate and reduce risk.</p>

Learning outcome	The learner will:
1.	understand the correct personal and vehicle protective equipment to be used within the automotive environment
Assessment criteria	
The learner can:	
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.

Learning outcome	The learner will:
2.	understand effective housekeeping practices in the automotive environment
Assessment criteria	
The learner can:	
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 minimize 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.

Learning outcome	The learner will:
3.	understand key health and safety requirements relevant to the automotive environment
Assessment criteria	
The learner can:	
3.1	list the main legislation relating to automotive environment health and safety
3.2	describe the general legal duties of employers and employees required by current health and safety legislation
3.3	describe key, current health and safety requirements relating to the automotive environment
3.4	describe why workplace policies and procedures relating to health and safety are important.

Learning outcome	The learner will:
4.	understand about hazards and potential risks relevant to the automotive environment
Assessment criteria	
The learner can:	
4.1	identify key hazards and risks in an automotive environment
4.2	describe policies and procedures for reporting hazards, risks, health and safety matters in the automotive environment
4.3	state precautions and procedures which need to be taken when working with vehicles, associated materials, tools and equipment
4.4	identify fire extinguishers in common use and which types of fire they should be used on

4.5	identify key warning signs and their characteristics that are found in the vehicle repair environment
4.6	state the meaning of common product warning labels used in an automotive environment.

Learning outcome	The learner will:
5.	understand personal responsibilities
Assessment criteria	
The learner can:	
5.1	explain the importance of personal conduct in maintaining the health and safety of the individual and others
5.2	explain the importance of personal presentation in maintaining health safety and welfare.

Unit 051 Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Economic use of resources

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

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.

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 eg 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 manufacturer's recommendations.
- h. Following application procedures eg 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 of 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 personnel, 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 policies 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.

Unit 053

Knowledge of Support for Job Roles in the Automotive Work Environment

Level:	6
Credit value:	3
Relationship to NOS:	This unit is linked to NOS G3 - Maintain Working Relationships in the Motor Vehicle Environment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of how to keep good working relationships with all colleagues in the automotive work environment by using effective communication and support skills.

Learning outcome	The learner will:
1.	understand key organisational structures, functions and roles within the automotive work environment
Assessment criteria	
The learner can:	
1.1	identify the purpose of different sections of a typical automotive work environment
1.2	explain organisational structures and lines of communication within the automotive work environment
1.3	explain levels of responsibility within specific job roles in an automotive workplace. To include: a. trainee b. skilled technician c. supervisor d. manager.

Learning outcome	The learner will:
2.	understand the importance of obtaining, interpreting and using information in order to support their job role within the automotive work environment
Assessment criteria	
The learner can:	
2.1	explain the importance of different sources of information in a automotive work environment
2.2	explain how to find, interpret and use relevant sources of information
2.3	describe the main legal requirements relating to the vehicle, including road safety requirements
2.4	explain the importance of working to recognised procedures and processes
2.5	explain when replacement units and components must meet the manufacturers' original equipment specification
2.6	explain how to use identification codes.

Learning outcome	The learner will:
3.	understand the importance of different types of communication within the automotive work environment
Assessment criteria	
The learner can:	
3.1	explain where different methods of communication would be used within the automotive environment
3.2	explain the factors which can determine your choice of communication
3.3	explain how the communication of information can change with the target audience to include uninformed and informed people.

Learning outcome	The learner will:
4.	understand communication requirements when carrying out vehicle repairs in the automotive work environment
Assessment criteria	
The learner can:	
4.1	explain how to report using written and verbal communication
4.2	explain the importance of documenting information relating to work carried out in the automotive environment
4.3	explain the importance of working to agreed timescales.

Learning outcome	The learner will:
5.	understand how to develop good working relationships with colleagues and customers in the automotive workplace
Assessment criteria	
The learner can:	
5.1	describe how to develop positive working relationships with colleagues and customers
5.2	explain the importance of developing positive working relationships
5.3	explain the importance of accepting other people's views and opinions.
5.4	explain the importance of making and honouring realistic commitments to colleagues and customers.

Unit 053 Knowledge of Support for Job Roles in the Automotive Work Environment

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

The structure of a typical vehicle repair business

- a. How these areas relate to each other within the business
 - i. body shop
 - ii. vehicle repair workshop
 - iii. paint shop
 - iv. valeting
 - v. vehicle parts store
 - vi. main office
 - vii. vehicle sales
 - viii. reception.

Sources of information:

- a. Other staff.
- b. Manuals.
- c. Parts lists.
- d. Computer software and the internet.
- e. Manufacturer.
- f. Diagnostic equipment.

Communication requirements when carrying out vehicle repairs

- a. Locating and using correct documentation and information for:
 - i. recording vehicle maintenance and repairs
 - ii. vehicle specifications
 - iii. component specifications
 - iv. oil and fluid specifications
 - v. equipment and tools
 - vi. identification codes.
- b. Procedures for:
 - i. referral of problems
 - ii. reporting delays
 - iii. additional work identified during repair or maintenance
 - iv. keeping others informed of progress.

- c. Methods of communication:
 - i. verbal
 - ii. signs and notices
 - iii. memos
 - iv. telephone
 - v. electronic mail
 - vi. vehicle job card
 - vii. notice boards
 - viii. SMS text messaging
 - ix. letters.
- d. Organisational and customer requirements:
 - i. importance of time scales to customer and organization
 - ii. relationship between time and costs
 - iii. meaning of profit.
- e. Choice of communication
 - i. distance
 - ii. location
 - iii. job responsibility.
- f. Importance of maintaining positive working relationships:
 - i. morale
 - ii. productivity
 - iii. company image
 - iv. customer relationships
 - v. colleagues.

Unit 054

Knowledge in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

Level:	5
Credit value:	4
Relationship to NOS:	This unit is linked to NOS G4 - Use of Hand Tools and Equipment in Motor Vehicle Engineering.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of: <ul style="list-style-type: none">• 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• the correct application of automotive engineering fabrication and fitting principles.

Learning outcome	The learner will:
9. understand how to select, use and care for hand tools and measuring devices in the automotive environment	
Assessment criteria	
The learner can:	
9.1	identify and explain the use of common types of hand tools used for fabricating and fitting in the automotive environment
9.2	identify and explain the use of common measuring devices used for fabrication and fitting in the automotive environment
9.3	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

9.4	state the limitations of common hand tools and measuring devices used for fabricating, repair and fitting in the automotive workplace
9.5	explain how common hand tools and measuring devices used for fabricating, repair and fitting in the automotive environment should be stored and maintained
9.6	identify common electrical measuring tools used in the repair of vehicles and components
9.7	explain the preparation and safe and correct use of common electrical tools when measuring voltage, current and resistance.

Learning outcome	The learner will:
10. understand how to prepare and use common workshop equipment	
Assessment criteria	
The learner can:	
10.1 describe the preparation and safe use of workshop equipment	
10.2 explain the term: safe working load.	

Learning outcome	The learner will:
11. understand how to select materials when fabricating, modifying and repairing vehicles and fitting components	
Assessment criteria	
The learner can:	
11.1 describe the properties, application and limitations of ferrous and non-ferrous metals, including their safe use	
11.2 describe the properties, application and limitations of common non-metallic materials, including their safe use	
11.3 define common terms relating to the properties of materials.	

Learning outcome	The learner will:
12. understand how to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components	
Assessment criteria	
The learner can:	
12.1 describe how to tap threads, file, cut and drill plastics and metals when modifying or repairing vehicles	
12.2 describe how to measure, mark out, shape and join materials when fabricating	
12.3 describe the selection and fitting procedures of the following:	
a. gaskets and seals	
b. sealants and adhesives	
c. fittings and fasteners	
d. electrical circuit components	
12.4 identify locking, fastening and fixing devices	
12.5 state the importance of correct operating specifications for limits, fits and tolerances in the automotive environment.	

Unit 054 Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Common types of hand tools used for fabricating and fitting in the automotive workplace to include:

- a. Files.
- b. Hacksaws and snips.
- c. Hammers.
- d. Screwdrivers.
- e. Pliers.
- f. Spanners.
- g. Sockets.
- h. Punches.
- i. Types of drill and drill bits.
- j. Taps and dies.
- k. Stud removers.
- l. Marking out tools.

Common measuring devices used for fabrication and fitting in the automotive workplace. To include:

- a. Rule or tape.
- b. Callipers.
- c. Feeler gauge.
- d. Volume measures.
- e. Micrometer.
- f. Dial gauges.
- g. Torque wrenches.
- h. Depth gauges.

Common electrical measuring tools used in the repair of vehicles and components. To include:

- a. Ammeter.
- b. Voltmeter.
- c. Ohmmeter.
- d. Multi-meter.

Common electrical terms when measuring:

- a. Voltage.
- b. Current.
- c. Resistance.

Workshop equipment (including appropriate PPE). To include:

- a. Hydraulic jack.
- b. Axle stands.
- c. Pillar drills.
- d. Air tools.
- e. Vehicle lifts.
- f. Cranes.
- g. Hoists.
- h. Electrical power tools.

The properties, application and limitations (to include safe use) of ferrous and non-ferrous metals used when constructing, modifying and repairing vehicles and components. Materials to include:

- a. Carbon steels.
- b. Alloy steels.
- c. Cast iron.
- d. Aluminium alloys.
- e. Brass.
- f. Copper.
- g. Lead.

Properties, application and limitations (to include safe use) of non-metallic materials used when constructing, modifying and repairing vehicles and components.

Materials to include:

- a. glass
- b. plastics (inc. GRP)
- c. Kevlar
- d. rubber.

Terms relating to the properties of materials to include:

- a. hardness
- b. toughness
- c. ductility
- d. elasticity
- e. tenacity
- f. malleability
- g. plasticity.

Unit 058

Knowledge of how to Identify and Agree the Motor Vehicle Customer Needs

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to NOS G8 - Identify and Agree the Motor Vehicle Customer Needs.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of how to gain: information from customers on their perceived needs; give advice and information and agree a course of action; contract for the agreed work and complete all necessary records and instructions.

Learning outcome	The learner will:
1.	understand legislative and organisational requirements and procedures
Assessment criteria	
The learner can:	
1.1	describe the fundamental legal requirements of current consumer legislation and the consequences of their own actions in respect of this legislation
1.2	describe the content and limitations of company and product warranties for the vehicles dealt with by their company
1.3	explain the limits of their own authority for accepting vehicles
1.4	explain the importance of keeping customers informed of progress
1.5	describe their workplace requirements for the completion of records
1.6	explain how to complete and process all the necessary documentation.

Learning outcome	The learner will:
2.	understand how to communicate and care for customers
Assessment criteria	
The learner can:	
2.1	explain how to communicate effectively with customers
2.2	describe how to adapt their language when explaining technical matters to non-technical customers
2.3	explain how to use effective questioning techniques
2.4	describe how to care for customers and achieve customer satisfaction.

Learning outcome	The learner will:
3.	understand company products and services
Assessment criteria	
The learner can:	
3.1	describe the range of options available to resolve vehicle problems
3.2	describe the range and type of services offered by their company
3.3	explain the effect of resource availability upon the receipt of customer vehicles and the completion work
3.4	explain how to access costing and work completion time information.

Unit 058 Knowledge of how to Identify and Agree the Motor Vehicle Customer Needs

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Organisational requirements

- a. Explain the organisation's terms and conditions applicable to the acceptance of customer vehicles.
- b. Explain the content and limitations of vehicle and component warranties for the vehicles dealt with by your organisation.
- c. Detail what, if any, limits there are to the authority for accepting vehicles.
- d. Detail why it is important to keep customers advised of progress and how this is achieved within the organisation.
- e. Detail the organisation's procedures for the completion and processing of documentation and records, including payment methods and obtaining customer signatures as applicable.

Principles of customer communication and care

- a. First impressions.
- b. Listening skills – 80:20 ratio.
- c. Eye contact and smiling.
- d. Showing interest and concern.
- e. Questioning techniques and customer qualification.
- f. Giving clear non-technical explanations.
- g. Confirming understanding (statement/question technique, reflective summary).
- h. Written communication – purpose, content, presentation and style.
- i. Providing a high quality service – fulfilling (ideally exceeding) customer expectations within agreed time frames.
- j. Obtaining customer feedback and corrective actions when dissatisfaction expressed.
- k. Dealing with complaints.

