

Diploma in Vehicle Accident Repair Paint Principles at SCQF Level 6 (4391-23)

February 2016 Version 1.4





Qualification at a glance

Subject area	Vehicle Accident Repair Paint
City & Guilds number	4391
Age group approved	16-18, 19+
Assessment	Assignment Online Multiple Choice
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 Accident Repair Paint Principles at SCQF Level 6	4391-23	R259 04

Version and date	Change detail	Section
1.1 Dec 2012	Amend unit order – Amend range of various units – General formatting improvements	Various
1.2 May 2013	Additional info added to structure	Structure
1.3 Oct 2013	Unit supporting information updated with introductory text	Units



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1 Introduction

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

Area	Description
Who is the qualification for?	<p>This Diploma in Vehicle Accident Repair Paint at SCQF Level 6 is for anyone developing a career in the motor industry. This practical qualification demonstrates candidates' skills on the job and in their own workplace showing that they meet national standards for automotive workers.</p> <p>The structure and assessment strategy have been produced by the Institute of the Motor Industry, who are the Sector Skills Council for the Automotive Industry.</p>
What does the qualification cover?	<p>Candidates cover areas such as preparing, painting and finishing different surfaces, applying fillers and carrying out repairs to motor vehicles paintwork. They are assessed in the workplace by using the following methods:</p> <ul style="list-style-type: none">• assignment• verbal questioning of essential knowledge• City & Guilds' GOLA multiple choice test
Is the qualification part of a framework or initiative?	<p>The qualification is part of the Scottish Automotive Maintenance and Repair Modern Apprenticeship Frameworks.</p>
What opportunities for progression are there?	<p>After taking this qualification, candidates will have a qualification that shows employers and customers they have the skills required to carry out paint repairs to paintwork as a result of accidents and will be able to progress into employment.</p> <p>Candidates may also wish to progress onto the competency based qualification SVQ 3 in Accident Repair Paint at SCQF Level 6 (4311-23).</p>

Structure

To achieve the **Diploma in Vehicle Accident Repair Paint Principles at SCQF Level 6**, learners must achieve all **83** credits from the mandatory units.

City & Guilds unit	Unit title	Credit value
Mandatory units		
001	Skills in health, safety and good housekeeping in the automotive environment	7
003	Skills in supporting job roles in the automotive work environment	5
051	Knowledge of health, safety and good housekeeping in the automotive environment	3
053	Knowledge of support for job roles in the automotive work environment	3
201	Skills in tools and equipment used in vehicle refinishing	5
204	Skills in preparing metal and pre-painted surfaces	5
207	Skills in establishing paint defects	5
209	Skills in applying topcoats and completing refinishing operations	5
213	Skills in vehicle colour matching	5
251	Knowledge of tools and equipment used in vehicle refinishing	5
254	Knowledge of preparing metal and pre-painted surfaces	6
257	Knowledge of establishing paint defects	6
259	Knowledge of applying topcoats and completing refinishing operations	6
263	Knowledge of vehicle colour matching	6
703	Skills in working with plastic and reinforced composite materials	5
*753	Knowledge of working with plastic and reinforced composite materials	n/a

* In addition learners must complete the assessment attached to unit: 253 Knowledge of working with plastic materials and components (online – multiple choice). This is due to the amount of overlap between units 253 and 753.



2 Centre requirements

Approval

If your Centre is approved to offer the Level 3 Certificate/Diploma in Automotive Body and Paint – Body Refinishing (4101-63) you will be granted automatic approval for the Diploma in Vehicle Accident Repair Paint Principles at SCQF Level 6 (4391-23) and will be able to make registrations straight away.

For any other cases, 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.

Resource requirements

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 areas 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

All assessors must:

- have sufficient and relevant technical/occupational competence in the unit, at or above the level of the unit being assessed
- have in depth knowledge of the qualification or credit based unit evidence requirements.
- hold or be working towards a relevant assessors' award as specified by the Sector Skills Council. This will include, but not be limited to the Assessor qualifications, Level 3 Award in Understanding the Principles and Practices of Assessment, Level 3 Award in Assessing Competence

in the Work Environment, Level 3 Award in Assessing Vocationally Related Achievement, Level 3 Certificate in Assessing Vocational Achievement. (and by implication legacy Assessor units A1, A2 and D32/33 unit) but may be an appropriate equivalent as defined by the SSC).

- assessors working towards a relevant assessor qualification must achieve their qualification within 12 months.
- demonstrate knowledge and understanding of the competencies that a learner is required to demonstrate for the qualification that they are undertaking
- provide evidence of completing 5 days working/job shadowing in industry within their professional area in a 24 month period.
- provide evidence of 30 hours of technical/qualification related CPD within a 12 month period. (This is in addition to working / job shadowing).

All internal verifiers must:

- have in-depth knowledge of the occupational standards and credit based unit evidence requirements.
- be occupationally aware of the relevant industry sector being internally verified
- hold or be working towards a relevant verifier award as specified by the Sector Skills Council. This will include, but not be limited to the Quality Assurance qualifications Level 4 Award in Understanding the Internal Quality Assurance of Assessment Processes and Practice, Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practice, Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice, (and by implication legacy Internal Verifier unit V1 D34 unit) but may be an appropriate equivalent as defined by the Sector Skills Council.
 - achieve their relevant verifier qualification within 12 months.
 - provide evidence of CPD totalling not less than 30 hours from within their professional area within a 12 month period.

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 this qualification. However, centres must ensure that candidates have the potential and opportunity to gain the qualification successfully.

Age restrictions

There is no age restriction for this qualification unless this is a legal requirement of the process or the environment.



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 qualifications.
- any units they have already completed, or credit they have accumulated which is relevant to the qualifications.
- the appropriate type and level of qualification.

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

Support materials

City & Guilds will provide the following learning and support resources which will be posted on our website.

www.cityandguilds.com/automotive

- Practical Assessment workbook
- Centre Handbook

Recording documents

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

To support the delivery of vocational qualifications we offer our own ePortfolio, Learning Assistant, an easy to use and secure online tool to support and evidence candidates' progress towards achieving qualifications. Further details are available at:

www.cityandguilds.com/eportfolios.

City & Guilds has developed training and assessment documentation specifically for these qualifications which are available from City & Guilds website. Although new centres are expected to use these forms, centres may devise or customise alternative forms, which must be approved for use by the external verifier, before they are used by candidates and assessors at the centre.

Health and safety

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

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

Data protection and confidentiality

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

Equal opportunities

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

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

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

Access to assessment

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

Appeals

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

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



4 Assessment

Assessment of the qualification

Candidates must:

- successfully complete one assignment for each unit stated below
- successfully complete one multiple choice test for each unit stated below.

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
051	Knowledge in health, safety and good housekeeping in the automotive environment	Assignment
053	Knowledge of support for job roles in the automotive work environment	Assignment
201	Skills in tools and equipment used in vehicle refinishing	Assignment
204	Skills in preparing metal and pre-painted surfaces	Assignment
207	Skills in establishing paint defects	Assignment
209	Skills in applying topcoats and completing refinishing operations	Assignment
213	Skills in vehicle colour matching	Assignment
251	Knowledge of tools and equipment used in vehicle refinishing	Multiple choice
254	Knowledge of preparing metal and pre-painted surfaces	Multiple choice
257	Knowledge of establishing paint defects	Multiple choice
259	Knowledge of applying topcoats and completing refinishing operations	Multiple choice
263	Knowledge of vehicle colour matching	Multiple choice
703	Skills in working with plastic and reinforced composite materials	Assignment
753	Knowledge of working with plastic and reinforced composite materials	Assignment

In addition learners must complete the assessments attached to units:

- 253 Knowledge of working with plastic materials and components (Online – multiple choice)

This is due to the amount of overlap between units 253 and 753.

Time constraints

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

Recognition of prior learning (RPL)

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



5 Units

Availability of units

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

Structure of units

These units each have the following:

- City & Guilds reference number
- title
- level
- credit value
- unit aim
- 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
- notes for guidance.

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 the NOS G1 Contribute to the housekeeping in motor vehicle environments and NOS G2 Reduce risks to health and safety in the motor vehicle environment.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Standards Setting Body for the automotive industry.
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 work 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 work 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 G3 Maintain working relationships in the motor vehicle environment.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit will help the learner develop the skills required to keep good working relationships with all colleagues and customers in the automotive work environment by using effective communication and support.

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 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 the NOS G1 Contribute to the housekeeping in motor vehicle environments and NOS G2 Reduce risks to health and safety in the motor vehicle environment.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by the IMI, the Standards Setting Body for the automotive industry.
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. It will provide an appreciation of significant risks in the automotive environment and how to identify and deal with them. Once completed the learner will be able to identify hazards and evaluate and reduce risk.

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 minimise waste when using utilities and consumables
2.4	state the procedures and precautions necessary when cleaning and maintaining an automotive environment
2.5	describe the selection and use of cleaning equipment when dealing with general cleaning, spillages and leaks in the automotive environment
2.6	describe procedures for correct disposal of waste materials from an automotive environment
2.7	describe procedures for starting and ending the working day which ensure effective housekeeping practices are followed.

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, eg 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

- i. HASAWA
- ii. COSHH
- iii. EPA
- iv. Manual Handling Operations Regulations 1992
- v. PPE Regulations 1992.

