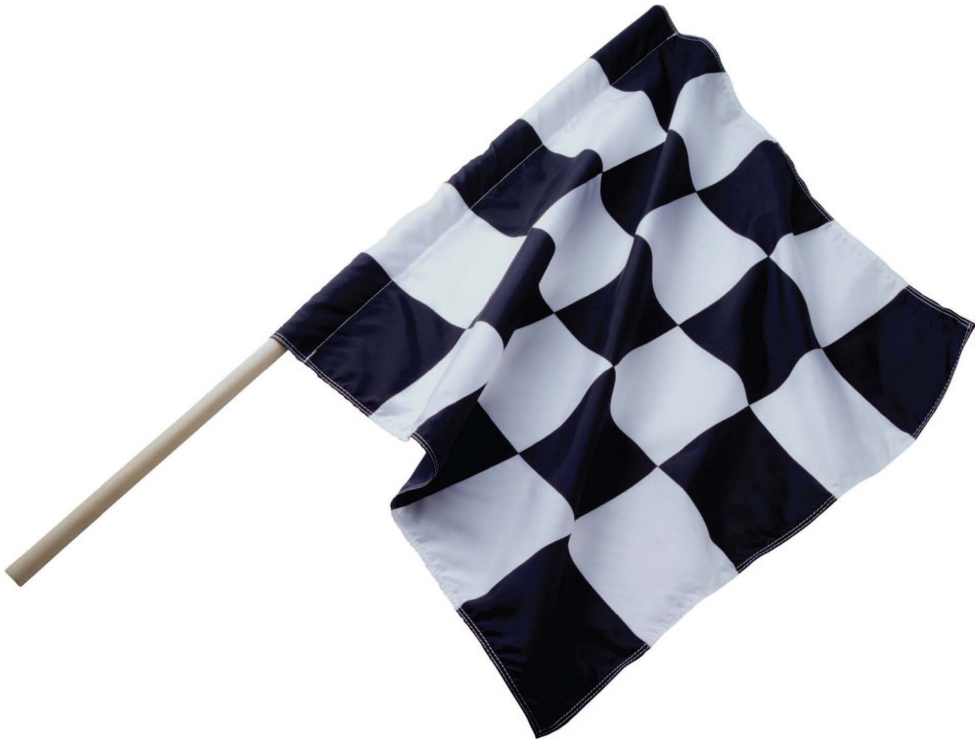
QUALIFICATION HANDBOOK

Level 2 and 3 Diplomas in Motorcycle Maintenance and Repair Principles (4290-32/33)

June 2020 Version 2.2



City & Guilds

Qualifications at a glance

Subject area	**Vehicle Maintenance and Repair**
City & Guilds number	4290
Age group approved	16+
Entry requirements	There are no entry requirements
Assessment	Online multiple choice tests (graded Pass, Merit, Distinction) and assignments (graded Pass)
Fast track	Not available; automatic approval applies in some cases
Support materials	Centre handbook Practical assessment workbook Practical training workbook
Registration and certification	See online catalogue/Walled Garden for last dates.

Title and level	City & Guilds number	Accreditation number
Level 2 Diploma in Motorcycle Maintenance and Repair Principles	4290-32	501/0288/6
Level 3 Diploma in Motorcycle Maintenance and Repair Principles	4290-33	501/0021/X

Title and level	GLH	TQT	City & Guilds number	Accreditation number
Level 2 Diploma in Motorcycle Maintenance and Repair Principles	595	700	4290-32	501/0288/6
Level 3 Diploma in Motorcycle Maintenance and Repair Principles	665	790	4290-33	501/0021/X

Version and date	Change detail	Section
Version 2 (September 2012)	Unit 312 - correction of transposed GLH and credit value; Units 351 and 352 - alignment of unit range to 4270-351 and 352; spelling errors corrected. Addition of statements in Section 4.	Various
Version 2.1 (October 2013)	Unit supporting information updated with introductory text	Units
V2.2 June 2020	TQT added	Qualifications at a glance

Contents

1 Introduction

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

Area	Description
Who are the qualifications for?	Candidates wanting to develop some of the key skills and understanding in motorcycle systems. These qualifications are ideal for young or adult learners with little or no knowledge and experience of the automotive industry.
What do the qualifications cover?	Allow candidates to learn, develop and practise the skills required for employment and/or career progression in the automotive industry.
Are the qualifications part of a framework or initiative?	These qualifications are part of the Automotive Maintenance and Repair Intermediate and Advanced Apprenticeship Frameworks (framework 1) which replaced framework 4 from April 2011.
What opportunities for progression are there?	Allow candidates to progress into employment in a variety of roles including specialist repair or specialist finisher in a motorcycle workshop or to the following City & Guilds qualifications: • 4270-32/33 Level 2 and 3 Diplomas in Motorcycle Maintenance and Repair • ILM management and leadership qualifications.