Company products and services

- a. Service standards:
 - i. national
 - ii. manufacturer
 - iii. organisational.

- b. The range and type of services offered by the organisation:
 - i. diagnostic
 - ii. servicing
 - iii. repair
 - iv. warranty
 - v. MOT testing
 - vi. fitment of accessories/enhancements
 - vii. internal.
- c. The courses of action available to resolve customer problems:
 - i. the extent and nature of the work to be undertaken
 - ii. the terms and conditions of acceptance
 - iii. the cost
 - iv. the timescale
 - v. required payment methods.
- d. The effect of resource availability upon the receipt of customer vehicles and the completion of work:
 - i. levels and availability of equipment
 - ii. levels and availability of technicians
 - iii. workshop loading systems.
- e. How to access costing and work completion time information:
 - i. manuals
 - ii. computer based.

Vehicle information systems, servicing and repair requirements

- a. Accessing technical data including diagnostics.
- b. Servicing to manufacturer requirements/standards.
- c. Repair/operating procedures.
- d. MOT standards/requirements.
- e. Quality controls – interim and final.
- f. Requirements for cleanliness of vehicle on return to customer.
- g. Handover procedures.

Consumer legislation to include:

- a. Consumer protection.
- b. Sale of goods.
- c. Data protection.
- d. Product liability.
- e. Health and safety.
- f. Discrimination.

Unit 413

Skills in Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels

Level:	6
Credit value:	7
Relationship to NOS:	This unit is linked to NOS BP13S Skills in removing and replacing motor vehicle body panels including permanently fixed panels
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop the skills required to carry out removal and replacement of exterior and sub-structure motor vehicle body panels and panel sections, including permanently fixed panels, where these are damaged. It also covers the evaluation of the components when fitted.

Learning outcome	The learner will:
1.	Be able to work safely when carrying out removal and replacement of vehicle body panels including permanently fixed panels
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment (PPE) and vehicle coverings throughout all removal and replacement activities
1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
1.3	work in a way which minimises the risk of cross contamination of materials such as aluminium and steel.

Learning outcome	The learner will:
2.	Be able to use relevant information to carry out the task
Assessment criteria	
The learner can:	

2.1	select suitable sources of technical information to support motor vehicle removal and fitting activities including: <ol style="list-style-type: none"> a. vehicle technical data b. removal and fitting procedures c. legal requirements
2.2	use technical information to support motor vehicle removal and fitting activities.

Learning outcome	The learner will:
3.	Be able to use appropriate tools and equipment
Assessment criteria	
The learner can:	
3.1	select the appropriate tools and equipment necessary for carrying out removal and fitting of vehicle body panels
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 removal and fitting of vehicle body panels.

Learning outcome	The learner will:
4.	Be able to carry out removal and fitting of vehicle body panels including permanently fixed panels
Assessment criteria	
The learner can:	
4.1	identify prior to working on the vehicle the component materials that will be worked on during the repair or replacement
4.2	work in a way which minimises the dangers of cross contamination of material such as aluminium and steel
4.3	carry out the removal and fitting of non-permanently fixed, welded and bonded vehicle body panels
4.4	carry out removal and fitting of vehicle body panels to specification and tolerance following: <ol style="list-style-type: none"> a. the manufacturer's approved removal and fitting methods b. recognised researched removal and fitting methods c. health and safety requirements d. workplace procedures
4.5	ensure all test weld pieces conform to the current Industry Standard for appearance and penetration
4.6	use and apply sealants and anti-corrosion materials to the manufacturers' specification
4.7	ensure that replacement panels conform to the vehicle specifications for dimension, material, quality of finish and functional capability
4.8	ensure the components are realigned to the manufacturers tolerance
4.9	ensure damage to mating surfaces is minimised and any additional damage caused correctly reinstated
4.10	ensure panels are replaced without causing damage to the vehicle systems

4.11 ensure all components and panels are stored safely and in the correct location.
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Learning outcome	The learner will:
5.	Be able to record information and make suitable recommendations
Assessment criteria	
The learner can:	
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

You must produce evidence of removing and replacing 2 out of the 4 types of vehicle body panels listed below, which covers the learning outcomes.

- a. non permanently fixed body panels
- b. welded exterior panels
- c. a welded sub structure panel (e.g. rear quarter panel, rear panel, roof, chassis legs, inner wheel housing, boot floors, complete sill, A post, B post, C post, D post and cross members)
- d. bonded panels (e.g. any panel that is fixed by adhesive bonding as part of the original manufacturers process).

Unit 414

Skills in Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels

Level:	6
Credit value:	7
Relationship to NOS:	This unit is linked to NOS BP14S – Skills in identifying and rectifying major repairs to motor vehicle body panels.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of carrying out repairs to motor vehicle body panels using a variety of techniques.

Learning outcome	The learner will:
1.	Understand how to work safely when carrying major repairs to motor vehicle body panels
Assessment criteria	
The learner can:	
1.1	describe the health, safety and legal requirements relating to the identification and rectification of major repairs to motor vehicle body panels
1.2	describe the importance of selecting, using and maintaining the appropriate personal protective equipment when carrying out major repairs to motor vehicle body panels
1.3	describe the requirements for protecting the vehicle and contents from damage before, during and after carrying major repairs to motor vehicle body panels.

Learning outcome	The learner will:
2.	Understand how to select, check, use and maintain appropriate tools and equipment used in major repairs to motor vehicle body panels
Assessment criteria	
The learner can:	
2.1	identify tools used in the repair processes
2.2	identify tools used in hydraulic reforming equipment including specialist pulling systems

2.3	explain how to prepare, test, use and maintain the hand and power tools required to repair vehicle body panels
2.4	explain how to adapt hydraulic push equipment to perform pulling operations.

Learning outcome	The learner will:
3.	Understand material types and properties used in major repairs to motor vehicle body panels
Assessment criteria	
The learner can:	
3.1	identify and describe the properties and different types of materials involved in the construction of the vehicle in the areas that will be worked on during repair
3.2	explain the types and selection of filling materials, their preparation and application
3.3	identify the properties and safe use of types of filling materials used to repair panels
3.4	explain how to mix and apply plastic fillers
3.5	identify and explain the different types and grades of abrasive paper and their use
3.6	explain the principles of chassis frame and monocoque/unitary vehicle construction
3.7	describe the techniques for identifying the type of plastic used for manufactured components.

Learning outcome	The learner will:
4.	Understand how to carry out major repairs to motor vehicle body panels
Assessment criteria	
The learner can:	
4.1	explain how to assess the extent of damage, including corrosion damage
4.2	explain how body panel and component damage can affect other panels and the operation of vehicle systems
4.3	identify the factors determining the use of specific preparation and repair methods
4.4	explain the implications of repairing mild strength steels, high strength steels, ultra high strength steels, low carbon steels, new generation steels i.e. UHSS, galvanised coatings, aluminium alloys and composite panels
4.5	explain the principles associated with hot and cold shrinking
4.6	explain how heat can assist in reforming panels but also affect the properties of the steel
4.7	explain the consequences of using inappropriate repair methods
4.8	identify the causes and rectification of distortion resulting from welding
4.9	explain how to prepare the vehicle to avoid contamination
4.10	describe how to prepare damaged areas to facilitate repairs
4.11	describe how to prepare the panel surface prior to filling
4.12	explain how to repair corrosion damage

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|------|--|
| 4.13 | explain how to repair and reinstate vehicle body panel contours and retain structural integrity to components |
| 4.14 | describe the methods used to check for panel contours for accuracy after reshaping |
| 4.15 | explain the procedures for reinstating anti corrosion, sealant and sound deadening materials |
| 4.16 | describe how to complete repairs to a suitable agreed condition to enable the next stage of repairs to proceed |
| 4.17 | identify the specification for panel shapes, dimensions and tolerances for the vehicles worked upon |
| 4.18 | identify the types of quality control checks that can be used to ensure the correct contour and standard of finish |
| 4.19 | describe the aspects of pedestrian safety in relation to the reparability of vehicles. |

Evidence Requirements

1. You must produce evidence from your normal workplace of repairing each of the following repairs listed below on 2 separate occasions:
 - a. severely distorted panels
 - b. difficult to access panel damage
 - c. fractures on plastic repairs
2. You must produce evidence of covering 5 of the 8 techniques and processes* listed below in carrying out the repairs listed above:
 - a. panel beating
 - b. panel shrinking
 - c. hydraulic forming
 - d. MIG brazing
 - e. body filling operations
 - f. metal finishing
 - g. plastic repair
 - h. specialist dent removal
3. You must be observed by your assessor on at least 2 occasions in your normal workplace.

*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of all of the techniques and processes.

Unit 417

Skills in Identifying and Rectifying Motor Vehicle Body Misalignment

Level:	6
Credit value:	4
Relationship to NOS:	This unit is linked to NOS BP17S Skills in identifying and rectifying motor vehicle body misalignment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop the skills required to carry out identification and rectification of motor vehicle body misalignment. It also covers the evaluation of the repair once completed.

Learning outcome	The learner will:
1.	Be able to work safely when carrying out identification and rectification to motor vehicle body misalignment
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings throughout all repair activities
1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome	The learner will:
2.	Be able to use relevant information to carry out the task
Assessment criteria	
The learner can:	
2.1	select suitable sources of technical information to support the identification and rectification of motor vehicle body misalignment including: a. vehicle technical data b. removal and fitting procedures c. equipment data specific to the vehicle d. legal requirements
2.2	use technical information to support the identification and rectification of motor vehicle body misalignment.

Learning outcome	The learner will:
3.	Be able to use appropriate tools and equipment
Assessment criteria	
The learner can:	
3.1	select the appropriate tools and equipment necessary for carrying out identification and rectification to motor vehicle body misalignment
3.2	ensure that equipment has been calibrated to meet manufacturers' and legal requirements
3.3	use the appropriate tools and equipment in the way specified by manufacturers when carrying out identification and rectification to motor vehicle body misalignment.

Learning outcome	The learner will:
4.	Be able to carry out identification and rectification to motor vehicle body misalignment
Assessment criteria	
The learner can:	
4.1	load and secure the vehicle to the body jig correctly following: <ul style="list-style-type: none"> a. the manufacturer's approved instructions b. recognised researched methods c. health and safety requirements
4.2	establish the extent of the vehicle misalignment accurately and completely
4.3	align and anchor areas adjacent to the damage in a way that prevents further damage to the vehicle
4.4	attach the pulling system securely to the damaged components and safely operate it to achieve the realignment required
4.5	operate the pulling system in a way that minimises the risk of injury to yourself and others
4.6	ensure all completed rectification activities restore the vehicle to the correct specification and tolerances.

Learning outcome	The learner will:
5.	Be able to record information and make suitable recommendations
Assessment criteria	
The learner can:	
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

You must produce evidence of rectifying vehicle body misalignment* covering all of the rectification activities listed below, which covers the learning outcomes

- a. visual examination
- b. setting up
- c. measurement in conjunction with alignment measuring equipment
- d. realignment using pulling equipment.

Unit 419

Skills in Motor Vehicle Body MIG/MAG Welding Operations

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to NOS BP19S – Skills in motor vehicle body MIG/MAG welding operations.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop the skills required to join materials using Metal Inert Gas (MIG) Metal Active Gas (MAG) welding techniques. It also covers the evaluation of the completed welded component.

Learning outcome	The learner will:
1.	Be able to work safely when carrying out motor vehicle body MIG/MAG welding operations
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings throughout all motor vehicle body MIG/MAG welding operations
1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome	The learner will:
2.	Be able to use relevant information to carry out the task
Assessment criteria	
The learner can:	
2.1	select suitable sources of technical information to support motor vehicle body MIG/MAG welding operation activities including: a. vehicle technical data b. welding procedures c. legal requirements
2.2	use technical information to support motor vehicle body MIG/MAG welding operation activities.

Learning outcome	The learner will:
3.	Be able to use appropriate tools and equipment
Assessment criteria	
The learner can:	
3.1	select the appropriate tools and equipment necessary for carrying out motor vehicle body MIG/MAG welding operations
3.2	ensure all tools and equipment that are required are in a safe working condition
3.3	set up and use the appropriate tools and equipment in the way specified by manufacturers when carrying out motor vehicle body MIG/MAG welding operations
3.4	clean and store PPE and equipment in the appropriate manner.