General regulations to include an awareness of:

- i. Health and Safety (Display Screen Equipment) Regulations 1992
- ii. Health and Safety (First Aid) Regulations 1981
- iii. Health and Safety (Safety Signs and Signals) Regulations 1996
- iv. Health and Safety (Consultation with Employees) Regulations 1996
- v. Employers Liability (Compulsory Insurance) Act 1969 and Regulations 1998
- vi. Confined Spaces Regulations 1997
- vii. Noise at Work Regulations 1989
- viii. Electricity at Work Regulations 1989
- ix. Electricity (Safety) Regulations 1994
- x. Fire Precautions Act 1971
- xi. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1985
- xii. Pressure Systems Safety Regulations 2000
- xiii. Waste Management 1991
- xiv. Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002
- xv. 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 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
 - 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 the 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 own limits of authority
- e. potential causes of:
 - i. fire
 - ii. explosion
 - iii. noise
 - iv. harmful fumes
 - v. slips
 - vi. trips
 - vii. falling objects
 - viii. accidents whilst dealing with broken down vehicles.

Personal responsibilities

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

Action to be taken in the event of colleagues suffering accidents

- a. The typical sequence of events following the discovery of an accident such as:
 - i. make the area safe
 - ii. remove hazards if appropriate i.e. switch off power
 - iii. administer minor first aid
 - iv. take appropriate action to re-assure the injured party
 - v. raise the alarm
 - vi. get help
 - vii. report on the accident.

- b. Typical examples of first aid which can be administered by persons at the scene of an accident:
 - i. check for consciousness
 - ii. stem bleeding
 - iii. keep the injured person's airways free
 - iv. place in the recovery position if injured person is unconscious
 - v. issue plasters for minor cuts
 - vi. action to prevent shock, ie 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 G3 maintain working relationships in the motor vehicle environment.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by the IMI, the Standards Setting Body for the Automotive industry.
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 the 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 an 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 manufacturer's original equipment specification
2.6	explain the purpose of 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 their choice of communication
3.3	explain how the communication of information can change with the target audience.

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 spoken methods of 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	
<p>The learner can:</p> <ul style="list-style-type: none"> 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 peoples' 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. Procedures for:
 - i. referral of problems
 - ii. reporting delays
 - iii. additional work identified during repair or maintenance
 - iv. keeping others informed of progress.
- b. 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.
- c. Choice of communication
 - i. distance
 - ii. location
 - iii. job responsibility.

- d. How the communication of information can change with the target audience. To include:
 - i. uninformed people
 - ii. informed people.
- e. 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.
- f. Organisational and customer requirements:
 - i. importance of time scales to customer and organisation
 - ii. relationship between time and costs
 - iii. meaning of profit.

Importance of maintaining positive working relationships:

- a. morale
- b. productivity
- c. company image
- d. customer relationships
- e. colleagues.

Unit 201

Skills in tools and equipment used in vehicle refinishing

Level:	5
Credit value:	5
Relationship to NOS:	This unit is linked to P001S Demonstrating skills in tools and equipment used in vehicle refinishing.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Standards Setting Body for the automotive industry.
Aim:	<p>This unit allows the learner to develop skills in the correct:</p> <ul style="list-style-type: none">• selection, maintenance and use of hand and power tools used in vehicle refinishing• preparation, use and maintenance of vehicle refinishing equipment.

Learning outcome	The learner will:
1. be able to select, use and care for hand and power tools used in vehicle refinishing	
Assessment criteria	
The learner can:	
1.1	select, prepare, safely use and maintain suitable hand and power tools when vehicle refinishing
1.2	report any faulty or damaged tools to the relevant person(s) clearly and promptly
1.3	store work tools in a clean, serviceable and safe manner, which permits ease of access and identification for use.

Learning outcome	The learner will:
2.	be able to prepare and use vehicle refinishing equipment
Assessment criteria	
The learner can:	
2.1	select, prepare and safely use vehicle refinishing workshop equipment
2.2	report any faulty or damaged equipment to the relevant person(s) clearly and promptly
2.3	store work equipment in a clean, serviceable and safe manner, which permits ease of access and use.

Unit 204

Skills in preparing metal and pre-painted surfaces

Level:	5
Credit value:	5
Relationship to NOS:	This unit is linked to PO0408S Demonstrating skills in preparing metal and pre-painted surfaces.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit will help the learner to develop the skills required to carry out the preparation of a wide variety of different panels and component surfaces to accept foundation/paint topcoat materials. It also covers the importance of following guidelines and recommended procedures.

Learning outcome	The learner will:
1.	be able to work safely when carrying out the preparation of metal and pre-painted surfaces
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings throughout the preparation of metal and pre-painted surfaces
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 preparation of metal and pre-painted surfaces
2.2	use technical information to support the preparation of metal and pre-painted surfaces.

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 the preparation of metal and pre-painted surfaces
3.2	ensure that the equipment is safe and has been calibrated to meet manufacturer's requirements
3.3	use the correct tools and equipment in the way specified by manufacturers when carrying out the preparation of metal and pre-painted surfaces
3.4	leave all application equipment in a clean and serviceable condition.

Learning outcome	The learner will:
4.	be able to carry out the preparation of metal and pre-painted surfaces to accept foundation materials and paint topcoats
Assessment criteria	
The learner can:	
4.1	identify, prior to working on the vehicle, the type of substrate
4.2	use surface cleaning agents and protect all surfaces adjacent to those being prepared using the specified method
4.3	remove and store safely any components likely to be affected by the preparation process
4.4	prepare all panel surfaces required following: <ul style="list-style-type: none"> a vehicle manufacturer technical data b product data c recognised methods and techniques
4.5	keep the work area clean and tidy throughout all preparation activities
4.6	dispose of waste materials to conform with legal and workplace requirements
4.7	ensure all preparation is finished to an agreed standard and free from contamination ready for the next process.

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.

Unit 207

Skills in establishing paint defects

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to PO075 Demonstrating skills in establishing paint defects.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit will help the learner to develop the skills required to identify and repair a range of paint faults that often require the removal of materials to a sound substrate in order for rectification to take place.

Learning outcome	The learner will:
1.	be able to work safely when carrying out the identification and rectification of paint defects
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings when carrying out the identification and rectification of paint defects
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 paint defects
2.2	interpret technical information to support the rectification of minor paint defects.

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 the identification and rectification of paint defects	
3.2 check that the equipment is safe and has been calibrated to meet manufacturer's requirements	
3.3 use the correct tools and equipment in the way specified by manufacturers when carrying out the identification and rectification of paint defects	
3.4 leave all application equipment in a clean and serviceable condition.	

Learning outcome	The learner will:
4. be able to carry out the identification and rectification of paint defects	
Assessment criteria	
The learner can:	
4.1 identify on the vehicle the type of paint defect and the body panel surface prior to working on the vehicle	
4.2 use surface cleaning agents and protect all surfaces adjacent to those being prepared using the specified method	
4.3 remove and store safely any components likely to be affected by the preparation process	
4.4 correct defects using the approved tools and equipment required	
4.5 keep the work area clean and tidy throughout all rectification activities	
4.6 dispose of waste materials to conform with legal and workplace requirements	
4.7 ensure all paint defects are rectified to an agreed standard.	

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.	

Unit 209

Skills in applying topcoats and completing refinishing operations

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to PO0912S Demonstrating skills in applying topcoats and completing refinishing operations
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit will help the learner to develop the skills required to follow guidelines and procedures for the refinishing of new and repaired vehicle panels. Including the preparation of the surface panel and application of the topcoat.

Learning outcome	The learner will:
1.	be able to work safely when carrying out preparation and application of topcoat materials in vehicle refinishing
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings when carrying out preparation and application of topcoat materials in vehicle refinishing
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 preparation and application of topcoat materials to vehicles
2.2	use technical information to support preparation and application of topcoat materials to vehicles.

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 preparation and application of topcoat materials to vehicles
3.2	ensure that equipment has been calibrated to meet manufacturer's requirements
3.3	use the correct tools and equipment in the way specified by manufacturers when carrying out preparation and application of topcoat materials to vehicles
3.4	leave all application equipment in a clean and serviceable condition.

Learning outcome	The learner will:
4.	be able to carry out preparation and application of topcoat materials in vehicle refinishing
Assessment criteria	
The learner can:	
4.1	identify the type of substrate prior to working on the vehicle
4.2	use of surface cleaning agents materials
4.3	prepare all the refinishing systems and materials required following health and safety requirements
4.4	mix and check the viscosity of topcoat materials
4.5	apply all topcoat materials
4.6	dry and cure all topcoat materials
4.7	ensure the finished product meets the requirements of the manufacturer's warranty, the refinishing specification required and customer needs
4.8	dispose of waste materials to conform with legal and workplace requirements.

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.

Unit 213

Skills in vehicle colour matching

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to PO135 Demonstrating skills in vehicle colour matching.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit will help the learner to develop the skills required to identify, mix and match vehicle paint colours including the use of tinters and preparation of test cards.

Learning outcome	The learner will:
1.	be able to work safely when carrying out vehicle mixing and matching
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings when carrying out vehicle mixing and matching
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 paint mixing and matching activities
2.2	use technical information to support paint mixing and matching 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 paint mixing and matching activities
3.2	ensure that equipment has been calibrated to meet manufacturer's requirements
3.3	use the correct tools and equipment in the way specified by manufacturers when carrying out paint mixing and matching activities
3.4	leave all mixing and application equipment in a clean and serviceable condition.

Learning outcome	The learner will:
4.	be able to carry out vehicle mixing and matching activities
Assessment criteria	
The learner can:	
4.1	identify, prior to working on the vehicle, the type of substrate to be painted.
4.2	prepare all the refinishing systems and materials required following health and safety requirements
4.3	mix, compare and adjust colour tones and effects using suitable mixing and matching techniques
4.4	ensure all refinishing systems and materials prepared meet the specification required for colour and viscosity prior to application
4.5	apply refinishing systems and materials to colour test cards
4.6	dry all colour test cards before checking colour
4.7	ensure the colour produced meets the material manufacturer's requirements, the customer requirements and is a blendable match to the existing colour
4.8	dispose of waste materials to conform with legal and workplace requirements.

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.