Structure

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

Qualification	Total credits	Credits from mandatory units	Credits from optional units
City & Guilds Level 2 Diploma in Motorcycle Maintenance and Repair Principles (4290-32)	**70**	**66**	**4 (min)**
		001, 003, 004, 051, 053, 054, 301, 302, 303, 304, 351, 352, 353, 354, 372	- 008 and 058, or - 305 and 355
City & Guilds Level 3 Diploma in Motorcycle Maintenance and Repair Principles (4290-33)	**79**	**69**	**10 (min)**
		001, 003, 004, 051, 053, 054, 305, 307, 308, 312, 355, 357, 358, 362, 436, 486	- 008 and 058, or - 006 and 056

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Y/601/7254	001	Skills in health, safety and good housekeeping in the automotive environment	7
J/601/6262	003	Skills in supporting job roles in the automotive work environment	5
Y/601/6279	004	Skills in materials, fabrication, tools and measuring devices used in the automotive environment	7
Y/601/6282	006	Skills in how to make learning possible through demonstrations and instruction	5
M/601/6286	008	Skills to identify and agree motor vehicle customer service needs	5
D/601/6171	051	Knowledge of health, safety and good housekeeping in the automotive environment	3
T/601/6175	053	Knowledge of support for job roles in the automotive work environment	3
K/601/6237	054	Knowledge of materials, fabrication, tools and measuring devices used in the automotive environment	4
T/601/6242	056	Knowledge of how to make learning possible through demonstrations and instruction	5
R/601/6247	058	Knowledge of how to identify and agree motor vehicle customer service needs	5
F/601/5594	301	Skills in routine motorcycle maintenance	2
R/601/5597	302	Skills in motorcycle internal engine systems	5
D/601/5604	303	Skills in removing and replacing motorcycle electrical units and components	5
M/601/5610	304	Skills in removing and replacing motorcycle chassis units and components	5
Y/601/5617	305	Skills in motorcycle preparation and inspection	2
T/601/5625	307	Skills in diagnosing and rectifying motorcycle engine faults	5
Y/601/5634	308	Skills in diagnosing and rectifying motorcycle chassis system faults	5
H/601/5636	312	Skills in diagnosing and rectifying motorcycle transmission faults	3
F/601/5515	351	Knowledge of routine motorcycle maintenance	2

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Y/601/5519	352	Knowledge of motorcycle internal engine systems	3
H/601/5555	353	Knowledge of removing and replacing motorcycle electrical units and components	6
T/601/5558	354	Knowledge of removing and replacing motorcycle chassis units and components	6
F/601/5563	355	Knowledge of motorcycle preparation and inspection	2
R/601/5566	357	Knowledge of diagnosis and rectification of motorcycle engine faults	6
D/601/5568	358	Knowledge in diagnosis and rectification of motorcycle chassis faults	6
L/601/5582	362	Knowledge of diagnosis and rectification of motorcycle transmission and driveline faults	4
T/601/5527	372	Knowledge of motorcycle fuel, ignition, air and exhaust system units and components	3
K/601/5590	436	Skills in diagnosing and rectifying motorcycle electrical faults	3
M/601/5512	486	Knowledge of diagnosis and rectification of motorcycle electrical faults	4

2 Centre requirements

Approval

Centres already approved to offer the Level 2/3 Certificate/Diploma in Motorcycle Maintenance and Repair (4101-48/53) will be automatically approved to register and certificate candidates on the respective 4290-32/33 (unless the centre is already subject to sanctions).

For all other cases, centres will need to gain both centre and qualification approval. Please refer to the *Centre guide* and *Providing City & Guilds Qualifications* 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 these qualifications must be able to demonstrate that they meet the following occupational expertise requirements. They should:

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

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

Assessor and verifiers

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

Continuing professional development (CPD)

Centres must support their staff to ensure that they have current knowledge of the occupational area, that delivery, mentoring, training,

assessment and verification is in line with best practice, and that it takes account of any national or legislative developments.

Candidate entry requirements

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

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

Age restrictions

These qualifications are accredited for candidates aged 16 years or older.

3 Delivering the qualification

Initial assessment and induction

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

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

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

Support materials

The following resources are available for these qualifications:

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

4 Assessment

Assessment of the qualification

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

- Assignments (practical assessment workbooks) comprising of practical tasks and knowledge based questions to cover all learning outcomes graded Pass only.
- Online multiple choice tests graded Pass, Merit, Distinction.
- Assignments can be downloaded from www.cityandguilds.com/automotive. These assessments are carried out in centres and must be completed to current industry standards and practice. It is important to note that although the units within these qualifications bear a close relationship to the VCQ units, they do not imply occupational competence.
- Assessment requirements for all skills units are shown in full in our assessment documentation.

Time constraints

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

- Candidates must complete their assessments within their registration period.

Test specifications

Summary test specifications for all 4290 online tests can be found in the *Automotive online test specifications* document, downloadable from the 4290 website.

Recognition of prior learning (RPL)

Proxy units / credit transfer

Learners transferring from City & Guilds 4101 NQF qualifications or from another awarding organisation may be exempt from taking the 4290/4270/4291/4271 online multiple choice tests, on production of a valid certificate of equivalent units achieved. Proxy units are available in these circumstances. Please note that a certificate of unit credit (CUC) is not available when claiming a proxy unit. For more information on credit transfer please refer to our 9420 Automotive Apprenticeship Framework centre guide available from **www.cityandguilds.com**

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

Unit number	Level	Unit title	Credit value	Assessment method
001	2	Skills in health, safety and good housekeeping in the automotive environment	7	Assignment
003	3	Skills in supporting job roles in the automotive work environment	5	Assignment
004	2	Skills in materials, fabrication, tools and measuring devices used in the automotive environment	7	Assignment
006	3	Skills in how to make learning possible through demonstrations and instruction	5	Assignment
008	3	Skills to identify and agree motor vehicle customer service needs	5	Assignment
051	2	Knowledge of health, safety and good housekeeping in the automotive environment	3	Assignment
053	3	Knowledge of support for job roles in the automotive work environment	3	Assignment
054	2	Knowledge of materials, fabrication, tools and measuring devices used in the automotive environment	4	Assignment
056	3	Knowledge of how to make learning possible through demonstrations and instruction	5	Assignment
058	3	Knowledge of how to identify and agree motor vehicle customer service needs	5	Assignment
301	2	Skills in routine motorcycle maintenance	2	Assignment
302	2	Skills in motorcycle internal engine systems	5	Assignment
303	2	Skills in removing and replacing motorcycle and electrical units and components	5	Assignment
304	2	Skills in removing and replacing motorcycle chassis units and components	5	Assignment
305	2	Skills in motorcycle preparation and inspection	2	Assignment
307	3	Skills in diagnosing and rectifying motorcycle engine faults	5	Assignment