Learning outcome	The learner will:
4.	Be able to carry out motor vehicle body MIG/MAG welding operations
Assessment criteria	
The learner can:	
4.1	prepare surface to ensure a good MIG/MAG weld is achieved
4.2	ensure alignment, mating and treatment of flanges to enable a suitable joint to be achieved
4.3	conduct MIG/MAG weld operations including: <ul style="list-style-type: none"> a. lap plug b. lap seam c. butt joint d. fillet joint
4.4	conduct MIG/MAG weld operations following: <ul style="list-style-type: none"> a. manufacturer's processes, methods and procedures b. test procedures to provide test coupons on equivalent material in accordance with Industry Standards c. recognised researched repair methods d. health, safety and legal requirements e. workplace procedures
4.5	dress the weld area without reducing material thickness and protect the area to inhibit corrosion where applicable
4.6	recognise when the weld is not forming correctly and what action needs to be taken
4.7	inspect and assess quality of welds in accordance with industry standards and manufacturer's specification
4.8	avoid damaging other components, units, panels and surfaces on the vehicle and the surrounding work area. Any damage caused should be correctly reinstated.

Learning outcome	The learner will:
5.	Be able to record information and make suitable recommendations
Assessment criteria	
The learner can:	
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

You must produce evidence of carrying out all of the different types of joints listed below to join materials using MIG/MAG welding. All learning outcomes must be covered

- a. lap plug
- b. lap seam
- c. butt joint
- d. fillet joint.

Unit 420

Skills in Carrying Out Motor Vehicle Body Resistance Spot Welding Operations

Level:	6
Credit value:	4
Relationship to NOS:	This unit is linked to NOS BP 20S – Skills in carrying out motor vehicle body resistance spot welding operations.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit will help the learner to develop the skills required to join materials correctly and effectively using resistance spot welding techniques and procedures. It also covers the evaluation of the completed welded component.

Learning outcome	The learner will:
1.	Be able to work safely when carrying out motor vehicle body resistance spot welding operations
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment checking it is fit for purpose before carrying out motor vehicle body resistance spot welding operations
1.2	protect the vehicle, it's systems and its contents effectively when carrying out resistance spot welding operations
1.3	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome	The learner will:
2.	Be able to use relevant information to carry out the task
Assessment criteria	
The learner can:	
2.1	select and use suitable sources of technical information to support motor vehicle body resistance spot welding operation activities including:
	a. vehicle technical data
	b. welding procedures
	c. legal requirements

2.2	use technical information to support motor vehicle body resistance spot welding operation activities.
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Learning outcome	The learner will:
3.	Be able to use appropriate tools and equipment
Assessment criteria	
The learner can:	
3.1	select the appropriate tools and equipment necessary for carrying out motor vehicle body resistance spot welding operations
3.2	ensure tools and equipment that are required are in a safe working condition
3.3	set up and use the correct tools and equipment in the way specified by manufacturers when carrying out motor vehicle body resistance spot welding operations
3.4	clean and store PPE and equipment in the appropriate manner.

Learning outcome	The learner will:
4.	Be able to carry out motor vehicle body resistance spot welding operations
Assessment criteria	
The learner can:	
4.1	carry out surface preparation to ensure a good resistance spot weld is achieved
4.2	ensure alignment and mating and treatment of flanges to enable a suitable join to be achieved
4.3	produce resistance spot welding operations following: <ul style="list-style-type: none"> a. Recognised research repair methods b. test procedures in accordance to British Standards and providing test coupons on equivalent material in c. manufacturers processes, methods and procedures
4.4	dress and protect the area to inhibit corrosion where applicable
4.5	identify when the weld is not forming correctly and what action needs to be taken
4.6	inspect and assess all resistance spot weld quality in accordance with Industry Standards and manufacturer's specification
4.7	ensure the integrity of the weld and record the type of weld achieved on the appropriate paperwork
4.8	record all weld test pieces
4.9	avoid damaging other components, units, panels and surfaces on the vehicle and the surrounding work area. Any damage caused should be correctly reinstated.

Learning outcome	The learner will:
5.	Be able to record information and make suitable recommendations
Assessment criteria	
The learner can:	
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

You must produce evidence of carrying out resistance spot welding when joining a vehicle body panel to a vehicle, which covers the learning outcomes

- a. weld pitch
- b. indentation
- c. heat zone
- d. nugget size
- e. peel or shear test

Unit 421

Skills in Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to NOS BP215 – Skills in carrying out motor vehicle body metal inert gas (MIG) brazing operations.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit will help the learner to develop the skills required to join materials correctly and effectively using Metal Inert Gas (MIG) brazing operations and procedures. It also covers the evaluation of the completed brazed component.

Learning outcome	The learner will:
1.	Be able to work safely when carrying out motor vehicle body MIG brazing operations
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and check it is fit for purpose before carrying out MIG brazing operations
1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome	The learner will:
2.	Be able to use relevant information to carry out the task
Assessment criteria	
The learner can:	
2.1	select suitable sources of technical information to support motor vehicle body MIG brazing operation activities including: a. vehicle technical data b. brazing procedures c. legal requirements
2.2	use technical information to support motor vehicle body MIG brazing operation activities.

Learning outcome	The learner will:
3.	Be able to use appropriate tools and equipment
Assessment criteria	
The learner can:	
3.1	select the appropriate tools and equipment necessary for carrying out motor vehicle body MIG brazing operations
3.2	ensure all tools and equipment that are required are in a safe working condition
3.3	set up and use the correct tools and equipment in the way specified by manufacturers when carrying out motor vehicle body MIG brazing operations
3.4	clean and store PPE and equipment in the appropriate manner.

Learning outcome	The learner will:
4.	Be able to carry out motor vehicle body MIG brazing operations
Assessment criteria	
The learner can:	
4.1	prepare surface to ensure a good MIG brazing operation is achieved
4.2	ensure alignment, and mating and treatment of flanges to enable a suitable join to be achieved
4.3	carry out MIG brazing operations including: <ul style="list-style-type: none"> a. lap plug b. lap seam c. butt joint
4.4	carry out MIG brazing operations following: <ul style="list-style-type: none"> a. manufacturer's processes, methods and procedures b. test procedures and providing test coupons on equivalent material in accordance with recognised standards c. recognised researched repair methods
4.5	dress the brazing area without reducing material thickness and protect the area to inhibit corrosion where applicable
4.6	recognise when brazing is not forming correctly and what action needs to be taken
4.7	inspect and assess all MIG brazing operations for quality in accordance with recognised standards and manufacturer's specification
4.8	ensure the integrity of the brazing and record the type of brazing achieved on the appropriate paperwork
4.9	avoid damaging other components, units, panels and surfaces on the vehicle and the surrounding work area. Any damage caused should be correctly reinstated
4.10	ensure no damage is incurred to other vehicle systems when carrying out MIG brazing operations.

Learning outcome	The learner will:
5.	Be able to record information and make suitable recommendations
Assessment criteria	
The learner can:	
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

You must produce evidence of carrying out all of the different types of joints listed below to join materials using MIG brazing. All learning outcomes must be covered

- a. lap slot
- b. lap seam
- c. butt joint

Unit 422

Skills in Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to NOS BP225 – Skills in carrying out motor vehicle body cosmetic aluminium panel welding operations.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit will help the learner to develop the skills required to join materials correctly and effectively using aluminium welding techniques and procedures. It also covers the evaluation of the completed welded components.

Learning outcome	The learner will:
1.	Be able to work safely when carrying out motor vehicle body cosmetic aluminium welding operations
Assessment criteria	
The learner can:	
1.1	select, use and maintain the appropriate personal protective equipment when joining materials using cosmetic aluminium welding operations
1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
1.3	protect the vehicle and its contents from damage before, during and after the joining of materials using cosmetic aluminium welding operations.

Learning outcome	The learner will:
2.	Be able to use relevant information to carry out the task
Assessment criteria	
The learner can:	
2.1	select suitable sources of technical information to support motor vehicle body cosmetic aluminium welding operations including: a. vehicle technical data

<ul style="list-style-type: none"> b. welding procedures c. legal requirements <p>2.2 use technical information to support motor vehicle body cosmetic aluminium welding operations.</p>
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Learning outcome	The learner will:
3.	Be able to select, check, maintain and set up all of the appropriate tools and equipment used in motor vehicle body cosmetic aluminium welding operations
Assessment criteria	
The learner can:	
3.1	select the appropriate tools and equipment required when carrying out cosmetic aluminium welding operations
3.2	check that the appropriate tools and equipment required when carrying out cosmetic aluminium welding operations are in a safe working condition
3.3	set up all of the appropriate tools and equipment, used in cosmetic aluminium welding operations in the way specified by manufacturers
3.4	clean and store the appropriate tools and equipment used in motor vehicle body cosmetic aluminium welding operations in the appropriate manner.

Learning outcome	The learner will:
4.	Be able to carry out motor vehicle body cosmetic aluminium welding operations
Assessment criteria	
The learner can:	
4.1	prepare surface preparation to ensure a good cosmetic aluminium weld is achieved
4.2	ensure alignment, and mating and treatment of flanges to enable a suitable join to be achieved
4.3	carry out aluminium welding operations including: <ul style="list-style-type: none"> a. lap slot b. lap seam c. butt joint d. fillet joint
4.4	carry out aluminium welding operations following: <ul style="list-style-type: none"> a. manufacturers processes, methods and procedures b. test procedures and providing test coupons on equivalent material in accordance with Industry Standards c. recognised researched repair methods
4.5	dress the weld area without reducing material thickness and protect the area to inhibit corrosion where applicable
4.6	identify when the weld is not forming correctly and what action needs to be taken
4.7	inspect and assess all aluminium weld quality in accordance with Industry Standards and manufacturers specification
4.8	ensure the integrity of the weld and record the type of weld achieved on the appropriate paperwork

4.9	store and record all weld test pieces
4.10	avoid damaging other components, units, panels and surfaces on the vehicle and the surrounding work area. Any damage caused should be correctly reinstated
4.11	ensure no damage is incurred to other vehicle systems when aluminium welding.

Learning outcome	The learner will:
5.	Be able to record information and make suitable recommendations
Assessment criteria	
The learner can:	
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

You must produce evidence of carrying out 3 out of 4 different types of joints listed below to join materials using aluminium welding. All learning outcomes must be covered

- a. lap slot
- b. lap seam
- c. butt joint
- d. fillet joint.

Unit 424

Skills in Motor Vehicle Body Mechanical Fastening Operations

Level:	5
Credit value:	4
Relationship to NOS:	This unit is linked to NOS BP 24 S– Skills in motor vehicle body mechanical fastening operations
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit will help the learner to develop the skills required to join materials using mechanical fastening techniques and procedures. It also covers the evaluation of the completed mechanical joint.

Learning outcome	The learner will:
1.	Be able to work safely when carrying out motor vehicle body mechanical fastening operations
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings throughout all motor vehicle body mechanical fastening operations
1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome	The learner will:
2.	Be able to use relevant information to carry out the task
Assessment criteria	
The learner can:	
2.1	select suitable sources of technical information to support motor vehicle body mechanical fastening operations activities including: a. vehicle technical data b. joining procedures c. legal requirements
2.2	use technical information to support motor vehicle body mechanical fastening operations activities.

Learning outcome	The learner will:
3.	Be able to use appropriate tools and equipment
Assessment criteria	
The learner can:	
3.1	select the appropriate tools and equipment necessary for carrying out motor vehicle body mechanical fastening operations
3.2	ensure all tools and equipment that are required are in a safe working condition
3.3	set up and use the correct tools and equipment in the way specified by manufacturers when carrying out motor vehicle body mechanical fastening operations
3.4	clean and store PPE and equipment in the appropriate manner.

Learning outcome	The learner will:
4.	Be able to carry out motor vehicle body mechanical fastening operations
Assessment criteria	
The learner can:	
4.1	prepare surface to ensure a good mechanical fastening is achieved
4.2	ensure alignment and mating and treatment of flanges to enable a suitable joint to be achieved
4.3	carry out a range of mechanical fastening
4.4	carry out mechanical fastening operations following: <ul style="list-style-type: none"> a. manufacturers processes, methods and procedures b. recognised researched repair methods
4.5	dress and protect the joint area to inhibit corrosion where applicable
4.6	recognise when the joint is not forming correctly and what action needs to be taken
4.7	avoid damaging other components, units, panels and surfaces on the vehicle and the surrounding work area. Any damage caused should be correctly reinstated.