Unit 251

Knowledge of tools and equipment used in vehicle refinishing

Level:	5
Credit value:	5
Relationship to NOS:	This unit is linked to PO01K Knowledge of tools and equipment used in vehicle refinishing.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by the IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit enables the learner to develop an understanding for the: <ul style="list-style-type: none">• correct selection, maintenance and use of hand and power tools used in vehicle refinishing• correct preparation, use and maintenance of vehicle refinishing equipment.

Learning outcome	The learner will:
1.	understand how to select, use and care for hand and power tools used in vehicle refinishing
Assessment criteria	
The learner can:	
1.1	describe the use of common types of hand and power tools used for vehicle refinishing
1.2	identify the main components of a spray gun
1.3	describe, within the scope of their responsibilities, how to select, prepare and maintain hand and power tools used in vehicle refinishing
1.4	state the limitations of hand and power tools used in vehicle refinishing
1.5	explain how hand and power tools used in vehicle refinishing should be stored
1.6	describe the methods of adjusting compressed air pressures by use of: <ul style="list-style-type: none">a. transformer/regulatorb. spray gun pressure gauge
1.7	describe the operation of gun cleaning machines to include the use of solvent and water based gun cleaners
1.8	describe the cleaning and maintenance of suction/gravity feed guns
1.9	identify spray gun faults, their cause and how they should be rectified.

Learning outcome	The learner will:
2.	understand how to prepare, use and care for vehicle refinishing equipment
Assessment criteria	
The learner can:	
2.1	identify workshop equipment used in vehicle refinishing
2.2	describe the preparation and safe use of workshop equipment
2.3	describe the maintenance requirements of a compressed air system oil level.

Unit 251 Knowledge of tools and equipment used in vehicle refinishing

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/power tools

- a. Flattening block
- b. Sponge
- c. Squeegee
- d. Chamois leather
- e. Trimming knife
- f. Polishing mop
- g. Denibbing blocks
- h. Sealer gun
- i. Air duster
- j. Rotary sander
- k. DA random orbital sander
- l. Orbital flat bed sander
- m. Belt sander
- n. Vacuum extraction sander
- o. Specialist extraction for aluminium particles (explosive)
- p. Suction feed spray gun
- q. Gravity feed spray gun
- r. Pressure feed spray gun
- s. HVLP spray guns
- t. Identify spray gun cleaning machines

Workshop equipment used in vehicle refinishing

- a. Combi-booth
- b. Separate oven
- c. Infra-red drying
- d. Compressor
- e. Main air line
- f. Transformer/regulator
- g. Water traps
- h. Flexible air and fluid hoses
- i. Pressure gauges
- j. Automatic paper/tape dispenser
- k. Plastic sheeting dispenser
- l. Complete car covers dispenser
- m. Wheel covers dispenser
- n. Viscosity measuring equipment

- o. Paint mixing schemes
- p. Air feed breathing equipment
- q. Smart scales

Paint gun cleaning and maintenance

- a. Loading
- b. Cleaning cycle
- c. Coagulant (water-based paints only)
- d. Filtration of solids

- a. Partial strip of paint spraying gun
- b. Complete strip of paint spraying gun
- c. Washer cycle
- d. Blow through
- e. Re-assembly
- f. Lubrication

Main components of a spray gun

- a. Trigger
- b. Body
- c. Packing gland
- d. Air valve
- e. Fluid needle
- f. Fluid tip (nozzle)
- g. Air cap
- h. Paint volume control
- i. Fan width control
- j. Material cup
- k. Filters

Compressed air system

- a. Tank drainage
- b. Ring drainage
- c. Regular maintenance and service logs
- d. Air quality checks (breathable air)
- e. Air filter/cartridge changes (breathable air)

Unit 254

Knowledge of preparing metal and pre-painted surfaces

Level:	5
Credit value:	6
Relationship to NOS:	This unit is linked to PO0408K Knowledge of preparing metal and pre-painted surfaces.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by the IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit enables the learner to develop an understanding for preparing a wide variety of different panels and component surfaces to accept foundation/paint topcoat materials. It also covers the importance of following guidelines and recommended procedures.

Learning outcome	The learner will:
1.	understand how to identify body surfaces requiring the application of foundation/paint topcoat materials in vehicle refinishing
Assessment criteria	
The learner can:	
1.1	identify the types of substrate likely to be found in vehicle refinishing
1.2	identify the main methods used to determine the vehicle substrate
1.3	identify the properties of the substrate.

Learning outcome	The learner will:
2.	understand how to prepare new and repaired panels for the application of foundation/paint topcoat materials in vehicle refinishing
Assessment criteria	
The learner can:	
2.1	describe the choice and use of surface cleaning agents, including wax and grease remover to ensure adequate adhesion
2.2	describe the types of materials used to prepare the surface and the factors governing their use
2.3	describe how to prepare new and repaired panels
2.4	describe the factors governing the choice of panel preparation methods
2.5	describe how to prepare panels and parts adjacent to the area being painted

- 2.6 identify the methods of protecting panels and parts adjacent to the areas being painted and the circumstances in which they should be used
- 2.7 identify the requirements for protecting the vehicle and contents from damage before, during and after preparing panel surfaces.

Unit 254 Knowledge of preparing metal and pre-painted surfaces

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.

Types of substrate likely to be found in modern vehicles

- a. Substrates to determine selection of undercoat with reference to:
 - i. condition of surface
 - ii. type of substrate
 - iii. process requirements
 - iv. material requirements.
- b. The physical properties of a substrate to include:
 - i. surface condition
 - ii. adhesion
 - iii. flexibility
 - iv. porosity.
- c. The technical properties of a substrate to include:
 - i. type of paint
 - ii. steel
 - iii. aluminium
 - iv. plastic
 - v. coated steels
 - vi. repaired panels
 - vii. OE finish
 - viii. primed panels (including 'E'-coat).

Methods used in determining vehicle substrates

- a. Workshop tests to determine substrates to include:
 - i. solvent wipe test (1K or 2K)
 - ii. colour of flattening sludge (straight colour or C O B).
 - iii. VIN plate

The main stages required in preparing a vehicle for refinishing, including areas adjacent to the painting area

- a. Manufacturer's protective coatings and explain their warranty implications such as:
 - i. electrostatic dip
 - ii. under-body compounds
 - iii. cavity wax
 - iv. body caulking.
- b. A vehicle must be thoroughly washed and cleaned prior to refinishing to include:
 - i. outside body panels

- ii. under arches
 - iii. under bonnet
 - iv. all apertures
 - v. degreased.
- c. The reasons for vehicle masking.
- d. The correct preparation of parts prior to painting to include products use for the removal of:
- i. wax
 - ii. grease
 - iii. skin oils
 - iv. dust
 - v. water
 - vi. abrasive contaminates
 - vii. environmental pollution.

The procedures used in preparing listed substrates

- a. The required preparation for the listed substrates to include:
- i. steel
 - ii. aluminium alloys
 - iii. GR plastics
 - iv. thermo plastics
 - v. cured 2K materials
- b. The procedures for the preparation of plastics to include:
- i. identification
 - ii. tempering
 - iii. porefilling
 - iv. release agent removal
 - v. cleaning
 - vi. adhesion promotion
 - vii. elastic primers.

The procedures for the preparation and application of chemical solutions and solvents to remove paint

- a. Materials used for conditioning processes such as:
- i. wax and grease removers
 - ii. spirit wipes
 - iii. acid based
 - iv. water based
- b. The correct and safe use of the above materials
- c. The properties of pre-preparation materials to include:
- i. neutralisation
 - ii. ability to alter the surface
 - iii. reaction with oxide
- d. Types of paint stripper available to include:
- i. aggressive
 - ii. non-aggressive
- e. The procedures for the preparation and application of chemical solutions and solvents to include:
- i. health and safety
 - ii. PPE
 - iii. mixing schedules

- iv. application schedules
- v. waste disposal.
- f. The process of stripping paint from:
 - i. steel
 - ii. aluminium
 - iii. plastics.

The selection and uses of a range of abrasives in common use

- a. Types and uses of abrasives materials to include:
 - i. aluminium oxide
 - ii. silicon carbide
 - iii. wet and dry types
 - iv. open coat
 - v. closed coat
 - vi. papers, pastes and woven plastics.
- b. Forms of abrasive to include:
 - i. pad
 - ii. disc
 - iii. sheet
 - iv. roll
 - v. backing materials
 - vi. methods of attachments.
- c. How grit sizes are classified according to the FEPA standards using 'P' grades with regard to:
 - i. the process being carried out
 - ii. the material being abraded
 - iii. the technique being employed.
- d. The differences between open and closed coat abrasives:
 - i. open coat
 - ii. closed coat
 - iii. 'P' grades.

Define the term 'feather edging' and explain why correct operation is required in achieving the required surface finish

- a. The procedure for the preparation of a repaired area on a large panel in terms of:
 - i. repair edge preparation
 - ii. surrounding area
 - iii. bare metal.
- b. Why correct preparation is required with reference to:
 - i. surface finish
 - ii. film thickness
 - iii. sinkage
 - iv. mapping
 - v. contouring.

The procedures for the preparation of minor damage prior to the application of body fillers

- a. The procedure for the preparation of minor damage to include:
 - i. paint removal
 - ii. feather edge
 - iii. surface condition
 - iv. substrate identification
 - v. cleanliness
 - vi. achieving correct contour.
- b. The problems of over catalysed body filled areas.
- c. The correct health and safety procedures associated with body fillers.
- d. Aids and techniques which can be used to achieve the correct contour of a filled area.

Unit 257

Knowledge of establishing paint defects

Level:	6
Credit value:	6
Relationship to NOS:	This unit is linked to PO07K Knowledge of establishing paint defects.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by the IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit enables the learner to develop an understanding about a range of faults that often require the removal of materials to a sound substrate in order for rectification to take place. It also covers the importance of following guidelines and recommended procedures.