Unit number	Level	Unit title	Credit value	Assessment method
308	3	Skills in diagnosing and rectifying motorcycle chassis system faults	5	Assignment
312	3	Skills in diagnosing and rectifying motorcycle transmission faults	3	Assignment
351	2	Knowledge of routine motorcycle maintenance	2	Multiple choice test
352	2	Knowledge of motorcycle internal engine systems	3	Multiple choice test
353	2	Knowledge of removing and replacing motorcycle electrical units and components	6	Multiple choice test
354	2	Knowledge of removing and replacing motorcycle chassis units and components	6	Multiple choice test
355	2	Knowledge of motorcycle preparation and inspection	2	Multiple choice test
357	3	Knowledge of diagnosis and rectification of motorcycle engine faults	6	Multiple choice test
358	3	Knowledge in diagnosis and rectification of motorcycle chassis faults	6	Multiple choice test
362	3	Knowledge of diagnosis and rectification of motorcycle transmission and driveline faults	4	Multiple choice test
372	2	Knowledge of motorcycle fuel, ignition, air and exhaust system units and components	3	Multiple choice test
436	3	Skills in diagnosing and rectifying motorcycle electrical faults	3	Assignment
486	3	Knowledge of diagnosis and rectification of motorcycle electrical faults	4	Multiple choice test

5 Units

Structure of units

These units each have the following:

- City & Guilds reference number
- unit accreditation number (UAN)
- title
- level
- credit value
- unit aim
- relationship to NOS
- learning outcomes which are comprised of a number of assessment criteria
- unit range.

Summary of units

City & Guilds unit number	Unit title	Unit accreditation number (UAN)
001	Skills in health, safety and good housekeeping in the automotive environment	Y/601/7254
003	Skills in supporting job roles in the automotive work environment	J/601/6262
004	Skills in materials, fabrication, tools and measuring devices used in the automotive environment	Y/601/6279
006	Skills in how to make learning possible through demonstrations and instruction	Y/601/6282
008	Skills to identify and agree motor vehicle customer service needs	M/601/6286
051	Knowledge of health, safety and good housekeeping in the automotive environment	D/601/6171
053	Knowledge of support for job roles in the automotive work environment	T/601/6175
054	Knowledge of materials, fabrication, tools and measuring devices used in the automotive environment	K/601/6237
056	Knowledge of how to make learning possible through demonstrations and instruction	T/601/6242

City & Guilds unit number	Unit title	Unit accreditation number (UAN)
058	Knowledge of how to identify and agree motor vehicle customer service needs	R/601/6247
301	Skills in routine motorcycle maintenance	F/601/5594
302	Skills in motorcycle internal engine systems	R/601/5597
303	Skills in removing and replacing motorcycle and electrical units and components	D/601/5604
304	Skills in removing and replacing motorcycle chassis units and components	M/601/5610
305	Skills in motorcycle preparation and inspection	Y/601/5617
307	Skills in diagnosing and rectifying motorcycle engine faults	T/601/5625
308	Skills in diagnosing and rectifying motorcycle chassis system faults	Y/601/5634
312	Skills in diagnosing and rectifying motorcycle transmission faults	H/601/5636
351	Knowledge of routine motorcycle maintenance	F/601/5515
352	Knowledge of motorcycle internal engine systems	Y/601/5519
353	Knowledge of removing and replacing motorcycle electrical units and components	H/601/5555
354	Knowledge of removing and replacing motorcycle chassis units and components	T/601/5558
355	Knowledge of motorcycle preparation and inspection	F/601/5563
357	Knowledge of diagnosis and rectification of motorcycle engine faults	R/601/5566
358	Knowledge in diagnosis and rectification of motorcycle chassis faults	D/601/5568
362	Knowledge of diagnosis and rectification of motorcycle transmission and driveline faults	L/601/5582
372	Knowledge of motorcycle fuel, ignition, air and exhaust system units and components	T/601/5527
436	Skills in diagnosing and rectifying motorcycle electrical faults	K/601/5590
486	Knowledge of diagnosis and rectification of motorcycle electrical faults	M/601/5512

Unit 001 Skills in health, safety and good housekeeping in the automotive environment

UAN:	**Y/601/7254**
Level:	2
Credit value:	7
GLH:	60
Relationship to NOS:	This unit is linked to G1 Contribute to Housekeeping in Motor Vehicle Environment and G2 Reduce Risks to Health and Safety in the Motor Vehicle Environment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit will enable the learner to develop the skills required to: • carry out day to day work area cleaning, clearing away, dealing with spillages and disposal of waste, used materials and debris • identify hazards and risks in the automotive environment and complying with relevant legislation and good practice • work safely at all times within the automotive environment, both as an individual and with others.

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

g. lungs 1.2 select and use vehicle protective equipment throughout all activities.