Learning outcome	The learner will:
5.	Be able to record information and make suitable recommendations
Assessment criteria	
The learner can:	
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

You must produce evidence of carrying out 3 of the 5 different types of joints listed below to join materials using mechanical fastenings. All learning outcomes must be covered

- a. riveting
- b. clinching
- c. bolts and fasteners.
- d. screwing
- e. hybrid joining (combinations of techniques listed that may also include adhesives)

Unit 425

Skills in Motor Vehicle Body Adhesive Bonding Operations

Level:	5
Credit value	3
Relationship to NOS:	This unit is linked to NOS BP25S– Skills in motor vehicle body adhesive bonding operations.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit will help the learner to develop the skills required to join materials using adhesive bonding techniques and procedures. It also covers the evaluation of the completed joint.

Learning outcome	The learner will:
1.	Be able to work safely when carrying out motor vehicle body adhesive bonding operations
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings throughout all motor vehicle body adhesive bonding operations
1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome	The learner will:
2.	Be able to use relevant information to carry out the task
Assessment criteria	
The learner can:	
2.1	select suitable sources of technical information to support motor vehicle body adhesive bonding operation activities including: a. vehicle technical data b. joining procedures c. legal requirements
2.2	use technical information to support motor vehicle body adhesive bonding operation activities.

Learning outcome	The learner will:
3.	Be able to use appropriate tools and equipment
Assessment criteria	
The learner can:	
3.1	select the appropriate tools and equipment necessary for carrying out motor vehicle body adhesive bonding operations
3.2	ensure tools and equipment that are required are in a safe working condition
3.3	set up and use the correct tools and equipment in the way specified by manufacturers when carrying out motor vehicle body adhesive bonding operations
3.4	clean and store PPE and equipment in the appropriate manner.

Learning outcome	The learner will:
4.	Be able to carry out motor vehicle body adhesive bonding operations
Assessment criteria	
The learner can:	
4.1	prepare surface to ensure a good adhesive bond is achieved
4.2	ensure alignment and mating and treatment of flanges to enable a suitable joint to be achieved
4.3	carry out adhesive bonding operations following: <ul style="list-style-type: none"> a. manufacturers processes, methods and procedures b. test procedures and providing test coupons on equivalent material c. recognised researched repair methods
4.4	dress and protect the area to inhibit corrosion where applicable
4.5	identify when the joint is not forming correctly and what action needs to be taken
4.6	avoid damaging other components, units, panels and surfaces on the vehicle and the surrounding work area. Any damage caused should be correctly reinstated.

Learning outcome	The learner will:
5.	Be able to record information and make suitable recommendations
Assessment criteria	
The learner can:	
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

You must produce evidence of carrying out adhesive bonding operations in joining a vehicle body panel to a vehicle, which covers the learning outcomes.

Unit 463

Knowledge of Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels

Level:	6
Credit value:	6
Relationship to NOS:	This unit is linked to NOS BP13K Knowledge of removing and replacing motor vehicle body panels including permanently fixed panels.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of how to remove a range of exterior and sub-structural motor vehicle body panels and panel sections, including permanently fixed panels, where these are damaged and how to refit with new or repaired replacements.

Learning outcome	The learner will:
1. Understand how to work safely when carrying the removal and replacement of motor vehicle body panels including permanently fixed panels	
Assessment criteria	
The learner can:	
1.1	describe the health, safety and legal requirements relating to the removal and replacement of motor vehicle body panels including permanently fixed panels
1.2	describe the importance of selecting, using and maintaining the appropriate personal protective equipment when carrying out the removal and replacement of motor vehicle body panels including permanently fixed panels
1.3	describe the requirements for protecting the vehicle and contents from damage before, during and after the removal and replacement of motor vehicle body panels including permanently fixed panels.

Learning outcome	The learner will:
2.	Understand how to select, check, use and maintain appropriate tools and equipment used in the removal and replacement of motor vehicle body panels including permanently fixed panels
Assessment criteria	
The learner can:	
2.3	explain the use of all tools and equipment required to remove and replace motor vehicle body panels including permanently fixed panels
2.4	explain, within the scope of their responsibilities, how to select, prepare and maintain tools and equipment required to remove and replace motor vehicle body panels including permanently fixed panels.

Learning outcome	The learner will:
3.	Understand how to remove and replace permanent and non-permanently fixed body panels
Assessment criteria	
The learner can:	
3.1	describe the properties of a range of sealants, adhesives and anti-corrosion materials.
3.2	explain the properties of sealants, adhesives and anti-corrosion materials used in the repair process
3.3	explain how to select and apply sealants, adhesives and anti-corrosion materials following manufacturers recommended methods
3.4	compare the advantages and limitations of vehicles built using chassis frame and monocoque/unitary construction
3.5	identify the implications of working with; <ul style="list-style-type: none"> a. mild strength steels b. high strength steels (HSS) c. ultra Strength steels (USS) d. low carbon steels (LCS) e. new generation steels e.g. UHSS f. galvanised coatings g. aluminium alloys

Learning outcome	The learner will:
4.	Understand how to carry out removal and replacement of motor vehicle body panels including permanently fixed panels
Assessment criteria	
The learner can:	
4.1	explain how to identify the manufacturers' joining techniques and how they may differ from the repair method
4.2	explain the different types of mechanical fixings for vehicle body panels and when and why they should be used
4.3	explain the procedures involved in the removal and replacement of vehicle body panels and assemblies
4.4	explain the procedures involved in the removal and replacement of vehicle door skins

- 4.5 explain the procedures involved in establishing cut lines for partial panel replacement
- 4.6 explain how to select the correct joints and joining processes to match the repair area without affecting vehicle strength and integrity
- 4.7 explain the importance and implications of panel clamping and aligning to match existing contours and gaps
- 4.8 explain the effect on the overall body structure of removing and replacing panels
- 4.9 explain the importance and implications of checking the accuracy of repair work
- 4.10 outline the types of quality control checks that can be used to ensure correct alignment and contour of panels, and the operation of components to manufacturers specification
- 4.11 explain the methods and procedures of storing removed components and the importance of storing them correctly and in accordance with legal requirements.

Unit 463 Knowledge of Removing and Replacing Motor Vehicle Body Panels Including Permanently Fixed Panels

Supporting Information

Content

Selection and use of tools and equipment

- a. How to prepare, test and use the tools and equipment required for the removal and replacement of vehicle body panels.
- b. How to operate joining equipment in accordance with the manufacturer's specifications.

Selection and use of materials

- a. The properties of sealants, adhesives and anti-corrosion materials and the requirement for their safe use.
- b. The type of sealants and anti-corrosion materials to use and the manufacturer's recommended methods of their application and thickness.
- c. How to use adhesive bonding materials.
- d. How to select and apply sealants and anti-corrosion materials.
- e. The properties of Vehicle construction materials involved in the construction of the vehicle in the areas that will be worked on during repair
- f. repair and welding implications of working with:
 - i. mild strength steels
 - ii. high strength steels (HSS)
 - iii. ultra Strength steels (USS)
 - iv. low carbon steels (LCS)
 - v. new generation steels e.g. UHSS
 - vi. galvanised coatings
 - vii. aluminium alloys

Removing and replacing vehicle body panels

- a. The principles governing how unitary and separate chassis vehicle bodies are constructed.
- b. How to identify and remove original joining techniques to meet manufacturers and current Industry Standards.
- c. How to identify the difference between manufacturer's processes and repair processes.
- d. The principles of thermal and non-thermal joining techniques i.e. spot welding, Metal Inert Gas (MIG)/Metal Active Gas (MAG), bonding etc.

- e. Correct procedures for the removal and replacement of vehicle body panels.
- f. The manufacturers approved methods of working for the removal and replacement of vehicle body panels.
- g. The different types of mechanical fixings for vehicle body panels and when and why they should be used.
- h. How panel removal and refitting affects the strength and integrity of the vehicle.
- i. The causes and rectification of distortion resulting from thermal joining.
- j. How to find, interpret and use sources of information relevant to the removal and replacement of vehicle body panels and assemblies.
- k. How to remove and replace vehicle body panels and assemblies.
- l. How to remove and replace door skins.
- m. How to establish cut lines for partial panel replacement.
- n. How to prepare all edges to be joined.
- o. How to select the correct joints and joining processes to match the repair area.
- p. The importance and implications of panel clamping and alignment to match existing contours and gaps.
- q. How to carry out bonding/riveting cold repairs
- r. How to test spot weld strength.
- s. How to carry out bonding/riveting cold repairs in panel replacement
- t. How to remove and replace supplementary restraint systems (SRS) using the manufacturers approved method.
- u. How to work safely avoiding damage to the vehicle and its systems.
- v. The importance and implications of checking accuracy of repair work.
- w. The types of quality control checks that can be used to ensure correct alignment and contour of panels and the operation of components to manufacturer's specification.
- x. The methods of storing removed components safely and securely and the importance of storing them correctly in accordance with legal requirements i.e. Airbags/SRS

Unit 464

Knowledge of Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels

Level:	6
Credit value:	6
Relationship to NOS:	This unit is linked to NOS BP14K – Knowledge of identifying and rectifying major repairs to motor vehicle body panels
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of carrying out repairs to motor vehicle body panels using a variety of techniques.

Learning outcome	The learner will:
1.	Understand how to work safely when carrying major repairs to motor vehicle body panels
Assessment criteria	
The learner can:	
1.1	describe the health, safety and legal requirements relating to the identification and rectification of major repairs to motor vehicle body panels
1.2	describe the importance of selecting, using and maintaining the appropriate personal protective equipment when carrying out major repairs to motor vehicle body panels
1.3	describe the requirements for protecting the vehicle and contents from damage before, during and after carrying major repairs to motor vehicle body panels.

Learning outcome	The learner will:
2.	Understand how to select, check, use and maintain appropriate tools and equipment used in major repairs to motor vehicle body panels
Assessment criteria	
The learner can:	
2.1	identify tools used in the repair processes
2.2	identify tools used in hydraulic reforming equipment including specialist pulling systems

2.3	explain how to prepare, test, use and maintain the hand and power tools required to repair vehicle body panels
2.4	explain how to adapt hydraulic push equipment to perform pulling operations.

Learning outcome	The learner will:
3.	Understand material types and properties used in major repairs to motor vehicle body panels
Assessment criteria	
The learner can:	
3.1	identify and describe the properties and different types of materials involved in the construction of the vehicle in the areas that will be worked on during repair
3.2	explain the types and selection of filling materials, their preparation and application
3.3	identify the properties and safe use of types of filling materials used to repair panels
3.4	explain how to mix and apply plastic fillers
3.5	identify and explain the different types and grades of abrasive paper and their use
3.6	explain the principles of chassis frame and monocoque/unitary vehicle construction
3.7	describe the techniques for identifying the type of plastic used for manufactured components.

Learning outcome	The learner will:
4.	Understand how to carry out major repairs to motor vehicle body panels
Assessment criteria	
The learner can:	
12.1	explain how to assess the extent of damage, including corrosion damage
12.2	explain how body panel and component damage can affect other panels and the operation of vehicle systems
12.3	identify the factors determining the use of specific preparation and repair methods
12.4	explain the implications of repairing mild strength steels, high strength steels, ultra high strength steels, low carbon steels, new generation steels i.e. UHSS, galvanised coatings, aluminium alloys and composite panels
12.5	explain the principles associated with hot and cold shrink
12.6	explain how heat can assist in reforming panels but also affect the properties of the steel
12.7	explain the consequences of using inappropriate repair methods
12.8	identify the causes and rectification of distortion resulting from welding
12.9	explain how to prepare the vehicle to avoid contamination
12.10	describe how to prepare damaged areas to facilitate repairs
12.11	describe how to prepare the panel surface prior to filling

- 12.12 explain how to repair corrosion damage
- 12.13 explain how to repair and reinstate vehicle body panel contours and retain structural integrity to components
- 12.14 describe the methods used to check for panel contours for accuracy after reshaping
- 12.15 explain the procedures for reinstating anti corrosion, sealant and sound deadening materials
- 12.16 describe how to complete repairs to a suitable agreed condition to enable the next stage of repairs to proceed
- 12.17 identify the specification for panel shapes, dimensions and tolerances for the vehicles worked upon
- 12.18 identify the types of quality control checks that can be used to ensure the correct contour and standard of finish
- 12.19 describe the aspects of pedestrian safety in relation to the reparability of vehicles

Unit 464 Knowledge of Identifying and Rectifying Major Repairs to Motor Vehicle Body Panels

Supporting information

Content

Selection and use of tools and equipment

- a. The principle governing the selection and use of hand tools during the repair process.
- b. The factors governing the selection and use of panel beating and hydraulic reforming equipment, including specialist pulling systems.
- c. How to prepare, test, use and maintain the tools and equipment required to repair vehicle body panels.
- d. How to adapt hydraulic push equipment to perform pulling operations.