Learning outcome	The learner will:
1.	understand how to identify and explain paint defects
Assessment criteria	
The learner can:	
1.1	explain how to identify the existing paint surface finish on which the defect has occurred
1.2	explain the main methods used to determine the surface finish
1.3	explain the types and appearance of paint defects
1.4	explain the causes of the paint defects including: <ul style="list-style-type: none">a. environmentb. preparationc. applicationd. deterioration.

Learning outcome	The learner will:
2.	understand how to repair paint defects
Assessment criteria	
The learner can:	
2.1	explain the factors affecting the choice and use of materials in the rectification of paint defects
2.2	explain the procedures involved in repairing paint defects
2.3	explain how to prevent further paint damage during rectification
2.4	describe the importance of proper cleaning prior to and after rectification work
2.5	explain the importance of keeping equipment and materials clean and free from contamination during rectification work
2.6	explain the requirements for protecting the vehicle and contents from damage before, during and after repairing paint defects and faults.

Unit 257 Knowledge of establishing paint defects

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.

Type of defects

- a. acid spotting
- b. blistering
- c. blushing
- d. blooming
- e. bridging
- f. chalking
- g. checking
- h. crazing
- i. dirt
- j. dry spray
- k. edge mapping
- l. etching
- m. fading
- n. fish eyes
- o. flaking
- p. haloing
- q. humidity blisters
- r. mottling
- s. orange peel
- t. overspray
- u. pin holes
- v. poor opacity
- w. plastic bleed through
- x. runs
- y. rust
- z. sand scratch swelling
- aa. shrinking and splitting
- bb. streaking
- cc. solvent popping
- dd. tape marks
- ee. water spotting
- ff. webbing

Types of paint finishes likely to be found in modern vehicles

- a. Types of substrate to include:
 - i. steel
 - ii. aluminium
 - iii. all plastics
 - iv. coated steels
 - v. high bake enamels (o e finishes)
 - vi. 2K paints

- vii. 1K paints
- viii. clear over bases
- ix. polyester fillers.
- b. Substrates to determine selection of undercoat with reference to:
 - i. condition of surface
 - ii. type of substrate
 - iii. process requirements
 - iv. material requirement.
- c. The physical properties of a substrate to include:
 - i. surface condition
 - ii. adhesion
 - iii. flexibility
 - iv. porosity
 - v. texture.

Methods used in determining types of vehicle paint finishes

- a. Workshop tests to determine paint substrates to include:
 - i. compound small area
 - ii. solvent wipe test (1K or 2K)
 - iii. colour of flattening sludge (straight colour or C O B)]
 - iv. VIN plate

Vehicle cleaning and protection procedures during paint defect rectification processes

- a. Vehicle must be thoroughly washed and cleaned prior to refinishing to include:
 - i. outside body panels
 - ii. under arches
 - iii. under bonnet
 - iv. all apertures
 - v. degreased
- b. The reasons for masking components adjacent to repair areas.
- c. The correct preparation of parts prior to painting to include products used for the removal of:
 - i. wax
 - ii. grease
 - iii. skin oils
 - iv. dust
 - v. water
 - vi. abrasive contaminates
 - vii. environmental pollution.
- d. Materials used for conditioning processes such as:
 - i. wax and grease removers
 - ii. spirit wipes
 - iii. acid based
 - iv. water based.
- e. The correct and safe use of the above materials.
- f. The properties of pre-preparation material to include:
 - i. neutralisation
 - ii. ability to alter the surface
 - iii. reaction with oxide.

Paint defects and their causes

- a. The reasons for the defects in vehicle finish such as:
 - i. environmental pollution
 - ii. ultra violet reaction
 - iii. industrial pollution
 - iv. accidental damage.

Which rectification procedure to use for each of the paint defects

- a. The procedures for the rectification of defects to include:
 - i. compound/polish surface
 - ii. flat/polish surface
 - iii. local paint removal/repaint
 - iv. panel/edge-to-edge repaint.

Tools and equipment must be kept free from contamination to avoid further defects

- a. The methods of cleaning tools and equipment after use:
 - i. washing polishing/compound heads to remove residues
 - ii. cleaning spray guns and brushes with appropriate solvents
- b. explain that failure to carry out these procedures may lead to defects to include:
 - i. surface scratches
 - ii. surface contamination
 - iii. silicone cratering
 - iv. staining of painted surfaces
 - v. equipment malfunction.

Materials used for the rectification of paint defects

- a. Types and uses of abrasives to include:
 - i. aluminium oxide
 - ii. silicon carbide
 - iii. wet and dry types
 - iv. open coat
 - v. closed coat
 - vi. 'P' grades
 - vii. papers, pastes and woven plastics.
- b. The properties of compounds used to refurbish paintwork including:
 - i. cutting compounds
 - ii. cutting creams
 - iii. surface polishes
 - iv. protective waxes
 - v. sponge cutting heads
 - vi. polishing mops
 - vii. polishing cloths.
- c. Types and uses of filler materials to include:
 - i. 2K polyester filler paste

- ii. 2K and 1K stopper.
- d. Types and uses of paints to include:
 - i. touch-up pots
 - ii. self-adhesive coloured paint film
 - iii. aerosols
 - iv. standard 2K and 1K paints.

Select the correct materials for rectifying listed paint defects

- a. Selection of materials for rectification will depend on:
 - i. type of surface defect to be repaired
 - ii. severity of defect
 - iii. size of area to be repaired
 - iv. equipment available
 - v. expertise of operator
 - vi. customer preference.

Correct preparation and use of materials for rectifying paint defects

- a. The preparation of listed materials for defect rectification to include:
 - i. replacing worn or used abrasive papers, pads and discs
 - ii. checking compound and polish pastes for contamination
 - iii. mixing of 2K fillers and stoppers to correct ratios.
- b. The preparation required prior to paint application to include:
 - i. stirring/shaking paint containers
 - ii. mixing touch-up and standard paints to correct ratios
 - iii. carrying out viscosity checks on mixed paint materials.

Touch-in techniques as required for the rectification of some paint defects

- a. Touch-in techniques:
 - i. may not exactly match factory (OE) finish
 - ii. may be viewed as a temporary repair
 - iii. should be confined to small areas.

Unit 259

Knowledge of applying topcoats and completing refinishing operations

Level:	6
Credit value:	6
Relationship to NOS:	This unit is linked to PO0912K Knowledge of applying topcoats and completing refinishing operations
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by the IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit enables the learner to develop an understanding for following guidelines and procedures for the refinishing of new and repaired vehicle panels. Including the preparation of the surface panel, application of the topcoat and any refinishing techniques.

Learning outcome	The learner will:
1.	understand how to prepare panels and refinishing systems for the application of topcoat materials in vehicle refinishing
Assessment criteria	
The learner can:	
1.1	explain how to prepare panels and parts adjacent to the area being painted
1.2	explain how to prepare refinishing systems and materials for use
1.3	explain the properties of the refinishing system and materials and the factors affecting their use.

Learning outcome	The learner will:
2.	understand how to how to repair paint defects
Assessment criteria	
<p>The learner can:</p> <ol style="list-style-type: none"> 2.1 explain how to condition and clean surfaces prior to the application of topcoat coatings 2.2 explain the importance of proper cleaning and correct use of foundation material to ensure adequate adhesion 2.3 explain the methods of protecting panels and parts adjacent to the areas being painted and the circumstances in which they should be used 2.4 describe the choice and use of topcoat materials 2.5 explain how to mix and check the viscosity of topcoat materials 2.6 explain the importance of viscosity and its effects on the surface finish 2.7 explain the principles of paint mixing, the importance of the right additive (hardener or thinner) in the correct ratio 2.8 explain how to apply topcoat coatings avoiding contamination and defects including: <ol style="list-style-type: none"> a. edge to edge techniques b. spot repairs c. fade out and blending techniques 2.9 explain the curing and drying recommendations for the various topcoat materials 2.10 explain the effects of the spray environment and natural environment on vehicle refinishing 2.11 explain the techniques used in polishing the vehicle topcoat finish 	

Unit 259

Knowledge of applying topcoats and completing refinishing 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.

The types of substrates likely to be found in vehicle refinishing

- a. List types of substrate to include:
 - i. steel
 - ii. aluminium
 - iii. all plastics
 - iv. coated steels
 - v. high bake Enamels (O E finishes)
 - vi. 2K Paints
 - vii. 1K Paints
 - viii. clear over bases
 - ix. polyester fillers
 - x. repaired panels
 - xi. primed panels (E coat).

Methods used in determining vehicle substrates

- a. Workshop tests to determine substrates to include:
 - i. visual test for aluminium, plastics
 - ii. magnet test for steel.
- b. For determination of paint type:
 - i. compound small area
 - ii. solvent wipe test (1K or 2K)
 - iii. colour of flattening sludge (straight colour or C O B).

The main stages required in preparing a vehicle for refinishing, including areas adjacent to the painting area

- a. Manufacturer's protective coatings and explain their warranty implications such as:
 - i. electrostatic dip
 - ii. under-body compounds
 - iii. cavity wax
 - iv. body caulking.
- b. Vehicles must be thoroughly washed and cleaned prior to refinishing to include:
 - i. outside body panels
 - ii. under arches
 - iii. under bonnet

- iv. all apertures
- v. degreased.
- c. The reasons for vehicle masking.
- d. The correct preparation of parts prior to painting to include products used for the removal of:
 - i. wax
 - ii. grease
 - iii. skin oils
 - iv. dust
 - v. water
 - vi. abrasive contaminates
 - vii. environmental pollution.

The procedures used in preparing listed substrates

- a. The required preparation for the listed substrates to include:
 - i. steel
 - ii. aluminium alloys
 - iii. GR plastics
 - iv. thermo plastics
 - v. cured 2K materials
 - vi. synthetic enamels
 - vii. timber (trim parts only).
- b. The procedures for the preparation of plastics to include:
 - i. identification
 - ii. tempering
 - iii. porefilling
 - iv. cleaning
 - v. adhesion promotion
 - vi. elastic primers.