Learning outcome	The learner will:
2. be able to carry out effective housekeeping practices in the automotive environment	
Assessment criteria	
The learner can: 2.1 select and use cleaning equipment which is of the right type and suitable for the task 2.2 use utilities and appropriate consumables, avoiding waste 2.3 use materials and equipment to carry out cleaning and maintenance duties in allocated work areas, following automotive work environment policies, schedules and manufacturers 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

UAN:	**J/601/6262**
Level:	3
Credit value:	5
GLH:	40
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 was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
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 004 Skills in materials, fabrication, tools and measuring devices used in the automotive environment

UAN:	**Y/601/6279**
Level:	2
Credit value:	7
GLH:	60
Relationship to NOS:	This unit is linked to G4 Use of hand tools and equipment in motor vehicle engineering.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit helps the learner to develop the skills required for: • the correct selection, care and use of key hand tools and measuring devices for modification, fabrication and repair in the automotive environment • the correct preparation and use of common work environment equipment • the correct selection and fabrication of materials used when modifying and repairing • the correct application of automotive engineering fabrication and fitting principles

Learning outcome	**The learner will:**
1. be able to select, maintain and use hand tools and measuring devices in the automotive environment	
Assessment criteria	
The learner can: 1.1 select, maintain and use suitable hand tools safely when fabricating and fitting in the automotive workplace 1.2 select, maintain and use suitable measuring devices safely when fabricating and fitting in the automotive environment 1.3 select, maintain and use suitable PPE for fabrication, repair and fitting in the automotive environment 1.4 select, maintain and use suitable electrical measuring tools safely when repairing vehicles and components.	

Learning outcome	The learner will:
2. be able to prepare and use common workshop equipment	
Assessment criteria	
The learner can: 2.1 use suitably maintained workshop equipment safely 2.2 use correct interpretation of 'safe working load' on lifting and supporting equipment 2.3 report any faulty or damaged tools and equipment to the relevant persons clearly and promptly 2.4 store work tools and equipment in a safe manner which permits ease of access and identification for use.	

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

Learning outcome	The learner will:
4. be able to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components	
Assessment criteria	
The learner can: 4.1 use correct procedures when: a. filing b. tapping threads c. cutting plastics and metals d. drilling plastics and metals e. fitting 4.2 use appropriate techniques when fabricating, repairing and modifying vehicles and components 4.3 select and use: a. gaskets b. seals c. sealants d. fittings and fasteners 4.4 apply modification and repair techniques to automotive electrical circuits 4.5 select and use locking, fixing and fastening devices.	

Unit 006 Skills in how to make learning possible through demonstrations and instruction

UAN:	**Y/601/6282**
Level:	3
Credit value:	5
GLH:	40
Relationship to NOS:	This unit is linked to G6 Enable Learning through Demonstration and Instruction.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit covers the skills needed in order to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners' progress and giving feedback.

Learning outcome	**The learner will:**
1. be able to demonstrate skills and methods to learners	
Assessment criteria	
The learner can: 1.1 perform demonstrations based on an analysis of the skills needed and the order in which they must be learned 1.2 perform demonstrations that are accurate and realistic 1.3 perform structured demonstrations so that the learner can get the most out of it 1.4 perform demonstrations whilst encouraging learners to ask questions and get explanation at appropriate stages in the demonstration 1.5 provide positive feedback to learners whilst they are being given the opportunity to practice the skills that have been demonstrated 1.6 perform additional demonstrations of skills being taught to reinforce learning 1.7 perform demonstrations in a safe environment which also allows learners to see clearly 1.8 respond to the needs of the learners during demonstrations 1.9 reduce distractions and disruptions as much as possible.	

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

Unit 008 Skills to identify and agree motor vehicle customer service needs

UAN:	**M/601/6286**
Level:	3
Credit value:	5
GLH:	40
Relationship to NOS:	This unit is linked to G8 Identify and Agree the Motor Vehicle Customer Needs.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit is about the skills required to: • gain information from customers on their perceived needs • give advice and information and agree a course of action • contract for the agreed work and complete all necessary records and instructions.

Learning outcome	**The learner will:**
1. be able to obtain relevant information from the customer	
Assessment criteria	
The learner can: 1.1 obtain and interpret sufficient, relevant information, from the customer to make an assessment of their needs 1.2 clarify customer and vehicle needs by referring to vehicle data and operating procedures.	

Learning outcome	**The learner will:**
2. be able to provide relevant information to the customer	
Assessment criteria	
The learner can: 2.1 provide customers with accurate, current and relevant advice and information, in a form that the customer will understand 2.2 demonstrate techniques which encourage customers to ask questions and seek clarification during conversation.	

Learning outcome	The learner will:
3. be able to agree work undertaken with the customer	
Assessment criteria	
The learner can: 3.1 summarise and record work agreed with the customer, before accepting the vehicle 3.2 implement confirmation of the agreement by ensuring customer understanding.	

Learning outcome	The learner will:
4. be able to ensure recording systems are implemented correctly	
Assessment criteria	
The learner can: 4.1 use recording systems which are accurate and complete, in the required format and signed by the customer where necessary 4.2 perform the next stage in the process by passing on completed records to the correct person promptly 4.3 demonstrate correct procedures for customer approval where the contracted agreement is likely to be exceeded.	

Unit 051 Knowledge of health, safety and good housekeeping in the automotive environment

UAN:	**D/601/6171**
Level:	Level 2
Credit value:	3
GLH:	30
Relationship to NOS:	This unit is linked to G1 Contribute to Housekeeping in Motor Vehicle Environments and G2 Reduce Risks to Health and Safety in the Motor Vehicle Environment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by IMI, the Sector Skills Council for the automotive retail industry.
Aim:	This unit enables the learner to develop an understanding of: • 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 3.4 automotive environment 3.5 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

Evidence requirements

The evidence requirements are shown in full in the assessment documentation.

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

Economic use of Resources

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

Requirement to maintain work area effectively

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

Spillages, leaks and waste materials

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

Basic legislative requirements

a. Provision and Use of Work Equipment Regulations 1992
b. Provision and Use of Work Equipment Regulations 1998 as applied to power presses
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 Wheels Regulations 1970
i. The Lifting Operations and Lifting Equipment Regulations 1998
j. Work at Height Regulations 2005.