Selection and use of materials

- a. The types and selection of filling materials, their preparation and application.
- b. The properties, types, grades and use of abrasives used in vehicle body panel repair process.
- c. The properties and safe use of types of filling materials used to repair panels including body fillers.
- d. How to mix and apply body fillers and stoppers used in repair.

Repairing vehicle bodies

- a. How to prepare the vehicle to avoid contamination.
- b. How to assess the extent of damage, including corrosion damage.
- c. How unitary vehicle bodies are constructed.
- d. How body panels and component damage can affect other panels and the operation of vehicle systems.
- e. The factors determining the use of specific preparation and repair methods.
- f. The repair and welding implications of working with:
 - i. mild strength steels
 - ii. high strength steels (HSS)
 - iii. ultra Strength steels (USS)
 - iv. low carbon steels (LCS)
 - v. new generation steels i.e. UHSS
 - vi. galvanized coatings
 - vii. aluminium alloys
 - viii. composite panels
- g. The consequences of using inappropriate repair methods.
- h. How heat can be used to assist reforming.
- i. The principles associated with hot and cold shrinking
- j. How heating can affect the properties of steels

- k. The techniques for identifying the type of plastics used for manufactured components.
- l. The procedures for reinstating anti-corrosion, sealant and sound deadening materials.
- m. The causes and rectification and distortion resulting from welding.
- n. The manufacturers approved methods of working for the preparation and repair of vehicle body panels and components.
- o. The specification of panel shapes, dimensions and tolerances for the vehicle worked on.
- p. The type of quality control checks that can be used to ensure the correct contour and standard of finish.
- q. How to interpret and use sources of information relevant to the repair of vehicle body panels and components.
- r. How to prepare damaged areas to facilitate repairs.
- s. How to repair corrosion damaged panels.
- t. How to remove protective materials.
- u. How to repair and reinstate vehicle body panel contours and retain structural integrity to panels and components using:
 - i. body filling operations
 - ii. metal finishing
 - iii. plastic repair
 - iv. panel beating
 - v. panel shrinking
 - vi. hydraulic reforming
 - vii. specialist dent removal tools
- v. The techniques of reshaping damaged vehicle body panels using hand and specialist tools.
- w. How to check the accuracy of reinstated vehicle body panel shapes.
- x. How to complete repairs to an agreed condition for handing on to the painting stage.
- y. How to work safely avoiding damage to the vehicle and its systems.

Repair activities are: -

- a. correction of severely distorted panels
- b. assessing panel damage
- c. fractures on plastic panels

Vehicle body panels are: -

- a. non-permanently fixed panels
- b. permanently fixed panels
- c. sub-structure components
- d. bonded panels

Reinstatement methods are:

- a. panel beating
- b. panel shrinking
- c. body filling operations
- d. metal finishing
- e. plastic repair

- f. specialist dent removal methods
- g. New Generation Steels i.e. UHSS etc

Tools and equipment are:

- a. Workshop equipment
- b. Generic hand tools
- c. Manufacturer's specified and specialist tools

Unit 467

Knowledge of Identifying and Rectifying Motor Vehicle Body Misalignment

Level:	6
Credit value:	6
Relationship to NOS:	This unit is linked to NOS BP17K – Knowledge of identifying and rectifying motor vehicle body misalignment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of how to identify and rectify motor vehicle body misalignment.

Learning outcome	The learner will:
1.	Understand how to work safely when identifying and rectifying motor vehicle body misalignment
Assessment criteria	
The learner can:	
1.1	describe the health, safety and legal requirements relating to the identifying and rectifying motor vehicle body misalignment
1.2	describe the importance of selecting, using and maintaining the appropriate personal protective equipment when identifying and rectifying motor vehicle body misalignment
1.3	describe the requirements for protecting the vehicle and contents from damage before, during and after identifying and rectifying motor vehicle body misalignment.

Learning outcome	The learner will:
2.	Understand how to select, check, use and maintain appropriate tools and equipment used in identifying and rectifying motor vehicle body misalignment
Assessment criteria	
The learner can:	
2.1	identify the constraints of the type of materials used in vehicle construction places on the choice of repair equipment
2.2	identify the tools and equipment used in the repair of vehicle body misalignment
2.3	explain how to prepare, test and set up the equipment required for misalignment rectification
2.4	explain how to install vehicles on misalignment rectification equipment, including the use of lifting equipment
2.5	explain how to use rectification equipment including hand and power tools, safety chains/cables, hydraulic push and pull and body alignment jigs (bracket system and/or measuring system)
2.6	explain how to use clamps, restraints and supports to minimise additional damage during the repair.

Learning outcome	The learner will:
3.	Understand how to identify and rectify motor vehicle body misalignment
Assessment criteria	
The learner can:	
3.1	describe the properties of materials used in vehicle body construction
3.2	compare the materials used in the construction of vehicle bodies.
3.3	compare chassis frame and monocoque/unitary vehicle construction
3.4	explain the principles of damage assessment and identification of direct and indirect damage
3.5	describe the function of pulling systems and the criteria used for their selection
3.6	identify the geometric principles of alignment in the absence of a data sheet
3.7	use sources of information relevant to the rectification of vehicle misalignment
3.8	identify the extent of the damage or misalignment using measuring equipment and or a measuring system
3.9	explain how to realign vehicles to the manufacturers original specification
3.10	explain the importance of following manufacturers and or/approved research repair methods (including use of materials and equipment), instructions and data sheets
3.11	state the possible consequences of failing to follow the manufacturers and/or research repair methods, instructions and data sheets.

Unit 467 Knowledge of Identifying and Rectifying Motor Vehicle Body Misalignment

Supporting information

Content

Selection and use of tools and equipment

- a. The constraints the type of vehicle places on the choice of repair equipment.
- b. How to prepare, test and setup all equipment required for misalignment rectification.
- c. How to install vehicles on misalignment rectification equipment, including the use of lifting equipment.
- d. How to use rectification equipment including:
 - i. hand and power tools
 - ii. safety chains/cables
 - iii. hydraulic push and pull
 - iv. body alignment jigs (bracket system and/or measuring system).
- e. The correct use of clamps, restraints and supports to minimise additional damage during repair.

Realignment of vehicles

- a. The principle of chassis frame and monocoque/unitary vehicle construction.
- b. The principle of damage assessment and identification of direct and indirect damage.
- c. The function of the pulling system and the criteria for selection:
 - i. Vector
 - ii. pull arm
 - iii. tower system
 - iv. floor mounted
 - v. bench mounted.
- d. How to use geometric principles of alignment in the absence of data sheets.
- e. The properties of vehicle body construction materials.
- f. How to find, interpret and use sources of information relevant to the rectification of vehicle misalignment.
- g. How to establish the extent of misalignment using measuring equipment and/or measuring system.
- h. How to realign vehicles to the manufacturers' original specification.
- i. How to work safely avoiding damage to vehicles, personal injury and injury to colleagues.
- j. The importance of following manufacturers' and/or approved research repair methods or instructions and using their approved methods of working (including use of materials and equipment), instructions and data sheets.

- k. The consequences of failing to follow manufacturers' and/or research repair methods or instructions and data sheets.

Rectification activities are:

- a. Visual examination.
- b. Setting up.
- c. Measurement in conjunction with alignment measuring equipment.
- d. Realignment using pulling equipment.

Unit 469

Knowledge of Motor Vehicle Body MIG/MAG Welding Operations

Level:	6
Credit value:	4
Relationship to NOS:	This unit is linked to NOS BP19K – Knowledge of motor vehicle body MIG/MAG welding operations.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of joining carbon steels using Metal Inert Gas (MIG)/Metal Active Gas (MAG) welding Operations.

Learning outcome	The learner will:
1.	Understand how to work safely when carrying out motor vehicle body MIG/MAG welding operations
Assessment criteria	
The learner can:	
1.1	describe the health, safety and legal requirements relating to the joining of carbon steels using MIG/MAG welding operations
1.2	describe the importance of selecting, using and maintaining the appropriate personal protective equipment when joining carbon steels using MIG/MAG welding operations
1.3	describe the requirements for protecting the vehicle and contents from damage before, during and after the joining of carbon steels by MIG/MAG welding operations.

Learning outcome	The learner will:
2.	Understand how to select, check, use and maintain appropriate tools and equipment used in motor vehicle body MIG/MAG welding operations
Assessment criteria	
The learner can:	
2.1	explain the use of all tools and equipment required to join carbon steels using MIG/MAG welding operations
2.2	describe, within the scope of their responsibilities, how to select, prepare and maintain the tools and equipment required to join carbon steels using MIG/MAG welding operations.

Learning outcome	The learner will:
3.	Understand how to carry out motor vehicle body MIG/MAG welding operations
Assessment criteria	
<p>The learner can:</p> <ul style="list-style-type: none"> 3.1 explain the importance of correct surface preparation methods to ensure a good MIG/MAG weld is achieved 3.2 identify the need for correct alignment and mating of carbon steels and the methods used to achieve this in MIG/MAG welding 3.3 describe the welding techniques used in MIG/MAG welding to include: <ul style="list-style-type: none"> a. Lap plug b. Lap seam c. Butt joint d. Fillet joint 3.4 identify the faults and defects that can occur when MIG/MAG welding and the common causes 3.5 describe the quality control measures that can be used to help ensure correct joining of carbon steels before, during and after the welding process 3.6 describe how to inspect and assess MIG/MAG welding in accordance to Industry Standards 3.7 explain the advantages and disadvantages of MAG welding over other welding methods 3.8 explain the importance and implications of checking and carrying out weld test pieces prior to carrying out the welding process. 	

Unit 469 Knowledge of Motor Vehicle Body MIG/MAG Welding Operations

Supporting information

Content.

- a. The correct handling and storage of gas cylinders (manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features, emergency shutdown procedures)
- b. The hazards associated with arc welding (live electrical components; current return (earth return); the electric arc; fumes and gases; gas supply leaks; spatter, hot slag and metal; elevated working; enclosed spaces; slips, trips and falls), and how they can be minimised
- c. The manual, MIG/MAG or welding process (principles of fusion welding, AC and DC power sources, ancillary equipment, power ranges, care of equipment)
- d. The consumables associated with, MIG/MAG or cored wire arc welding (types of wire and their application (solid and cored), types of shielding gas and their application, gas supply and control)
- e. The types of welded joints to be produced (fillet and butt welds and single welds, sheet and sections; welding positions)
- f. Setting up and restraining the joint (the use of jigs and fixtures, manipulators and positioners, restraining devices, tack welding size and spacing in relationship to material thickness).
- g. Preparing the welding equipment and checks that need to be made to ensure that it is safe and ready to use (electrical connections, power return and current return (earth return); wire feed mechanisms, gas supply, setting welding parameters, correct joint set-up, cleanliness of materials used; calibration before use; routine care and maintenance of equipment)
- h. The techniques of operating the welding equipment to produce a range of joints in the various joint positions (fine tuning parameters, correct manipulation of the welding gun, safe closing down of the welding equipment)
- i. The importance of complying with job instructions and the welding procedure specification
- j. Problems that can occur with the welding activities and how these can be overcome (causes of distortion and methods of control, effects of welding on materials and sources of weld defects; methods of prevention)
- k. The importance and usage of organisational quality systems used and weld standards to be achieved; weld inspection and test procedures used (including visual and non-destructive tests)
- l. Personal approval tests, and their applicability to your work

- m. The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- n. Reporting lines and procedures, line supervision and technical experts.