The selection and uses of a range of abrasives in common use

- a. Types and uses of abrasives materials to include:
 - i. aluminium oxide
 - ii. silicon carbide
 - iii. wet and dry types
 - iv. open coat
 - v. closed coat
 - vi. papers, pastes and woven plastics.
- b. Forms of abrasive to include:
 - i. pad
 - ii. disc
 - iii. sheet
 - iv. roll
 - v. backing materials
 - vi. methods of attachments.
- c. How grit sizes are classified according to the FEPA standards using 'P' grades with regard to:
 - i. the process being carried out
 - ii. the material being abraded
 - iii. the technique being employed.

- d. The differences between open and closed coat abrasives
 - i. open coat
 - ii. closed coat
 - iii. 'P' grades.

The term 'feather edging' and why correct operation is required in achieving the required surface finish

- a. The procedure for the preparation of a repaired area on a large panel in terms of:
 - i. repair edge preparation
 - ii. surrounding area
 - iii. bare metal.
- b. Why correct preparation is required with reference to:
 - i. surface finish
 - ii. film thickness
 - iii. sinkage
 - iv. mapping
 - v. contouring.

Masking procedures for part and whole vehicles. Masking processes and techniques

- a. Common masking systems, materials and techniques to include:
 - i. masking paper
 - ii. plastic sheeting
 - iii. masking tape
 - iv. foam tape
 - v. wheel covers
 - vi. liquid masking
 - vii. roll-back masking.
- b. The characteristics of a quality masking tape to include:
 - i. ability to turn corners
 - ii. non-aggressive adhesive/non-drying
 - iii. clean edges to painted areas.
- c. The properties of these masking materials such as:
 - i. economy of use
 - ii. costs per unit
 - iii. absorption
 - iv. flexibility
- d. Where and how these masking materials and systems should be used.
- e. The masking procedures for listed items such as:
 - i. door glass and windscreens
 - ii. handles
 - iii. lights
 - iv. mirrors
 - v. wheels.
- f. Masking schedule for the type of repair to include:
 - i. time efficiency
 - ii. material costs
 - iii. given protection.

- g. Faults which are caused by careless masking such as:
 - i. flash lines
 - ii. bridging
 - iii. creep
 - iv. hard edges.

The factors affecting the choice and use of topcoat materials

- a. The types of paints such as:
 - i. non convertible:
 - o nitro cellulose
 - o 1K acrylic
 - ii. convertible:
 - o oil based synthetics
 - o 2K acrylics
 - o 2K polyurethane
 - o polyesters
 - o isocyanate resins
 - iii. waterborne basecoats:
 - o microgel
 - o latex.
- b. The reasons for using paint to include:
 - i. protection
 - ii. filling
 - iii. decoration
 - iv. identification
 - v. safety.
- c. Use process data sheets to determine information such as:
 - i. material description
 - ii. material properties
 - iii. material characteristics
 - iv. limitations
 - v. related materials
 - vi. mixing ratios
 - vii. viscosity
 - viii. build film thickness
 - ix. pot life.
- d. The procedure for the preparation of minor damage to include:
 - i. paint removal
 - ii. feather edge
 - iii. surface condition
 - iv. substrate identification
 - v. cleanliness
 - vi. achieving correct contour.
- e. The problems of over catalysed body filled areas.
- f. The correct health and safety procedures associated with body fillers.
- g. Aids and techniques which can be used to achieve the correct contour of a filled area.

- h. Undercoat materials for plastics to include:
 - i. adhesion promoters
 - ii. surface modifiers
 - iii. flexible additives
 - iv. texture additives
- i. Listed additives such as:
 - i. adhesion promoters
 - ii. flexible additives
 - iii. texture finishes
 - iv. extenders
 - v. UV absorbers
 - vi. flow aids

The properties of topcoat materials

- a. The ingredients of paint include:
 - i. pigment
 - ii. binder/vehicle
 - iii. solvent/thinner/reducer
 - iv. additives.
- b. The different types of paints to include:
 - i. non convertible:
 - o nitro cellulose
 - o 1K acrylics
 - o basecoats
 - ii. convertibles:
 - o two packs
 - o oil based synthetic enamels.
- c. The characteristics and properties of surface coatings to include:
 - i. nitro-cellulose- non convertible-low build –fast surface dry
 - ii. oil based synthetics-convertible-slow dry through uptake of oxygen
 - iii. two packs- convertible- chemical reaction –high build
 - iv. base coats- solvent or water borne -non convertible-very low build-high opacity-have to be over coated with a clear coat.
- d. The principles of operation of water based materials.
- e. The materials used in water based paint technology.
- f. The environmental advantages of using water based paints.
- g. The materials in terms of their:
 - i. preparation of substrates
 - ii. mixing procedures
 - iii. application
 - iv. drying processes
 - v. working techniques
 - vi. covering and hiding power
 - vii. rectification
 - viii. cleaning processes.

Preparation and use of topcoat materials for refinishing procedures

- a. The process data sheets to determine information such as:
 - i. mixing ratios
 - ii. viscosity
 - iii. number of coats
 - iv. flash off times
 - v. build film thickness
 - vi. spray gun type
 - vii. spray gun set up
 - viii. air pressure requirements
 - ix. substrate requirements
 - x. suitability as a substrate
 - xi. drying times
 - xii. suitability to be applied by methods other than spraying.
- b. Procedures for mixing topcoats such as:
 - i. 1K – cellulose and acrylics
 - ii. 2K solid finishes and clear lacquers
 - iii. basecoats – solid, metallic and pearlescent.

Tools and equipment used in the preparation of topcoat materials

- a. The tools and equipment required for paint preparation to include:
 - i. mixing schemes
 - ii. ratio/mixing sticks
 - iii. calibrated mixing cups
 - iv. paint filters
 - v. viscosity cups
 - vi. timers
 - vii. appropriate PPE.

The selection of appropriate techniques for refinishing new and repaired panels, using edge-to-edge, fade outs, blending and spot repair methods

- a. The procedure for carrying out edge-to-edge paint application to include:
 - i. panel preparation
 - ii. masking
 - iii. gun technique.
- b. The procedure for carrying out paint blend to include:
 - i. panel preparation
 - ii. masking
 - iii. gun technique
 - iv. final thinning.
- c. The procedure for carrying out spot or fade out repair to include:
 - i. panel preparation
 - ii. masking
 - iii. gun technique
 - iv. final thinning
 - v. fade out thinners.

Correct application of topcoat materials can help to avoid surface defects such as colour/tone variations, overspray, etc.

- a. Spray gun motion to include:
 - i. gun distance
 - ii. gun angle
 - iii. gun speed
 - iv. overlaps.
- b. The relationship between the four motions to give an even film thickness.
- c. The reason for flash off times between coats.
- d. What is meant by 'Wet on Wet' applications.
- e. The application differences of using MS, HS and UHS materials.
- f. Methodology to refinish a large part of or complete vehicle.
- g. The differences to applying a basecoat material compared with one stage solid colours such as:
 - i. gun distance
 - ii. gun speed
 - iii. air pressure
 - iv. 'drop coats'.
- h. The application of clearcoat with reference to:
 - i. gun speed
 - ii. flash off
 - iii. number of coats
 - iv. HS and UHS.

The procedures to be adopted to rectify spray gun, topcoat surface defects and avoid their recurrence

- a. The 'Spray Out' checks to establish spray gun faults such as:
 - i. spray flutter
 - ii. sickle-shaped patterns
 - iii. centre heavy pattern
 - iv. constricted centre pattern
 - v. top/bottom heavy patterns.
- b. The causes and remedies for these faults.
- c. Application paint faults to include:
 - i. runs
 - ii. sags
 - iii. dirt
 - iv. contamination (fish eyes)
 - v. orange peel
 - vi. dry spray.
 - vii. Solvent pop
- d. The causes, prevention and rectification of these faults.

The importance of sourcing, correctly interpreting and following manufacturer's instructions and the consequences of failing to do so

- a. Sources of material information to include:
 - i. PC based material
 - ii. paint manufacturer's information
 - iii. paint data sheets
 - iv. World Wide Web
 - v. Thatcham Methods Manuals.
- b. Types of material recoverable from the above sources to include:
 - i. product and mixing information
 - ii. health and safety information
 - iii. first aid procedures
 - iv. application techniques
 - v. rectification procedures
 - vi. colour information.
- c. Sources of information relevant to equipment to include:
 - i. manufacturer's instructions
 - ii. operating manuals
 - iii. trade publications
 - iv. World Wide Web.
- d. The type of information recoverable from these sources such as:
 - i. maintenance schedules
 - ii. maintenance procedures
 - iii. replacing parts and consumables
 - iv. spare parts list and suppliers
 - v. accessories available
 - vi. trouble shooting information
 - vii. adjustment and operation guides.

Unit 263

Knowledge of vehicle colour matching

Level:	6
Credit value:	6
Relationship to NOS:	This unit is linked to PO013K Knowledge of vehicle colour matching
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by the IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit enables the learner to develop an understanding of colours, paints, identification, mixing and matching of vehicle paint colours including the use of tinters and preparation of test cards.

Learning outcome	The learner will:
1.	understand about colour theory
Assessment criteria	
The learner can:	
1.1	describe the colours of the spectrum
1.2	identify the primary colours
1.3	explain the effect by which pigments produce visible colour, including black and white
1.4	identify and recognise colour classification systems
1.5	describe the terms colour, strength, hue, chroma
1.6	explain the effects of the viewing environment on colour matching
1.7	explain the terms gloss, opacity and metamerism and their effects on colour matching.