Routine maintenance of the workplace

a. Trainees' 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 manufacturers' recommendations.
m. Location of routine maintenance information e.g. electrical safety check log.

Legislation relevant to Health and Safety

a. Health And Safety At Work Act 1974
b. Control of Substances Hazardous to Health Regulations 2002
c. Environmental Protection Agency
d. Manual Handling Operations Regulations 1992
e. Personal Protective Equipment Regulations 1992.

General regulations to include an awareness of:

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

Legislative duties

a. The purpose of a Health and Safety Policy.

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

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

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

PPE to include:

a. Typical maintenance procedures for PPE equipment to include:
    i typical maintenance log
    ii cleaning procedures
    iii filter maintenance
    iv variation in glove types
    v air quality checks.
b. Choice and fitting procedures for masks and air breathing equipment.
c. Typical workplace processes which would require the use of PPE to include:
    i. welding
    ii. sanding and grinding
    iii. filling
    iv. panel removal and replacement
    v. drilling
    vi. cutting
    vii. chiselling
    viii. removal of broken glass
    ix. removal of rubber seals from fire damaged vehicles
    x. removal of hypodermic needles
    xi. servicing activities
    xii. roadside recovery
    xiii. unserviceable PPE.
d. 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 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 i.e. keep the injured party warm
vii administer water for minor burns or chemical injuries
viii wash eyes with water to remove dust or ingress of chemicals (battery acid)
ix need to seek professional help for serious injuries.

c. Examples of bad practice which may result in further injury such as:
i moving the injured party
ii removing foreign objects from wounds or eyes
iii inducing vomiting
iv straightening deformed limbs.

Unit 053 Knowledge of support for job roles in the automotive work environment

UAN:	**T/601/6175**
Level:	Level 3
Credit value:	3
GLH:	20
Relationship to NOS:	This unit is linked to G3 Maintaining Working Relationships in the Motor Vehicle Environment.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by IMI, the Sector Skills Council for the automotive retail 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 main 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 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 manufacturers' 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 the different methods of communication would be used within the automotive environment 3.2 explain the factors which can determine your choice of communication 3.3 explain how the communication of information can change with the target audience to include uninformed people and informed people	

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

Learning outcome	The learner will:
5. understand how to develop good working relationships with colleagues and customers in the automotive workplace	
Assessment criteria	
The learner can: 5.1 describe how to develop positive working relationships with colleagues and customers 5.2 explain the importance of developing positive working relationships 5.3 explain the importance of accepting other 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

Evidence requirements

The evidence requirements are shown in full in the assessment documentation.

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

The structure of a typical vehicle repair business

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

Sources of information:

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

Communication requirements when carrying out vehicle repairs

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

iv keeping others informed of progress.

Methods of communication:

a. Verbal.
b. Signs and notices.
c. Memos.
d. Telephone.
e. Electronic mail.
f. Vehicle job card.
g. Notice boards.
h. SMS text messaging.
i. Letters.

Organisational and customer requirements:

a. Importance of time scales to customer and organization.
b. Relationship between time and costs.
c. Meaning of profit.

Choice of communication

a. Distance.
b. Location.
c. Job responsibility.

Importance of maintaining positive working relationships:

a. Morale.
b. Productivity.
c. Company image.
d. Customer relationships.
e. Colleagues.

Unit 054 Knowledge of materials, fabrication, tools and measuring devices used in the automotive environment

UAN:	**K/601/6237**
Level:	Level 2
Credit value:	4
GLH:	40
Relationship to NOS:	This unit is linked to G4 Use of Hand Tools and Equipment in Motor Vehicle Engineering.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by IMI, the Sector Skills Council for the automotive retail industry.
Aim:	This unit enables the learner to develop an understanding of: • the correct selection, care and use of key hand tools and measuring devices for modification, fabrication and repair in the automotive environment • the correct preparation and use of common automotive environment equipment • the correct selection and fabrication of materials used when modifying and repairing • the correct application of automotive engineering fabrication and fitting principles.

Learning outcome	**The learner will:**
1. understand how to select, use and care for hand tools and measuring devices in the automotive environment	
Assessment criteria	
The learner can: 1.1 identify and explain the use of common types of hand tools used for fabricating and fitting in the automotive environment 1.2 identify and explain the use of common measuring devices used for fabrication and fitting in the automotive environment 1.3 describe, within the scope of their responsibilities, how to select, prepare and maintain hand tools, measuring devices and PPE used for fabrication, repair and fitting in the automotive environment	

1.4 state the limitations of common hand tools and measuring devices used for fabricating, repair and fitting in the automotive workplace 1.5 explain how common hand tools and measuring devices used for fabricating, repair and fitting in the automotive environment should be stored and maintained 1.6 identify common electrical measuring tools used in the repair of vehicles and components 1.7 explain the preparation and safe and correct use of common electrical tools when measuring voltage, current and resistance

Learning outcome	**The learner will:**
2. understand how to prepare and use common workshop equipment	
Assessment criteria	
The learner can: 2.1 describe the preparation and safe use of workshop equipment 2.2 explain the term: safe working load.	

Learning outcome	**The learner will:**
3. understand how to select materials when fabricating, modifying and repairing vehicles and fitting components	
Assessment criteria	
The learner can: 3.1 describe the properties, application and limitations of ferrous and non-ferrous metals including their safe use 3.2 describe the properties, application and limitations of non-metallic materials including their safe use 3.3 define common terms relating to the properties of materials.	