Unit 470

Knowledge of Carrying Out Motor Vehicle Body Resistance Spot Welding Operations

Level:	6
Credit value:	4
Relationship to NOS:	This unit is linked to NOS BP20K – Knowledge of carrying out motor vehicle body resistance spot welding operations
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop the knowledge in order to join materials using resistance spot welding operations.

Learning outcome	The learner will:
1.	Understand how to work safely when carrying out motor vehicle body resistance spot welding operations
Assessment criteria	
The learner can:	
1.1	describe the health, safety and legal requirements relating to the joining of materials using resistance spot welding operations
1.2	describe the importance of selecting, using and maintaining the appropriate personal protective equipment when joining materials using resistance spot welding operations
1.3	describe the requirements for protecting the vehicle and contents from damage before, during and after the joining of materials by resistance spot welding operations.

Learning outcome	The learner will:
2.	Understand how to select, check, use and maintain appropriate tools and equipment used in motor vehicle body resistance spot welding operations
Assessment criteria	
The learner can:	
2.1	identify and explain the use of all tools and equipment required to join materials using resistance spot welding operations
2.2	describe, within the scope of their responsibilities, how to select, prepare, test and maintain tools and equipment required to join materials using resistance spot welding operations.

Learning outcome	The learner will:
3.	Understand how to carry out motor vehicle body resistance spot welding operations
Assessment criteria	
The learner can:	
3.1	describe the constraints of the type of materials used in vehicle construction places on the choice of repair
3.2	describe the importance of correct surface preparation methods to ensure the correct resistance spot weld is achieved and the reasons why surface preparation is important
3.3	identify and explain the need for alignment and mating of materials and the best methods used to achieve this in resistance spot welding
3.4	describe the welding processes, operations and joints used for the joining of materials using resistance spot welding
3.5	identify the faults and defects that can occur when carrying out resistance spot welding
3.6	identify common causes which produce the faults and defects in resistance spot welding and the common causes of these faults
3.7	describe the types of quality control checks that can be used to ensure correct joining of materials e.g. test coupons
3.8	describe how to inspect and assess resistance spot welding quality in accordance to Industry Standards including: <ul style="list-style-type: none"> a. weld pitch b. indentation/ weld profile c. heat zone d. nugget size e. peel and shear test
3.9	explain the importance and implications of checking and carrying out weld test pieces prior to carrying out the welding process.

Unit 470 Knowledge of Carrying Out Motor Vehicle Body Resistance Spot Welding Operations

Supporting information

Content

- a. The specific safety precautions to be taken when operating resistance welding installations (working with machinery; the use of appropriate personal protective equipment machine guards; operation of machine safety devices; stopping the machine in an emergency; closing down the machine on completion of the welding activities; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials), any regulations relating to EMF (Electric Magnetic Field)
- b. The hazards associated with resistance welding machines (dangers from live internal electrical components, fumes, hot metal, expulsion of hot particles, moving parts of machines), and how they can be minimised
- c. The principles of resistance welding; terminology used in welding
- d. Mechanised and automated welding s (types of installation; machine functions; control systems; safety features)
- e. The key components and features of the equipment used (power source; electrical parameters such as current, electrode pressure and welding time; systems for parameter control; how variation in the parameters influence weld features, quality and output)
- f. Extracting the information required from recognised researched repair methods
- g. Operation of the machine controls and their function; clamping of components and equipment care procedures
- h. Setting up and aligning the work piece
- i. Monitoring the welding process; recognition of problems, and action to be taken
- j. Problems that can occur with the welding activities, materials and weld defects
- k. Self inspection of completed work
- l. Organisational quality systems (standards to be achieved; production records to be kept)
- m. Personal approval tests and their applicability to your work
- n. The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- o. Reporting lines and procedures, line supervision and technical experts
- p. The requirements of the power supply to the unit and the use of extension cables.

Unit 471

Knowledge of Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations

Level:	6
Credit value:	4
Relationship to NOS:	This unit is linked to NOS BP21K- Knowledge of carrying out motor vehicle body metal inert gas (MIG) brazing operations
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of joining materials using Metal Inert Gas (MIG) brazing operations and procedures.

Learning outcome	The learner will:
1.	Understand how to work safely when carrying out motor vehicle body MIG brazing operations
Assessment criteria	
The learner can:	
1.1	describe the health, safety and legal requirements relating to the joining of materials using MIG brazing operations
1.2	describe the importance of selecting, using and maintaining the appropriate personal protective equipment when joining materials using MIG brazing operations
1.3	describe the requirements for protecting the vehicle and contents from damage before, during and after the joining of materials by MIG brazing operations.

Learning outcome	The learner will:
2.	Understand how to select, check, use and maintain appropriate tools and equipment used in motor vehicle body MIG brazing operations
Assessment criteria	
The learner can:	
2.1	explain the use of all tools and equipment required to join materials using MIG brazing operations

2.2	explain, within the scope of their responsibilities, how to select, prepare and maintain tools and equipment required to join materials using MIG brazing operations.
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Learning outcome	The learner will:
3.	Understand how to carry out motor vehicle body MIG brazing operations
Assessment criteria	
The learner can:	
3.1	explain the importance of correct surface preparation methods to ensure a good MIG brazing technique is achieved
3.2	identify the correct need for alignment/mating of materials and the best methods used to achieve this in MIG brazing operations
3.3	explain the brazing processes, techniques and joints used for the joining of materials using MIG brazing technique, joints include: <ul style="list-style-type: none"> a. lap slot b. lap seam c. butt joint
3.4	identify the faults and defects that can occur when carrying out MIG brazing
3.5	identify common causes which produce the faults and defects in MIG brazing
3.6	describe the types of quality control checks that can be used to ensure correct joining of materials
3.7	describe how to inspect and assess MIG brazing operation in accordance to recognised Standards
3.8	explain the importance and implications of checking and carrying out brazing test pieces prior to carrying out the brazing process
3.9	report any anticipated delays in completing our work to the relevant person(s).

Unit 471 Knowledge of Carrying Out Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations

Supporting information

Content

- a. The safe working practices and procedures to be observed when operating brazing installations (working with machinery; the use of appropriate personal protective equipment; machine guards; operation of machine safety devices; stopping the machine in an emergency; closing the machine down on completion of activities; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
- b. The hazards associated with MIG brazing machines (dangers from relevant equipment sources; fumes and gases; hot metal; moving parts of machinery), and how they can be minimized
- c. The hazards associated when preparing aluminium or cutting through a mix of materials due to the risk of explosion and how the correct type of extraction must be used when doing so
- d. Principles of the relevant brazing process; terminology used in brazing
- e. The key components and features of the equipment
- f. How to extract the information required from drawings and brazing procedure specifications
- g. Operation of the machine controls and their function; care of equipment; control and storage of consumables
- h. Setting up and aligning the work pieces
- i. Monitoring the installation during the brazing process; recognition of problems, and action to be taken
- j. Problems that can occur with the brazing activities, materials, filler metals and joint defects
- k. Self-inspection of completed work
- l. Organisational quality systems (standards to be achieved; production records to be kept)
- m. Personal approval tests and their applicability to your work
- n. The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- o. Reporting lines and procedures, line supervision and technical experts

Unit 472

Knowledge of Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations

Level:	6
Credit value:	4
Relationship to NOS:	This unit is linked to NOS BP22K – Knowledge of carrying out motor vehicle body cosmetic aluminium panel welding operations
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of joining materials using aluminium welding techniques and procedures on cosmetic aluminium panels only.

Learning outcome	The learner will:
1.	Understand how to work safely when carrying out welding operations to cosmetic aluminium panels
Assessment criteria	
The learner can:	
1.1	explain the health, safety and legal requirements relating to welding operations whilst repairing cosmetic aluminium panels.
1.2	explain the importance of selecting, using and maintaining the appropriate personal protective equipment when welding whilst repairing cosmetic aluminium panels
1.3	explain the requirements for protecting the vehicle and contents from damage before, during and after welding operations whilst repairing cosmetic aluminium panels.

Learning outcome	The learner will:
2.	Understand how to select, check, maintain and set up all of the appropriate tools and equipment used in motor vehicle body cosmetic aluminium welding operations
Assessment criteria	
The learner can:	
2.1	explain the use of all tools and equipment required to join materials using welding operations whilst repairing cosmetic aluminium panels
2.2	explain, within the scope of their responsibilities, how to select, check, maintain and set up all of the tools and equipment required to correctly join materials using cosmetic aluminium welding operations.

Learning outcome	The learner will:
3.	Understand how to carry out motor vehicle body cosmetic aluminium welding operations
Assessment criteria	
The learner can:	
3.1	explain the different types of welding processes, techniques, materials and joints used for joining of materials when using cosmetic aluminium welding operations
3.2	explain the importance of correct surface preparation methods to ensure a good cosmetic aluminium weld is achieved and the reasons why surface preparation is important
3.3	identify the correct need for alignment of materials and the methods used to achieve this in cosmetic aluminium welding
3.4	identify the faults and defects that can occur when carrying out cosmetic aluminium welding and the common causes of these faults
3.5	explain how to ensure cross contamination does not occur and the effect of cross contamination on cosmetic aluminium
3.6	explain the importance and implications of checking and carrying out weld test pieces prior to carrying out the welding process.

Unit 472 Knowledge of Carrying Out Motor Vehicle Body Cosmetic Aluminium Panel Welding Operations

Supporting information

Content

- a. The safe working practices and procedures to be observed when working with cosmetic aluminium welding equipment (general workshop and site safety; appropriate personal protective equipment; fire prevention; protecting other
- b. Workers from the effects of the electric arc; safety in enclosed/confined spaces; fume control; accident procedure; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
- c. The hazards associated with cosmetic aluminium welding (live electrical components; current return (earth return) arrangements; the electric arc; fumes and gases; gas supply leaks; spatter; hot slag and metal; grinding and mechanical metal/slag removal; elevated working; enclosed spaces; slips, trips and falls), and how they can be minimised
- d. The correct handling and storage of gas cylinders (manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features, emergency shutdown procedures)
- e. The manual MIG welding process (principles of fusion welding; power sources; ancillary equipment; power ranges; arc initiation system; care and maintenance of equipment)
- f. The consumables associated with MIG welding (types of filler wire, types of shielding gas, welding electrodes, gas supply and control, control and storage of consumables)
- g. The types of welded joints to be produced (fillet and butt welds, single and multi-run welds, sheet and sections; welding positions)
- h. Setting up and restraining the joint (confirming correct set-up of joint; cleanliness of materials used; the use of jigs and fixtures, manipulators and positioners, restraining devices; tack welding size and spacing in relationship to material thickness)
- i. Preparing the equipment, and checks that need to be made to ensure that it is safe to use (condition of electrical connections, power return and current return (earth return) arrangements, operating parameters)
- j. The techniques of operating the welding equipment to produce a range of joints in the various joint positions (fine tuning parameters, correct manipulation of torch, safe closing down of the welding equipment)

- k. The importance of complying with job instructions and the welding procedure specification
- l. Problems that can occur with the welding activities and how these can be overcome (causes of distortion and methods of control, effects of welding on materials and sources of weld defects; methods of prevention)
- m. The organisational quality systems used and weld standards to be achieved; weld inspection and test procedures used (including visual and non-destructive tests)
- n. Personal approval tests and their applicability to your work
- o. The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- p. Reporting lines and procedures, line supervision and technical experts.

Unit 474

Knowledge of Motor Vehicle Body Mechanical Fastening Operations

Level:	5
Credit value:	2
Relationship to NOS:	This unit is linked to NOS BP24 – Motor Vehicle Body Mechanical Fastening Operations.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of joining materials using mechanical fastening techniques and procedures.

Learning outcome	The learner will:
1.	understand how to select, check, use and maintain appropriate tools and equipment used in motor vehicle body mechanical fastening operations.
Assessment criteria	
The learner can:	
1.1	explain the use of all tools and equipment required to join materials using mechanical fastening operations
1.2	explain, within the scope of their responsibilities, how to select, prepare and maintain tools and equipment required to join materials using mechanical fastening operations.