Learning outcome	The learner will:
2.	understand about vehicle paint coatings, ingredients and their application
Assessment criteria	
The learner can:	
2.1	explain the purpose of paint materials
2.2	describe the kinds of undercoats, their functions and use on motor vehicles
2.3	describe the kinds of topcoats, their functions and use on motor vehicles including:
a.	solid colours
b.	clear over base colours

- c. metallic colours
- d. pearl colours
- 2.4 identify and explain the basic ingredients of paints
- 2.5 explain the types of paints available and their function including:
 - a. single pack
 - b. two pack
 - c. acrylic
- 2.6 explain the types of pigments available and their function
- 2.7 explain the types of solvents available and their function
- 2.8 explain the purpose of testing paint materials.

Learning outcome	The learner will:
3.	understand about mixing and matching vehicle paint colours
Assessment criteria	
The learner can:	
3.1	describe how to find, interpret and use sources of information relevant to the mixing and matching of vehicle paint colours
3.2	describe how to identify the paint substrate and the importance of doing so
3.3	explain how to compare, mix, test and adjust colour tones and effects, including metallic and mica effects
3.4	explain the consequences of adding too much of one type of tinter and the process for correcting and adjusting it
3.5	describe how to use test panels and colour test cards including drying and the importance of doing so
3.6	explain how spray equipment adjustments can alter colour
3.7	explain how to identify the causes of colour mismatch and how to rectify
3.8	explain how to assess and evaluate the need for blending techniques to achieve an acceptable colour match
3.9	describe the importance of correctly preparing the existing finish for colour matching and checking the match using the correct light source.

Unit 263 Knowledge of vehicle colour matching

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 effects of the viewing environment on colour matching:

- a. Artificial light
- b. Natural light
- c. Light box
- d. Direct sunlight
- e. Shaded light
- f. Reflection

The purpose of paint materials :

- a Anti-corrosion
- b Protection
- c Reflection
- d Visual
- e Body sound deadening (all list to go in content)

Types of undercoats and their function:

- a Primer
- b Primer surfacer
- c Anticorrosion
- d Etch primers
- e Plastic primers
- f Primer fillers
- g Electrodepositing (E-coating)
- h e-coat replacement products
- i Sealers/isolators
- j Anti chip/texture coatings

Types of paints and their function:

- a. Single pack
- b. Two pack
- c. Acrylic
- d. Alkyd
- e. Epoxy
- f. Polyurethane
- g. Phenolic
- h. Polyester

Types of pigments available and their function:

- a Coloured
- b Metallic

- c Pearl
- d Anti corrosion
- e Extender
- f Special effects

The purpose of testing paint materials:

- a. Adhesion
- b. Durability
- c. Corrosion
- d. Resistance to chemicals
- e. Abrasion
- f. Acid rain
- g. Ultraviolet

Types of topcoat

- a. solid colours
- b. clear over base colours
- c. metallic colours
- d. pearl colours

Methods and importance of correctly identifying paint substrates prior to undertaking any refinishing work

- a. Workshop tests to determine substrates to include:
 - i. solvent wipe test (1K or 2K)
 - ii. colour of flattening sludge (straight colour or C O B).
 - iii. VIN plate
- b. Substrates to determine selection of undercoat with reference to:
 - i. condition of surface
 - ii. type of substrate
 - iii. process requirements
 - iv. material requirements.
- c. The physical properties of a substrate to include:
 - i. surface condition
 - ii. adhesion
 - iii. flexibility
 - iv. porosity.
- d. The technical properties of a substrate to include:
 - i. type of paint
 - ii. steel
 - iii. aluminium
 - iv. plastic
 - v. coated steels
 - vi. repaired panels
 - vii. OE finish

How to prepare existing paint substrates for colour matching

- a. The required preparation for the listed substrates to include:
 - i. steel
 - ii. aluminium alloys
 - iii. GR plastics
 - iv. thermo plastics
 - v. cured 2K materials
 - vi. synthetic enamels.

- b. The procedures for the preparation of paint finishes to include:
 - i. thorough cleaning and drying
 - ii. compounding to restore original colour.
- c. The procedures for the preparation of plastics to include:
 - i. identification
 - ii. tempering
 - iii. porefilling
 - iv. release agent removal
 - v. cleaning
 - vi. adhesion promotion
 - vii. elastic primers.
- d. The preparation requirements for textured and special effect coatings to include:
 - i. spoilers
 - ii. bumpers
 - iii. exterior trim.

How different light sources can affect the perception of colour for matching purposes

- a. Colour in terms of light reflected from a surface to include:
 - i. light quality
 - ii. surface quality
 - iii. absorbed light
 - iv. reflected light.
- b. The effects of metamerism under:
 - i. sodium light
 - ii. mercury vapour
 - iii. explain how this phenomenon is created.

Types of refinishing materials by their film forming characteristics

- a. The different types of paints to include:
 - i. non convertible
 - ii. nitro cellulose
 - iii. 1K acrylic
 - iv. convertible
 - v. oil based synthetics
 - vi. 2K acrylics
 - vii. 2K polyurethane
 - viii. polyesters
 - ix. isocyanate resins
 - x. waterborne basecoats
 - xi. microgel
 - xii. latex.
- b. The properties of binders to include:
 - i. convertible
 - ii. oxidise
 - iii. high temperature reactants
 - iv. chemical reactants.
- c. Non-convertible:
 - i. solvent evaporation.

- d. The forms of binder such as:
 - i. nitro-cellulose
 - ii. alkyds
 - iii. urethanes
 - iv. polyesters
 - v. isocyanates
 - vi. acrylics.
- e. The uses of binders in paints:
 - i. film forming
 - ii. binding the pigments
 - iii. adhesion
 - iv. cohesion
 - v. flexibility.
- f. The principles of operation of water based materials.
- g. The materials used in water based paint technology.
- h. The environmental advantages of using water based paints.

Distinguish between paint system classification, such as MS, HS, UHS, waterbased, etc.

- a. The difference between paint systems to include:
 - i. medium solids
 - ii. high solids
 - iii. ultra high solids
 - iv. waterbased.

The properties of different types of solvents, thinners and hardeners

- a. The properties of different types of solvent, thinners and hardeners such as:
 - i. evaporation rate
 - ii. ability to dissolve the binder
 - iii. ability to be tolerated by the binder
 - iv. fade out properties
 - v. drying rate.
- b. The forms of solvent/thinner such as:
 - i. alcohols
 - ii. ketones
 - iii. glycol ethers
 - iv. blends.
- c. The use of solvent/thinner
 - i. to make the paint fluid in the tin
 - ii. to reduce the paint to a spraying/ application viscosity.
- d. The properties of 2K hardeners to include:
 - i. effectiveness at blocking out harmful ultra violet light
 - ii. necessity for adding to 2K paints to effect curing
 - iii. inclusion of isocyanates requires special health and safety procedures.

The properties of paint system additives

- a. Listed additives and describe their properties to include:
 - i. adhesion promoters
 - ii. flexible additives
 - iii. texture finishes
 - iv. extenders
 - v. UV absorbers
 - vi. flow aids.
- b. The characteristics of additives to be added to textured paints such as those for:
 - i. textured finish
 - ii. leather look finishes
 - iii. crackle finishes
 - iv. metallic additives other than aluminium.

The factors to be considered when choosing and using refinishing systems

- a. The characteristics and properties of surface coatings to include:
 - i. nitro-cellulose- non convertible-low build –fast surface dry
 - ii. oil based synthetics-convertible-slow dry through uptake of oxygen
 - iii. two packs- convertible- chemical reaction –high build
 - iv. basecoats- solvent or water borne -non convertible-very low build-high opacity have to be overcoated with clearcoat.
- b. The listed paint materials in terms of their:
 - i. preparation of substrates
 - ii. mixing procedures
 - iii. application
 - iv. drying processes
 - v. working techniques
 - vi. covering and hiding power
 - vii. rectification
 - viii. cleaning processes.

Spraying equipment adjustments can alter the colour of refinishing materials

- a. The spray gun adjustments that can be made to determine the surface finish of a colour coat to include:
 - i. air pressure
 - ii. fluid volume
 - iii. fan width.

Sources of information relevant to the mixing and matching of vehicle paint colours

- a. The information that may be gained from the Vehicle Identification Number (VIN) plate with regard to paint codes.
- b. Alternative areas of the vehicle where the paint code may be found.

- c. The sources of information relevant to paint finishing to include:
 - i. PC based material
 - ii. paint manufacturer's information
 - iii. trade magazines
 - iv. specialist magazines (customising periodicals)
 - v. vehicle manufacturer's information sheets
 - vi. paint data sheets
 - vii. microfiche
 - viii. World Wide Web
 - ix. Thatcham Methods Manuals.
- d. Types of information recoverable from the above sources to include:
 - i. product and mixing information
 - ii. health and safety information
 - iii. first aid procedures
 - iv. application techniques
 - v. rectification procedures
 - vi. colour information.
- e. The meaning of the symbols used on most microfiche such as:
 - i. colour data
 - ii. formula field
 - iii. technical field
 - iv. on line finish
 - v. coding field
 - vi. formula in development
 - vii. special technical information
 - viii. variants
 - ix. respray
 - x. poor opacity
 - xi. 3-stage colour
 - xii. colours for mouldings/bumpers
 - xiii. revised formula.
- f. The extra colour information available such as:
 - i. colour variants
 - ii. colour 'wheel'
 - iii. on-line colour back up.
- g. The sources of tinting information available to the painter to aid colour matching of metallics.

The principles of colour, the colour wheel, and Munsell's Notation

- a. The theory of colour matching to include:
 - i. primary and secondary colours
 - ii. metamerism
 - iii. quality of light source
 - iv. colour circles

- b. The terminology used to describe the matching of metallic colours with reference to:
 - i. the Munsell Colour Circle
 - ii. the variant shade
 - iii. hue
 - iv. chroma
 - v. value.
- c. What is meant by subtractive mixing.
- d. What is meant by additive mixing.