Learning outcome	**The learner will:**
4. understand how to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components	
Assessment criteria	
The learner can: 4.1 describe how to tap threads, file, cut and drill plastics and metals when modifying and repairing vehicles 4.2 describe how to measure, mark out, shape and join materials when fabricating 4.3 describe the selection and fitting procedures of the following: a. gaskets and seals b. sealants and adhesives c. fittings and fasteners d. electrical circuit components 4.4 identify locking, fastening and fixing devices 4.5 state the importance of correct operating specifications for limits, fits and tolerances in the automotive environment.	

Unit 054 Knowledge of materials, fabrication, tools and measuring devices used in the automotive environment

Supporting information

Evidence requirements

The evidence requirements are shown in full in the assessment documentation.

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

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

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

Common measuring devices used for fabrication and fitting in the automotive workplace, to include:

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

Common electrical measuring tools used in the repair of vehicles and components, to include:

a. Ammeter.
b. Voltmeter.

c. Ohmmeter.
d. Multi-meter.

Common electrical terms when measuring:

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

Workshop equipment (including appropriate PPE) to include:

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

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

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

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

a. Glass.
b. Plastics (inc GRP).
c. Kevlar.
d. Rubber.

Terms relating to the properties of materials, to include:

a. Hardness.
b. Toughness.
c. Ductility.
d. Elasticity.
e. Tenacity.
f. Malleability.
g. Plasticity.

Unit 056 Knowledge of how to make learning possible through demonstrations and instruction

UAN:	**T/601/6242**
Level:	Level 3
Credit value:	5
GLH:	45
Relationship to NOS:	This unit is linked to G6 Enable Learning Through Demonstration and Instruction.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by IMI, the Sector Skills Council for the automotive retail industry.
Aim:	This unit enables the learner to develop an understanding of how to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners' progress and giving feedback.

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

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

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

Unit 056 Knowledge of how to make learning possible through demonstrations and instruction

Supporting information

Evidence requirements

The evidence requirements are shown in full in the assessment documentation.

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.

Separate areas of demonstration which encourage learning, to include:

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

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

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

How to structure demonstration and instruction sessions, to include:

a. Before the demonstration and/or instruction ensure that the following good practice is recognised:
    i. identify key points
    ii. relate theoretical underpinning knowledge to key points
    iii. rehearse to ensure that all equipment is working

iv. ensure all students can see even small equipment and processes
v. time the demonstration
vi. consider how to make students participate
vii. consider how to emphasise safe working practices.

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

c. After the demonstration (if possible):
i. enable the audience to practice the techniques
ii. provide feedback on their performance.

How to identify individual learning needs

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

What factors are likely to prevent learning to include:

a. Language barriers.
b. Physical barriers.
c. Specialist knowledge.
d. Pace of learning.
e. Method of delivery.
f. Environmental factors.
g. Teaching styles.
h. Dyslexia.

How to check learners understanding and progress

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

How to organise information and prepare materials

a. Identify the course aim.
b. Identify the subject aim.
c. Identify the lesson aim.

d. Complete a lesson plan – plan the teaching.
e. Identify a series of 'cues' to be used during the lesson.
f. Logically organise the information.
g. Use suitable resources and equipment to maximise learning opportunities.
h. Assess the learner's progress and understanding.

Instructional techniques

a. Lectures.
b. Handouts.
c. Team teaching.
d. Peer teaching.
e. Discussion – individual, group and peer.
f. Question and answer.
g. Multimedia.
h. Seminars.
i. Case studies.
j. Project/assignments.

Environmental factors that effect learning

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

Health and safety factors that affect learning

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

Analysis of demonstration/instruction to include:

a. Feedback from students.
b. Feedback from colleagues.
c. Organisational quality assessment.
d. Feedback from external organisations.
e. Awarding body requirements.

Developments in learning to include:

a. Multimedia based materials.

b. Web based materials.
c. Interactive materials.

How to choose and prepare appropriate materials, to include:

a. Putting information in order.
b. Deciding whether the language used is appropriate.
c. Type of material i.e. paper and technology based.

Unit 058 Knowledge of how to identify and agree motor vehicle customer service needs

UAN:	**R/601/6247**
Level:	Level 3
Credit value:	5
GLH:	45
Relationship to NOS:	This unit is linked to G8 Identify and Agree the Motor Vehicle Customer Needs.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by IMI, the Sector Skills Council for the automotive retail industry.
Aim:	This unit enables the learner to develop an understanding of how to gain: information from customers on their perceived needs; give advice and information and agree a course of action; contract for the agreed work and complete all necessary records and instructions.

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

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

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

Unit 058 Knowledge of how to identify and agree motor vehicle customer service needs

Supporting information

Evidence requirements

The evidence requirements are shown in full in the assessment documentation.

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

Organisational requirements

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

Principles of customer communication and care

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

Company products and services

a. Service standards:
    i. national

ii. manufacturer
iii. organisational.

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

Vehicle information systems, servicing and repair requirements

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

Consumer legislation to include:

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

Unit 301 Skills in routine motorcycle maintenance

UAN:	**F/601/5594**
Level:	2
Credit value:	2
GLH:	20
Relationship to NOS:	This unit is linked to MC01 Carry out Routine Motor Vehicle Maintenance.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of conducting routine maintenance, adjustment and replacement activities as part of the periodic servicing of motorcycles.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out motorcycle routine maintenance	
Assessment criteria	
The learner can: 1.1 use suitable personal protective equipment and motorcycle coverings throughout all motorcycle routine maintenance activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, 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 motorcycle routine maintenance activities including: a. motorcycle technical data b. maintenance procedures c. legal requirements 2.2 use technical information to support motorcycle inspection 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 routine maintenance 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the correct tools and equipment in the way specified by manufacturers when carrying out routine maintenance.	