Learning outcome	The learner will:
2.	understand how to carry out motor vehicle body mechanical fastening operations
Assessment criteria	
The learner can:	
2.1	describe the importance of correct surface preparation methods to ensure a good mechanical fastening is achieved
2.2	identify the correct need for alignment and mating of materials and the best methods used to achieve this in mechanical fastening operations
2.3	explain the mechanical fastening processes, techniques and joints used for the joining of materials, joints include: a. riveting (single sided, double sided and self piercing)

- b. clinching
- c. bolts and fasteners
- d. screwing (self threading and self piercing)
- e. hybrid joining (combinations of techniques listed that may also include adhesives)

- 2.4 explain how different materials used in the construction of motor vehicles react with each other
- 2.5 identify the faults and defects that can occur when carrying out mechanical fastening operations
- 2.6 identify common causes which produce the faults and defects in mechanical fastening operations
- 2.7 explain the types of quality control checks that can be used to ensure correct joining of materials
- 2.8 explain how to use adhesives with riveting techniques
- 2.9 explain the advantages and disadvantages of mechanical fastening operations over other joining methods.

Unit 474 Knowledge of Motor Vehicle Body Mechanical Fastening Operations

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

- a. The hazards associated with the joining operations (such as handling sheet/fabricated components, using hot metal riveting techniques, handling and using sealants and cleaning agents, dangerous or badly maintained tools and equipment), and how they can be minimised.
- b. How to obtain the necessary drawings and joining procedure specifications.
- c. How to extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards in relation to work undertaken).
- d. The use of manufacturers' specifications for the types of fasteners used.
- e. The various joining processes that are used, and the tools and equipment required.
- f. The preparations to be carried out on the materials/components prior to joining them (such as materials to be degreased, dry and clean, with holes and flanges de-burred).
- g. How to set up and align the joints prior to fixing, and the tools and methods that can be used (such as clamps, rivet gripping tools, temporary fixings, jacking and supporting devices).
- h. How to produce a secure joint using blind rivets, and the type of riveting tools that are available.
- i. The range of bolts and screwed fasteners that are to be used; why it is important to use the correct type of washer; sequence of tightening bolts on flanged joints; and the tools and equipment used to ensure they are tightened to the required torque.
- j. Checks to be carried out on the tools and equipment prior to use to ensure that they are in a safe and useable condition (such as condition of plugs and leads on power tools, condition of striking faces on hammers, condition of riveting tools).
- k. Equipment setting, operating and care procedures; why equipment and tools need to be correctly set up and in good condition.
- l. The importance of using the tools only for the purpose intended; the care that is required when using the equipment and tools; the proper way of preserving and storing tools and equipment between operations.
- m. The things that can go wrong with the joining operations, and how these can be avoided.

- n. The extent of your own authority and whom you should report to if you have problems that you cannot resolve.
- o. Reporting lines and procedures, line supervision and technical experts.

Unit 475

Knowledge of Motor Vehicle Body Adhesive Bonding Operations

Level:	6
Credit value:	4
Relationship to NOS:	This unit is linked to NOS BP25 K – Knowledge of motor vehicle body adhesive bonding operations.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of joining materials using adhesive bonding techniques and procedures.

Learning outcome	The learner will:
1.	Understand how to work safely when carrying out motor vehicle body adhesive bonding operations
Assessment criteria	
The learner can:	
1.1	explain the health, safety and legal requirements relating to the joining of materials using adhesive bonding techniques
1.2	explain the importance of selecting, using and maintaining the appropriate personal protective equipment when joining materials using adhesive bonding techniques
1.3	explain the requirements for protecting the vehicle and contents from damage before, during and after the joining of materials by adhesive bonding techniques.

Learning outcome	The learner will:
2.	Understand how to select, check, use and maintain appropriate tools and equipment used in motor vehicle body adhesive bonding operations
Assessment criteria	
The learner can:	
2.1	explain the use of all tools and equipment required to join materials using adhesive bonding techniques
2.2	explain, within the scope of their responsibilities, how to select, prepare and maintain tools and equipment required to join materials using adhesive bonding techniques.

Learning outcome	The learner will:
3.	Understand how to carry out motor vehicle body adhesive bonding operations
Assessment criteria	
The learner can:	
3.1	explain the importance of correct surface preparation methods to ensure a good adhesive bonding joint is achieved
3.2	identify the need for alignment/mating of materials and the best methods used to achieve this in adhesive bonding
3.3	explain the joining processes, techniques and joints used for the joining of materials using adhesive bonding
3.4	identify the faults and defects that can occur when carrying out adhesive bonding
3.5	identify common causes which produce the faults and defects in adhesive bonding
3.6	explain the types of quality control checks that can be used to ensure correct joining of materials
3.7	explain the advantages and disadvantages of adhesive bonding over other joining methods
3.8	explain the importance and implications of checking and carrying out test pieces prior to carrying out the joining process.

Unit 475 Knowledge of Motor Vehicle Body Adhesive Bonding Operations

Supporting information

Content

- a. The specific safety precautions to be taken when bonding materials using adhesives (general workshop and site safety, appropriate personal protective equipment, accident procedure; statutory regulations, risk assessment procedures and COSHH regulations)
- b. The personal protective clothing and equipment to be worn when carrying out bonding as part of the fabrication activities (gloves, eye protection, respiratory protection, etc)
- c. The importance of good workshop practice and housekeeping, ventilation and fume control equipment, first aid procedures and actions, hazardous substances and relevant sections of COSHH
- d. The hazards associated with bonding components, and how they can be minimised
- e. How to obtain the necessary drawings and joining specifications

How to extract information from research repair methodology in relation to the work undertaken

- a. Types of adhesives
 - i. impact
 - ii. two parts
 - iii. cyanoacrylate
 - iv. anaerobic
 - v. sealants
 - vi. toughened
- b. Knowledge of Curing Mechanisms including:
 - i. moisture/solvent evaporation
 - ii. chemical/thermal reaction
 - iii. exposure/exclusion to oxygen
- c. Understanding the importance of recording shelf life, pot life, setting and curing times
- d. Knowledge of adhesion and cohesion.
- e. Understanding
- f. The material preparations that are required, and the equipment and consumables that are used.
- g. The importance of working to organisational and bonding agent manufacturers' instructions whilst carrying out the bonding activities.
- h. The methods and techniques used for bonding the materials (such as gluing, impact, chemical and thermal reaction techniques).
- i. The characteristics of the adhesives that are to be used.

- j. The application of, and precautions to be taken when using, adhesives and solvents.
- k. Maintenance and care of tools and equipment.
- l. Methods of degreasing components and producing a keying surface.
- m. Type and suitability of adhesives, setting or curing requirements and time, strength and appearance.
- n. Common causes of defects associated with the bonding processes, and how to avoid them.
- o. The effects of the environment on the bonding process (such as temperature humidity, cleanliness).
- p. How to identify, select, use, and clean, the appropriate bonding agent holding vessels, brushes, stirrers and spatulas, scrapers, knives, clamps and weights.
- q. The importance of cleaning up after use, to ensure everything can be used again and to minimise the need for replacement of equipment.
- r. Reasons for checking that components are assembled in the correct sequence, are positioned dimensionally accurately and to the correct orientation, in accordance with the specifications, prior to bonding.
- s. How to check that completed joints are firm, sound and fit for purpose.
- t. Procedures for cleaning off surplus adhesive and tidying up the appearance of joints.
- u. The extent of your own authority and whom you should report to if you have problems that you cannot resolve.
- v. Reporting lines and procedures, line supervision and technical experts.

Unit 476

Knowledge of Motor Vehicle Construction and Materials

Level:	5
Credit value:	3
Relationship to NOS:	This unit is linked to NOS BP26K – Knowledge of motor vehicle construction and materials.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of types of metals and composites used in the construction of motor vehicles, the areas where these materials are used and what their properties are. It is also about the design and construction techniques used in the vehicle body and chassis.

Learning outcome	The learner will:
1.	Understand material types and properties used in motor vehicle construction
Assessment criteria	
The learner can:	
1.1	describe the properties and different types of materials used in the construction of vehicle bodies including: <ol style="list-style-type: none"> a. mild steel b. ultra high strength steel c. aluminium alloys d. stainless steel e. plastics f. composites g. trim materials
1.2	identify the types of materials used in the construction of vehicle bodies and chassis components
1.3	explain the properties of materials used in vehicle body construction
1.4	describe how different materials used in the construction of motor vehicles react with each other
1.5	describe the importance of cleanliness and avoiding cross contamination when working with different materials

1.6	describe the importance of selecting and using the appropriate joining techniques for the type of material.
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Learning outcome	The learner will:
2.	Understand how the different types of materials and formation methods affect the construction of motor vehicle bodies
Assessment criteria	
The learner can:	
2.1	explain the principles of chassis frame and monocoque vehicle construction
2.2	identify the different types of chassis designs used for modern vehicles, including commercials
2.3	explain the effects on strength once the overall body structure is complete
2.4	identify the different body and chassis components that are made using different materials, including the advantages and disadvantages
2.5	describe how crumple zones affect the safety, design, cost and construction of motor vehicle bodies and chassis
2.6	describe how the type of material used affects the safety, design, cost and construction of motor vehicle bodies and chassis
2.7	identify the implications of recycling of vehicle bodies and chassis components, now and in the future.

Learning outcome	The learner will:
3.	Understand how damage to the construction of a motor vehicle will affect its safety
Assessment criteria	
The learner can:	
3.1	describe how to carry out a vehicle inspection to assess for damage
3.2	describe how to check a vehicle for correct alignment
3.3	describe how manipulation of the vehicle body and chassis will affect its residual strength.

Unit 476 Knowledge of Motor Vehicle Construction and Materials

Supporting information

Content

Common forms in which body repair materials are supplied

- a. Identify the common forms of supply of metals to include:
 - i. sheet
 - ii. roll
 - iii. bar
 - iv. section.
- b. Identify common forms of supply for non metals:
 - i. solid
 - ii. liquid
 - iii. composites
 - iv. laminated.

Mechanical properties and use examples of materials to illustrate these properties

- a. Define the three states of matter.
- b. State the definitions of the following mechanical properties:
 - i. ductility
 - ii. malleability
 - iii. hardness
 - iv. toughness
 - v. elasticity
 - vi. plasticity
 - vii. weldability
 - viii. conductivity
 - ix. insulation.
- c. Give examples of materials and components exhibiting the above properties.
- d. Describe ways in which the above properties can be changed temporarily or permanently to include:
 - i. heating
 - ii. alloying
 - iii. cold working
 - iv. heat treatments.

Define and distinguish between classes of materials

- a. Define classes of materials as:
 - i. metals
 - ii. non metals
 - iii. synthetic

- iv. natural.
- b. Classify metals into:
 - i. ferrous
 - ii. non ferrous
 - iii. pure metals
 - iv. alloys.

Factors which affect the selection of listed materials

- a. Identify the range of selection factors which determine the use of materials to include:
 - i. material costs
 - ii. suitability for use
 - iii. form of supply
 - iv. joining characteristics
 - v. strength
 - vi. material properties
 - vii. corrosion resistance
 - viii. melting point.
- b. Compare the factors affecting the use of:
 - i. pure metals
 - ii. alloys
 - iii. plastics.
- c. Understand the importance of melting points of the following:
 - i. LC steel
 - ii. aluminium alloy
 - iii. stainless steel
 - iv. solder
 - v. common plastics.

Listed materials used in repair or construction

- a. Identify the types and properties of steels used in construction and repair to include:
 - i. low carbon steels
 - ii. medium carbon steels
 - iii. high carbon steels
 - iv. cast irons
 - v. alloy steels
 - vi. UHSS.
- b. Describe the properties of common non ferrous metals used in construction and repair to include:
 - i. aluminium
 - ii. zinc
 - iii. lead
 - iv. tin
 - v. copper.

- c. Compare and identify listed non-metals used in repair or construction to include:
 - i. plastics
 - ii. glass
 - iii. fabrics
 - iv. leather
 - v. rubber.
- d. Define the terms:
 - i. Thermos plastic
 - ii. thermosetting plastics.
- e. Identify the uses and properties of materials used for interior furnishings such as:
 - i. rubber
 - ii. fabric
 - iii. leather
 - iv. glass.
- f. Give examples of common plastics used in repair and construction including:
 - i. ABS
 - ii. polyethylene
 - iii. polypropylene
 - iv. polyester
 - v. acrylic
 - vi. glass reinforced plastic.
- g. State the constituents and general properties of the following alloys:
 - i. solder
 - ii. stainless steel
 - iii. low carbon steel
 - iv. brass
 - v. aluminium alloys including duralumin.