The factors affecting colour and colour perception, including metamerism

- a. Factors affecting colour variation such as:
 - i. orientation of metallic particles
 - ii. flip and face tones
 - iii. coating thickness and viscosity
 - iv. spraying temperatures
 - v. spraying pressures.
- b. How each of the above has an effect on the colour match.
- c. How the above problems can be overcome.
- d. The process of light and pigment interaction with reference to:
 - i. colour spectrum
 - ii. colour effects
 - iii. refraction
 - iv. diffusion
 - v. light wavelengths
 - vi. thickness of pigment particles
 - vii. type of pigment particles.
- e. The function of a light box testing unit as:
 - i. testing under normal daylight conditions
 - ii. testing for metamerism
 - iii. comparison of colour standards.
- f. The operation of a light testing unit with reference to:
 - i. operation
 - ii. type of light used.

How to obtain matching colours and how to compare them with the original finish in terms of colour, tone and effect, including the use of dried test cards or panels

- a. The procedures and principles for using colour chips such as:
 - i. cleaning the panel
 - ii. matching in daylight conditions
 - iii. matching adjacent panels.
- b. What is meant by subtractive mixing.
- c. What is meant by additive mixing.
- d. The mixing of basecoat materials to include:
 - i. mixing tinters
 - ii. thinners, solvents or water
 - iii. additives.

- e. The preparation of a clearcoat material to include:
 - i. hardeners
 - ii. thinners/solvents
 - iii. additives.
- f. The types of 'advanced pigments' used in modern paints:
 - i. metallic (aluminium and titanium)
 - ii. pearlescents (micas)
 - iii. 'multi flip' pigments.
- g. The operation and characteristics of different pigments to include:
 - i. acicular-noodle shaped-add strength and reinforcing
 - ii. lamollar - flakes-increased durability
 - iii. nodular- roughly spherical-most common
- h. The function of spray out cards to determine:
 - i. opacity of colour
 - ii. hiding power
 - iii. colour comparison
 - iv. as a reference for future use.
- i. The functions of spray out cards with reference to a 'colour library':
 - i. reference functions
 - ii. colour tinting information
 - iii. information required
 - iv. recording of information.

Different application techniques

- a. The differences to applying a base coat material compared with one stage solid colours such as:
 - i. gun distance
 - ii. gun speed
 - iii. air pressure
 - iv. 'drop coats'
 - v. flash off.
- b. The application of clear coat with reference to:
 - i. gun speed
 - ii. flash off
 - iii. number of coats
 - iv. MS, HS and UHS.

The importance of using material application methods which assist in achieving colour match

- a. the differences to applying a base coat material compared with one stage solid colours such as:
 - i. gun distance
 - ii. gun speed
 - iii. air pressure
 - iv. 'drop coats'
 - v. flash off.
- b. The effects of applying metallic colours:
 - i. wet
 - ii. dry.

- c. The application of clear coat with reference to:
 - i. gun speed
 - ii. flash off
 - iii. number of coats
 - iv. MS, HS and UHS.

The use of blending techniques as an aid to achieving an acceptable colour match

- a. The procedure for carrying out paint blend to include:
 - i. panel preparation
 - ii. masking
 - iii. gun technique
 - iv. final thinning
 - v. spraying onto adjacent areas and panels to assist in matching colours.

The methods used to rectify mismatches caused by over tinting

- a. The requirements of tinting colours to:
 - i. lighten the colour
 - ii. darken the colour
 - iii. tint the colour
 - iv. 'clean' the colour.
- b. The procedure of colour matching with reference to:
 - i. identifying the mismatch
 - ii. describing the hue and value
 - iii. identifying the required tinter
 - iv. regulating the tinter additions.

Unit 703

Skills in working with plastic and reinforced composite materials

Level:	6
Credit value:	5
Relationship to NOS:	This unit is linked to PO03.1S Demonstrating skills in working with plastic materials and components.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit will help the learner to develop the skills required when working with plastic and reinforced composite materials whilst undertaking repair and paint operations.

Learning outcome	The learner will:
1.	be able to work safely when carrying out repairs to plastic and composite materials, and the preparation and application of foundation materials used in vehicle refinishing.
Assessment criteria	
The learner can:	
1.1	use suitable personal protective equipment and vehicle coverings throughout all repairs to plastic and reinforced composite materials, and during the preparation and application of foundation materials used in vehicle refinishing
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 repair and paint operation tasks.
Assessment criteria	
The learner can:	
2.1	select suitable sources of technical information to support repairs to plastic and reinforced composite materials, and for the preparation and application of foundation materials used in vehicle refinishing
2.2	use technical information to support repairs to plastic and reinforced composite materials, and for the preparation and application of foundation materials used in vehicle refinishing.

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 repairs to plastic and reinforced composite materials, and to prepare and apply the foundation materials used in vehicle refinishing
3.2	ensure that equipment has been calibrated to meet manufacturers' requirements
3.3	use the correct tools and equipment following manufacturers' guidelines when carrying out repairs to plastic and reinforced composite materials, and throughout the preparation and application of foundation materials used in vehicle refinishing
3.4	leave all application equipment in a clean and serviceable condition.

Learning outcome	The learner will:
4.	be able to carry out repairs to plastics and reinforced composite materials and the preparation and application of foundation materials used in vehicle refinishing.
Assessment criteria	
The learner can:	
4.1	identify the type of plastic or reinforced composite component prior to working on the vehicle
4.2	remove and store safely any components likely to be affected by the preparation process
4.3	keep the work area clean and tidy throughout all repair and preparation activities
4.4	use surface cleaning agents and protect adjacent panels to those being repaired
4.5	leave the repaired and prepared areas free from contamination and ready for the application of foundation materials
4.6	check the viscosity of foundation materials
4.7	prepare and apply all foundation materials to plastic and reinforced composite components
4.8	dry and cure all foundation materials applied to plastic and reinforced composite components
4.9	dispose of waste material to conform with legal and workplace requirements
4.10	ensure all completed repairs are finished to an agreed standard ready for the next process.

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.	

Unit 753

Knowledge of working with plastic and reinforced composite materials

Level:	6
Credit value:	6
Relationship to NOS:	This unit is linked to PO01K Knowledge of working with plastic materials and components.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by the IMI, the Standards Setting Body for the automotive industry.
Aim:	This unit enables the learner to develop an understanding of working with plastics and reinforced composite materials, whilst undertaking repair and paint operations following guidelines and procedures.

Learners must also complete the assessment for unit 253 in order to complete this unit

Learning outcome	The learner will:
1.	understand how to identify plastic and reinforced composite body surfaces requiring the application of foundation materials in vehicle refinishing
Assessment criteria	
The learner can:	
1.1	list the types of substrate likely to be found in vehicle refinishing
1.2	outline the main methods used to determine the vehicle substrate
1.3	describe the properties of the vehicle substrate
1.4	outline the factors that influence the selection of the preparation process and foundation material
1.5	state the types of body components that are likely to be manufactured from plastic and reinforced composite materials.

Learning outcome	The learner will:
2.	understand how to repair plastic and reinforced composite materials
Assessment criteria	
The learner can:	
2.1	explain the properties of plastic and reinforced composite materials used in vehicle body manufacturing.
2.2	explain the types of reinforcing materials used in the manufacture and repair of plastic and reinforced composite materials
2.3	explain the resins used in reinforced composite materials.

2.4	explain the moulding and laminating techniques used in the manufacture and repair of plastic and reinforced composite materials
2.5	explain how to assess the extent of the repair to be carried out
2.6	explain the factors determining the use of specific preparation and repair methods
2.7	explain the implications of working with plastic and reinforced composite materials
2.8	explain the consequences of using inappropriate repair methods

Learning outcome	The learner will:
3.	understand how to prepare plastic and reinforced composite body surfaces prior to application of foundation materials
Assessment criteria	
The learner can:	
3.1	explain the choice and use of surface cleaning agents prior to applying foundation materials to plastics and reinforced composite materials
3.2	explain how to condition and clean surfaces prior to the application of foundation coatings to ensure adequate adhesion.

Learning outcome	The learner will:
4.	understand how to mix and apply foundation materials onto plastics and reinforced composite materials in vehicle refinishing
Assessment criteria	
The learner can:	
4.1	explain how to mix and check the viscosity of foundation materials
4.2	explain the importance of viscosity and its effects on the surface finish
4.3	describe the properties of the foundation materials
4.4	explain the principles of paint mixing, the importance of the right additive (hardener or thinner) in the correct ratio
4.5	describe the curing and drying recommendations for the various foundation materials for plastics and reinforced composite materials
4.6	explain how to apply foundation coatings
4.7	describe how to find and interpret sources of information relevant to the mixing and application of foundation coatings relating to plastics and reinforced composite materials
4.8	describe how to avoid application defects
4.9	describe the masking procedures, methods and techniques for part or whole vehicles
4.10	explain how to carry out masking procedures to avoid material wastage and vehicle contamination for each stage of the process
4.11	identify the requirements for protecting the vehicle and contents from damage before, during and after preparing and applying foundation materials.

Unit 753 Knowledge of working with plastic and reinforced composite materials

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 types of substrates likely to be found in vehicle refinishing

- a. Types of substrate to include:
 - i. all plastics and reinforced composite materials
 - ii. high bake Enamels (O E finishes)
 - iii. 2 K Paints
 - iv. 1K Paints
 - v. clear over bases
 - vi. polyester fillers and spraying primers
 - vii. repaired panels
 - viii. primed panels
- b. Substrates to determine selection of undercoat with reference to:
 - i. condition of surface
 - ii. type of substrate
 - iii. process requirements
 - iv. material requirement.
- c. List the physical properties of a substrate to include:
 - i. surface condition
 - ii. adhesion
 - iii. flexibility
 - iv. porosity
 - v. texture.