Learning outcome	The learner will:
4. be able to carry out motorcycle routine maintenance	
Assessment criteria	
The learner can: 4.1 carry out motorcycle inspections using prescribed methods, adhering to the correct specifications and tolerances for the motorcycle and following: a. the manufacturer's approved inspection methods b. recognised researched inspection methods c. health and safety requirements 4.2 carry out adjustments, replacement of motorcycle components and replenishment of consumable materials following the manufacturer's current specification 4.3 ensure the examination methods identify accurately any motorcycle system and or component problems falling outside the maintenance schedule are specified. 4.4 ensure that the inspected motorcycle conforms to the motorcycle operating specification and any legal requirements 4.5 use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately.	

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 302 Skills in motorcycle internal engine systems

UAN:	**R/601/5597**
Level:	2
Credit value:	5
GLH:	45
Relationship to NOS:	This unit is linked to MC02 Remove and Replace Motorcycle Engine Units and Components.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the construction and operation of common motorcycle engine systems: mechanical, lubrication and cooling systems. It also covers the clutch and transmission systems. It covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out removal and replacement activities	
Assessment criteria	
The learner can: 1.1 use suitable personal protective equipment and motorcycle coverings throughout all light motorcycle routine maintenance activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, 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 motorcycle engine power train unit and component removal and replacement activities including: a. motorcycle technical data b. removal and replacement procedures c. legal requirements 2.2 use technical information to support motorcycle engine power train unit and component removal and replacement 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 removal and replacement of motorcycle engine power train systems 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the correct tools and equipment in the way specified by manufacturers to remove and replace light motorcycle engine systems.	

Learning outcome	The learner will:
4. be able to carry out removal and replacement of motorcycle electrical units and components	
Assessment criteria	
The learner can: 4.1 remove and replace the motorcycle electrical systems and components, adhering to the correct specifications and tolerances for the motorcycle and following: a. the manufacturer's approved and workplace removal and replacement methods b. recognised researched repair methods c. health and safety requirements 4.2 check that replaced motorcycle electrical units and components conform to the motorcycle operating specification and any legal requirements 4.3 use suitable testing methods to evaluate the performance of the reassembled system 4.4 ensure that the reassembled motorcycle electrical system performs to the motorcycle operating specification and meets any legal 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 303 Skills in removing and replacing motorcycle electrical units and components

UAN:	**D/601/5604**
Level:	2
Credit value:	5
GLH:	45
Relationship to NOS:	This unit is linked to MC03 Remove and Replace Motorcycle Electrical Units and Components.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop skills in the construction and operation and testing methods of common electrical and electronic systems and components. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out removal and replacement activities	
Assessment criteria	
The learner can: 1.1 use suitable personal protective equipment and motorcycle coverings throughout all light motorcycle routine maintenance activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, 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 motorcycle electrical unit and component removal and replacement activities including: a. motorcycle technical data and codes b. removal and replacement procedures c. legal requirements 2.2 use technical information to support motorcycle electrical unit and component removal and replacement 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 removal and replacement of motorcycle electrical system components 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the correct tools and equipment in the way specified by manufacturers to remove and replace motorcycle electrical systems.	

Learning outcome	The learner will:
4. be able to carry out removal and replacement of motorcycle electrical units and components	
Assessment criteria	
The learner can: 4.1 remove and replace the motorcycle electrical systems and components, adhering to the correct specifications and tolerances for the motorcycle and following: a. the manufacturer's approved and workplace removal and replacement methods b. recognised researched repair methods c. health and safety requirements 4.2 ensure that replaced motorcycle electrical units and components conform to the motorcycle operating specification and any legal requirements 4.3 use suitable testing methods to evaluate the performance of the reassembled system 4.4 ensure that the reassembled motorcycle electrical systems perform to the motorcycle operating specification and meets any legal 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 304 Skills in removing and replacing motorcycle chassis units and components

UAN:	**M/601/5610**
Level:	2
Credit value:	5
GLH:	45
Relationship to NOS:	This unit is linked to MC04 Remove and Replace Motorcycle Chassis Units and Components.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop skills in the construction and operation of common steering, suspension and braking systems (including wheels and tyres). It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out removal and replacement activities	
Assessment criteria	
The learner can: 1.1 use suitable personal protective equipment and motorcycle coverings throughout all motorcycle routine maintenance activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, 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 motorcycle chassis unit and component removal and replacement activities including: a. motorcycle technical data b. removal and replacement procedures c. legal requirements 2.2 use technical information to support motorcycle chassis unit and component removal and replacement 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 removal and replacement of motorcycle chassis systems including: a. steering b. suspension c. braking d. wheels & tyres 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the correct tools and equipment in the way specified by manufacturers to remove and replace motorcycle chassis systems.	

Learning outcome	The learner will:
4. be able to carry out removal and replacement of the motorcycle chassis systems and components	
Assessment criteria	
The learner can: 4.1 remove and replace the motorcycle chassis systems and components, adhering to the correct specifications and tolerances for the motorcycle and following: a. the manufacturer's approved removal and replacement methods b. recognised researched repair methods c. health and safety requirements 4.2 ensure that replaced motorcycle chassis units and components conform to the motorcycle operating specification and any legal requirements 4.3 use suitable testing methods to evaluate the performance of the reassembled system 4.4 ensure that the reassembled motorcycle chassis system performs to the vehicle operating specification and meets any legal 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 305 Skills in motorcycle preparation and inspection

UAN:	**Y/601/5617**
Level:	2
Credit value:	2
GLH:	20
Relationship to NOS:	This unit is linked to MC05 Carry Out Motorcycle Preparation and Inspections.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop skills in the assembly and pre delivery inspection preparation of motorcycles. In accordance with manufacturers' and legal requirements.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out motorcycle preparation activities and inspections	
Assessment criteria	
The learner can: 1.1 use suitable personal protective equipment and use suitable motorcycle coverings throughout all light motorcycle inspection activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, people and the environment.	