Ways in which the properties of metals can be changed temporarily or permanently

- a. Explain the advantages of changing the material properties temporarily.
- b. Explain the effects of changing the material properties permanently
- c. State the advantages of changing materials properties.
- d. State that material properties can be changed by:
 - i. heat treatment
 - ii. cold working
 - iii. alloying.
- e. Describe how the properties of metals are changed under the above three headings

Causes of corrosion in steel car bodies

- a. Explain the principle of oxidation to include:
 - i. simple corrosion cell
 - ii. combination with oxygen
 - iii. effects of an electrolyte
 - iv. effects of dissimilar metals.

- b. Identify reasons for corrosion in vehicles to include:
 - i. bad joint design
 - ii. poor protection
 - iii. stone chips
 - iv. water leaks
 - v. industrial pollution.
- c. Explain that methods of corrosion protection can include:
 - i. protective metal coatings
 - ii. protective non-metal coatings
 - iii. cavity waxes
 - iv. anti chip coatings
 - v. sealers.
- d. Describe the effects of corrosion in a vehicle body to include:
 - i. loss of strength
 - ii. manufacturer's warranty consideration
 - iii. loss of appearance.

Characteristics of body assemblies

- a. Describe methods of producing body panels to include:
 - i. forming
 - ii. pressing
 - iii. moulding.
- b. Describe the methods of imparting strength to sheet metal to include:
 - i. swages
 - ii. edging
 - iii. forming into sections
 - iv. combining sections into box sections
 - v. the principles of crowned panels.
- c. Describe the characteristics of monocoque structures.
- d. Describe the characteristics of separate construction.
- e. Identify by name and description of use, the following:
 - i. sill panel
 - ii. bulkhead
 - iii. chassis leg
 - iv. inner flitch
 - v. cross member
 - vi. a, b, c and d posts
 - vii. roof
 - viii. cant rail
 - ix. windscreen header rails
 - x. floor assembly
 - xi. inner wheel arches
 - xii. dog leg
 - xiii. scuttle panels
 - xiv. front panel
 - xv. headlamp mounting panels
 - xvi. back panel.

Unit 506

Skills in how to Make Learning Possible through Demonstration and Instruction

Level:	7
Credit value:	5
Relationship to NOS:	This unit is linked to NOS G6S – Skills in how to make learning possible through demonstrations and instruction
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit will help the learner to develop the skills required to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners' progress and giving feedback.

Learning outcome	The learner will:
1.	Be able to demonstrate skills and methods to learners
Assessment criteria	
The learner can:	
1.1	perform demonstrations based on an analysis of the skills needed and the order in which they must be learned
1.2	perform demonstrations that are accurate and realistic
1.3	perform structured demonstrations so that the learner can get the most out of it
1.4	perform demonstrations whilst encouraging learners to ask questions and get explanation at appropriate stages in the demonstration
1.5	provide positive feedback to learners whilst they are being given the opportunity to practise the skills that have been demonstrated
1.6	perform additional demonstrations of skills being taught to reinforce learning
1.7	perform demonstrations in a safe environment which also allows learners to see clearly
1.8	respond to the needs of the learners during demonstrations

1.9 reduce distractions and disruptions as much as possible.

Learning outcome	The learner will:
2.	Be able to instruct learners
Assessment criteria	
The learner can:	
2.1	implement instruction which is matched to the needs of learners
2.2	use identified learning outcomes which can be achieved through instruction
2.3	perform instruction, ensuring that the manner, level and speed of the instruction encourages learners to take part
2.4	perform instruction whilst regularly checking that the learners understand and adapt instruction as appropriate
2.5	give learners positive feedback on the learning experience and the outcomes achieved
2.6	carry out a review with the learners to identify anything that prevented learning and adapt instruction as appropriate.

Evidence Requirements

1. You must provide 1 record of an activity which has been a combination of demonstration and instruction.
2. You must provide records of an observation, which covers a combination of demonstration and instruction.
3. It is expected that the records must include evidence to show how you:
 - a. decided on the sequence of the demonstration
 - b. identified which learning outcomes were achieved
 - c. ensured that the demonstration was accurate and realistic
 - d. ensured a safe environment for the demonstration and allowed all learners to see the demonstration clearly
4. In preparing the record you should consider:
 - a. which types of learning are best achieved and supported through demonstrations
 - b. how to choose and prepare appropriate materials, including technology based materials.
 - c. how to choose between instruction and demonstration as learning methods
 - d. which types of learning are best achieved through instruction
 - e. how to identify individual learning needs
 - f. how to make sure everybody acts in line with health, safety and environmental protection legislation and best practice
 - g. which factors are likely to prevent learning and how to overcome them
 - h. how to analyse developments in learning and new ways of delivery, including technology based learning

5. It is also expected that evidence from your observations will show how you:
 - a. structured the demonstration so that the learner got the most out of it
 - b. reduced distractions and disruptions as much as possible
 - c. encouraged learners to ask questions and get explanations at appropriate stages in the demonstration
 - d. matched instruction to the needs of learners
 - e. gave learners the opportunities to practice the skill being demonstrated
 - f. ensured that the manner, level and speed of the instruction encourages learners to take part
 - g. gave learners positive feedback
 - h. regularly check that learners understand and adapt instruction as appropriate
 - i. reinforced learning by repeating demonstration
 - j. gave learners positive feedback on the learning experience and the outcome achieved
 - k. responded to the needs of learners during the demonstration
 - l. identified anything that prevented learning and reviewed this with the learner.

Evidence from **real** or **simulated** activities and **role play** is acceptable for this unit

Unit 556

Knowledge of how to Make Learning Possible through Demonstration and Instruction

Level:	7
Credit value:	5
Relationship to NOS:	This unit is linked to NOS G6K – Knowledge of how to make learning possible through demonstrations and instruction
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements.
Aim:	This unit enables the learner to develop an understanding of how to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners' progress and giving feedback.

Learning outcome	The learner will:
1.	Understand the nature and role of demonstrations and instruction
Assessment criteria	
The learner can:	
1.1	classify the separate areas of demonstrations which encourage learning
1.2	identify which types of learning are best achieved and supported through demonstrations
1.3	explain how to identify and use different learning opportunities
1.4	explain how to structure demonstrations and instruction sessions
1.5	explain how to choose from a range of demonstration techniques.

Learning outcome	The learner will:
2.	Understand the principles and concepts of demonstration and instruction
Assessment criteria	
The learner can:	
2.1	describe how to put learners at ease and encourage them to take part
2.2	justify the choice between demonstration and instruction as a learning method
2.3	explain how to identify individual learning needs
2.4	clarify which factors are likely to prevent learning and how to overcome them
2.5	explain how to check learners' understanding and progress
2.6	explain how to choose and prepare appropriate materials
2.7	explain the separate areas of instructional techniques which encourage learning
2.8	describe which types of learning are best achieved and supported through instruction.

Learning outcome	The learner will:
3.	Understand the external factors influencing human resource development
Assessment criteria	
The learner can:	
3.1	explain how to make sure everybody acts in line with health, safety and environmental protection, legislation and best practice
3.2	analyse developments in technology based learning and new ways of delivery.

Unit 556 Knowledge of how to Make Learning Possible through Demonstration and Instruction

Supporting information

Content

Separate areas of demonstration which encourage learning to include:

- a. Demonstration is particularly applicable to learning manual skills.
- b. Learning to do something usually involves:
 - i. purpose – the aim or objective
 - ii. procedure - the most effective way of completing the task
 - iii. practice – all skills require practice to improve.
- c. Practical tasks are more quickly learnt through demonstration.
- d. Emphasis is required to body movements when demonstrating.
- e. The demonstrator should encourage learners to ask questions.
- f. Emphasis should be placed upon key points whilst demonstrating.
- g. Any demonstration should ensure that all safety aspects are covered.

Types of learning which are best achieved and supported through demonstrations to include:

- a. Types of learning:
 - i. psychomotor – measurement of manual skill performance
 - ii. cognitive – learning involving thought processes
 - iii. affective – demonstration of feelings, emotions or attitudes.
- b. Demonstration - involves learning to do something (Psychomotor Domain).
- c. Combination of instruction and practical demonstrations are very effective means of learning practical skills.

How to structure demonstration and instruction sessions

To include:

- a. Before the demonstration and/or instruction ensure that the following good practice is recognised:
 - i. identify key points
 - ii. relate theoretical underpinning knowledge to key points
 - iii. rehearse to ensure that all equipment is working
 - iv. ensure all students can see even small equipment and processes
 - v. time the demonstration
 - vi. consider how to make students participate
 - vii. consider how to emphasise safe working practices.

- b. During the demonstration and/or instruction good practice is to:
 - i. give a clear introduction
 - ii. identify any tools/equipment
 - iii. determine the current audience level of knowledge
 - iv. complete the demonstration correctly (do not show how not to do it)
 - v. stress key points and show links between them
 - vi. monitor safety aspects
 - vii. check learner understanding.
- c. After the demonstration (if possible)
 - i. enable the audience to practice the techniques
 - ii. provide feedback on their performance.

How to identify individual learning needs

- a. Diagnose the learning needs of your audience to include:
 - i. what competencies they already have
 - ii. what experience they have of the subject area
 - iii. what competencies they need to achieve
 - iv. what demonstration techniques are best suited to their needs
 - v. how you will assess their needs have been met.

What factors are likely to prevent learning, to include:

- a. language barriers
- b. physical barriers
- c. specialist knowledge
- d. pace of learning
- e. method of delivery
- f. environmental factors
- g. teaching styles
- h. dyslexia.

How to check learners' understanding and progress

- a. Questionnaires.
- b. Verbal questioning.
- c. Observation.
- d. Assessment.
- e. Role play.
- f. Projects/assignments.
- g. Multi-choice questions.
- h. Simulation
- i. Tests.

How to organise information and prepare materials

- a. Identify the course aim.
- b. Identify the subject aim.
- c. Identify the lesson aim.
- d. Complete a lesson plan - plan the teaching.
- e. Identify a series of 'cues' to be used during the lesson.
- f. Logically organise the information.
- g. Use suitable resources and equipment to maximise learning opportunities.
- h. Assess the learners' progress and understanding.

Instructional techniques

- a. Types of instructional techniques to include:
 - i. lectures
 - ii. handouts
 - iii. team teaching
 - iv. peer teaching
 - v. discussion – individual, group and peer
 - vi. question and answer
 - vii. multimedia
 - viii. seminars
 - ix. case studies
 - x. project/assignments.

Environmental factors that affect learning

- a. Environmental factors that should be considered before demonstration/instruction to include:
 - i. loud noises
 - ii. bright colours
 - iii. bright lights
 - iv. strong smells
 - v. atmosphere
 - vi. temperature
 - vii. classroom seating
 - viii. classroom layout

Health and safety factors that affect learning

- a. Health and safety factors that should be considered before demonstration/instruction to include:
 - i. assessment of risk and hazards
 - ii. condition of electrical/electronic equipment
 - iii. position of cables and wires
 - iv. safety of equipment used in demonstration/instruction
 - v. condition of classroom equipment/furniture/structure
 - vi. suitable protective clothing/equipment.

Analysis of demonstration/instruction

- a. Analysis of demonstration/instruction to include:
 - i. feedback from students
 - ii. feedback from colleagues
 - iii. organisational quality assessment
 - iv. feedback from external organisations
 - v. awarding body requirements.

Developments in learning

To include:

- a. multimedia based materials
- b. web based materials
- c. interactive materials.

How to choose and prepare appropriate materials

To include:

- a. putting information in order
- b. deciding whether the language used is appropriate
- c. type of material i.e. paper and technology based etc.



Appendix 1 Relationships to other qualifications

Links to other qualifications

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

This qualification has connections to the 4311-43 SVQ in Vehicle Body Repair and Alignment at SCQF Level 6.



Appendix 2 Sources of general information

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

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

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

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

- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

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

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

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

- **Walled Garden:** how to register and certificate candidates on line
- **Events:** dates and information on the latest Centre events
- **Online assessment:** information on how to register for GOLLA assessments.

Useful contacts

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

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

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

City & Guilds Group

The City & Guilds Group is a leader in global skills development. Our purpose is to help people and organisations to develop their skills for personal and economic growth. Made up of City & Guilds, City & Guilds Kineo, The Oxford Group and ILM, we work with education providers, businesses and governments in over 100 countries.

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