Methods used in determining vehicle substrates

- a. Workshop tests to determine substrates to include:
 - i. visual tests for plastics and reinforced composite materials and identification of plastic type through identification code
- b. For determination of paint type:
 - ii. compound small area
 - iii. solvent wipe test (1K or 2K)
 - iv. colour of flattening sludge (straight colour or C O B).

The properties and correct use of conditioning materials

- a. That a vehicle must be thoroughly washed and cleaned prior to refinishing to include:
 - i. outside body panels
 - ii. under arches

- iii. under bonnet
 - iv. all apertures
 - v. degreased.
- b. The reasons for masking components adjacent to repair areas.
- c. The correct preparation of parts prior to painting to include products used for the removal of:
 - i. wax
 - ii. grease
 - iii. skin oils
 - iv. dust
 - v. water
 - vi. abrasive contaminates
 - vii. environmental pollution
 - viii. mould release agents
- d. Materials used for conditioning processes such as:
 - i. wax and grease removers
 - ii. spirit wipes
 - iii. acid based
 - iv. water based.
- e. The correct and safe use of the above materials.
- f. The properties of pre-preparation material to include:
 - i. neutralisation
 - ii. ability to alter the surface
 - iii. reaction with oxide.

The types and properties of foundation materials in common use

- a. The types of undercoat in common use to include:
 - i. etch primer / adhesion promoters
 - ii. primer surfacer
 - iii. primer filler
 - iv. stopper/putty
 - v. sealers
 - vi. anti stone chip
 - vii. polyester fillers and spraying primers
- b. The characteristics of these undercoats such as:
 - i. protection
 - ii. flexibility
 - iii. build
 - iv. drying
 - v. flatting.
- c. The types and characteristics of common protective coatings such as:
 - i. anti stone chip
 - ii. etch primer
 - iii. PVC.

The factors affecting the choice and use of foundation materials

- a. The reasons for using paint to include:
 - i. protection
 - ii. filling
 - iii. decoration
 - iv. identification
 - v. safety.
- b. Undercoat materials for plastics and reinforced composite materials to include:
 - i. adhesion promoters
 - ii. surface modifiers
 - iii. flexible additives
 - iv. texture additives.
- c. The procedures for the preparation of plastics and reinforced composite material to include:
 - i. identification
 - ii. cleaning
 - iii. adhesion promotion
 - iv. elastic primers.
- d. Identify the preparation requirements for textured and special effect coatings to include:
 - i. spoilers
 - ii. bumpers
 - iii. exterior trim.

The procedures for mixing foundation materials to the correct ratio with hardeners and thinners

- a. Procedures for mixing undercoats such as:
 - i. anti-stone chip primers
 - ii. surfacers
 - iii. wash fillers
 - iv. primer fillers
 - v. plastic adhesion promoters
 - vi. elastic primers
 - vii. sealers
 - viii. polyester fillers and spraying primers.
- b. Listed additives such as:
 - i. adhesion promoters
 - ii. flexible additives
 - iii. texture finishes
 - iv. extenders
 - v. UV absorbers
 - vi. flow aids.

The importance of checking and adjusting paint viscosity and its effect on surface finish

- a. Why the viscosity of a paint is important to application to include:
 - i. build
 - ii. surface finish
 - iii. speed of application
- b. Describe the procedure for checking viscosity.
- c. Describe the effects on viscosity of:
 - i. temperature
 - ii. additions of thinner/reducer.

Foundation material technical data sheets to extract listed information. The importance of correctly interpreting and following manufacturers' instructions and the consequences of failing to do so

- a. The process data sheets to determine information such as:
 - i. mixing ratios
 - ii. viscosity
 - iii. number of coats
 - iv. flash off times
 - v. build film thickness
 - vi. spray gun type
 - vii. spray gun set up
 - viii. air pressure requirements
 - ix. substrate requirements
 - x. suitability as a substrate
 - xi. drying times
 - xii. suitability to be applied by methods other than spraying.
- b. The main information sourced from data sheets to include:
 - i. product identification
 - ii. product description
 - iii. substrate suitability
 - iv. pre-treatment requirement
 - v. mixing ratio
 - vi. pot life
 - vii. method of application
 - viii. spray viscosity
 - ix. nozzle/air cap set up
 - x. number of coats
 - xi. flash off times
 - xii. drying times
 - xiii. recoatability.
- c. Common pictograms and state their meaning including those for:
 - i. cleaning information
 - ii. mixing ratios
 - iii. use a measuring stick
 - iv. addition of hardener
 - v. application viscosity
 - vi. type of spray gun
 - vii. spray coats information
 - viii. flash-off

- ix. drying time
- x. drying with infrared
- xi. sanding
- xii. polishing
- xiii. technical data required
- xiv. hand stirring.

Masking procedures for part and whole vehicles. Describe masking processes and techniques

- a. Common masking systems, materials and techniques to include:
 - i. masking paper
 - ii. plastic sheeting
 - iii. masking tape
 - iv. foam tape
 - v. wheel covers
 - vi. roll-back masking.
- b. The characteristics of a quality masking tape to include:
 - i. ability to turn corners
 - ii. non-aggressive adhesive/non-drying
 - iii. clean edges to painted areas.
- c. The properties of these masking materials such as:
 - i. economy of use
 - ii. costs per unit
 - iii. absorption
 - iv. flexibility.
- d. Where and how these masking materials and systems should be used.
- e. The masking procedures for listed items such as:
 - i. door glass and windscreens
 - ii. handles
 - iii. lights
 - iv. mirrors
 - v. wheels.
- f. Masking schedule for the type of repair to include:
 - i. time efficiency
 - ii. material costs
 - iii. given protection.
- g. Faults which are caused by careless masking such as:
 - i. flash lines
 - ii. bridging
 - iii. creep
 - iv. hard edges.

Identify and use sources of information relevant to the repair of plastic and reinforced composite panels

- a. Use manufacturers' data sheets to identify information on:
 - i. material specifications
 - ii. forms of supply
 - iii. mixing ratios
 - iv. material limitations
 - v. material properties

- vi. curing times
 - vii. mixing ratios.
- b. Use safety data sheets to determine information on:
- i. dangers associated with materials
 - ii. PPE required
 - iii. safe working practices
 - iv. toxicity of material components
 - v. fire safety
 - vi. storage recommendations
 - vii. flash points.
- c. Interpret job specification sheets in determining:
- i. shape and size of laminations and mouldings
 - ii. material specifications
 - iii. surface finish
 - iv. colour
 - v. thickness or weight.

Describe the properties of the material and the factors affecting their use

- a. Define properties of moulded plastics and composite laminates in terms of:
- i. tensile and compressive strength
 - ii. uni-directional strength
 - iii. corrosion resistance
 - iv. impact characteristics
 - v. weight to strength ratio
 - vi. comparison with traditional materials
- b. Define factors affecting the use of plastics and reinforced composite materials in terms of:
- i. mould availability
 - ii. labour requirements
 - iii. curing times
 - iv. material costs
 - v. suitability for the purpose
 - vi. impact resistance
 - vii. tensile and compressive strength
 - viii. durability
 - ix. repairability
 - x. assembly techniques.

Explain how to carry out repairs to small sections and material damage (splits, cracks, undercuts)

- a. Describe the techniques used to:
- i. determine extent of damage
 - ii. prepare damaged area
 - iii. realign material prior to bonding
 - iv. prepare joint edges
 - v. measure and mix materials for economy.
- b. Explain the procedures used to:
- i. carry out small repairs using bonding

- ii. carry out repairs using small amounts of reinforcement
- iii. apply resin or adhesive as a filling agent
- iv. regain material contours
- v. reinforce weakened panels using bracing.

List the materials required to produce repair sections for reinforced composite materials

- a. Explain the selection, use and characteristics of:
 - i. gel coat resins
 - ii. general purpose resins
 - iii. chopped strand matting
 - iv. woven cloth
 - v. repair tapes
 - vi. mould release agents
 - vii. thixotropic agents
 - viii. catalysts
 - ix. accelerators
 - x. pigments.
- b. Describe the production of male and female moulds.
- c. Describe the production of simple one-piece moulds.
- d. Describe the production of a repair section from an existing undamaged part in terms of:
 - i. preparation of the surface
 - ii. application of release agents
 - iii. hand lay up of materials
 - iv. removal of cured part
 - v. trimming and finishing.

State the health and safety requirements when using plastic and reinforced composite materials

- a. Identify material components which carry a risk factor
- b. Determine correct PPE required when carrying out:
 - i. mould preparation
 - ii. material preparation
 - iii. laminating
 - iv. trimming and sanding.
- c. Describe the environmental and work area conditions
- d. Explain the fire risks associated with catalysed resins and adhesives and their disposal
- e. State the respiratory requirements required when laminating or trimming
- f. Determine the correct storage requirements
- g. Explain the importance of disposing of waste safely and the consequences of not doing so to others and the environment
- h. How to dispose of waste materials.

Describe common material faults and forms of damage commonly encountered in plastic and reinforced composite material components

- a. Describe the possible causes of the following faults:
 - i. star cracks
 - ii. delamination or poor adhesion
 - iii. crazing
 - iv. wrinkling
 - v. air pockets or voids
 - vi. fibre pattern
 - vii. blistering
 - viii. fish eyes
 - ix. warping of new mouldings
 - x. irregularity of mould surfaces
 - xi. scuffs, scratches and splits.
- b. Describe the rectification procedures for the above faults.



Appendix 1 Sources of general information

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

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 GOL/e-volve assessments.

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Useful contacts

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Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: centresupport@cityandguilds.com
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International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: intops@cityandguilds.com
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, GOLLA, Navigation, User/menu option, Problems	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: walledgarden@cityandguilds.com
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