Learning outcome	**The learner will:**
2. be able to use relevant information to carry out preparation activities and inspections of motorcycles	
Assessment criteria	
The learner can: 2.1 select suitable sources of technical information to support motorcycle inspection activities including: a. motorcycle technical data b. inspection procedures c. legal requirements 2.2 use technical information to support motorcycle inspection activities.	

Learning outcome	The learner will:
3. be able to use appropriate tools and equipment to carry out preparation activities and inspections of motorcycles	
Assessment criteria	
The learner can: 3.1 select the appropriate tools and equipment necessary for carrying out preparation and inspections 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the correct tools and equipment in the way specified by manufacturers when carrying out a range of inspections on motorcycle systems.	

Learning outcome	The learner will:
4. be able to carry out the preparation activities and inspections of motorcycles	
Assessment criteria	
The learner can: 4.1 carry out motorcycle preparation and inspections using prescribed methods, adhering to the correct specifications and tolerances for the motorcycle 4.2 ensure that inspected motorcycle conforms to the motorcycle operating specification and any legal requirements 4.3 ensure any comparison of the motorcycle against specification accurately identifies any differences from the motorcycle specification 4.4 use suitable testing methods to evaluate the performance of the inspected systems.	

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 307 Skills in diagnosing and rectifying motorcycle engine faults

UAN:	**T/601/5625**
Level:	3
Credit value:	5
GLH:	45
Relationship to NOS:	This unit is linked to MC07 Diagnose and Rectify Motorcycle Engine and Component Faults.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit allows the learner to develop skills to diagnose and rectify motorcycle related systems faults.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out motorcycle engine diagnostic and rectification activities	
Assessment criteria	
The learner can: 1.1 use suitable personal protective equipment and motorcycle coverings when using diagnostic methods and carrying out rectification activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, 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 motorcycle diagnostic and rectification activities including: a. motorcycle technical data b. diagnostic test procedures 2.2 use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of motorcycle engine system faults.	

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 diagnostic and rectification activities 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the equipment required, correctly and safely throughout all motorcycle engine diagnostic and rectification activities.	

Learning outcome	The learner will:
4. be able to carry out motorcycle engine diagnosis, rectification and test activities	
Assessment criteria	
The learner can: 4.1 use diagnostic methods that are relevant to the symptoms presented 4.2 evaluate their assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately 4.3 carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements 4.4 ensure all repaired or replacement components and units conform to the motorcycle operating specification and any legal requirements 4.5 adjust components and units correctly to ensure that they operate to meet system requirements 4.6 use testing methods that are suitable for assessing the performance of the system rectified 4.7 ensure the rectified motorcycle engine system performs to the motorcycle operating specification and any legal 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 308 Skills in diagnosing and rectifying motorcycle chassis system faults

UAN:	**Y/601/5634**
Level:	3
Credit value:	5
GLH:	45
Relationship to NOS:	This unit is linked to MC08 Diagnose and Rectify Motorcycle Chassis System Faults.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop skills in the diagnosis and rectification of chassis system faults.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out motorcycle chassis diagnostic and rectification activities	
Assessment criteria	
The learner can: 1.1 use suitable personal protective equipment and use motorcycle coverings when using motorcycle diagnostic methods and carrying out rectification activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, 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 motorcycle diagnostic and rectification activities including: a. motorcycle technical data b. diagnostic test procedures 2.2 use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of motorcycle chassis system faults.	

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 diagnostic and rectification activities 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the equipment required, correctly and safely throughout all motorcycle chassis diagnostic and rectification activities.	

Learning outcome	The learner will:
4. be able to carry out motorcycle chassis diagnosis, rectification and test activities	
Assessment criteria	
The learner can: 4.1 use diagnostic methods that are relevant to the symptoms presented on: a. brakes b. steering c. suspension 4.2 evaluate their assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately 4.3 carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements 4.4 ensure all repaired or replacement components and units conform to the motorcycle operating specification and any legal requirements 4.5 adjust components and units correctly to ensure that they operate to meet system requirements 4.6 use testing methods that are suitable for assessing the performance of the system rectified 4.7 ensure the rectified motorcycle chassis system performs to the motorcycle operating specification and any legal 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 312 Skills in diagnosing and rectifying motorcycle transmission faults

UAN:	**H/601/5636**
Level:	3
Credit value:	3
GLH:	25
Relationship to NOS:	This unit is linked to MC12 Diagnose and Rectify Motorcycle Transmission and Drive System Faults.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit allows the learner to develop skills to diagnose and rectify faults within motorcycle transmission systems.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out motorcycle transmission diagnostic and rectification activities	
Assessment criteria	
The learner can: 1.1 use suitable personal protective equipment and motorcycle coverings when using diagnostic methods and carrying out rectification activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, 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 motorcycle diagnostic and rectification activities including: a. motorcycle technical data b. diagnostic test procedures 2.2 use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of motorcycle transmission system faults.	

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 diagnostic and rectification activities 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the equipment required, correctly and safely throughout all motorcycle transmission diagnostic and rectification activities.	

Learning outcome	The learner will:
4. be able to carry out motorcycle transmission diagnosis, rectification and test activities	
Assessment criteria	
The learner can: 4.1 use diagnostic methods that are relevant to the symptoms presented 4.2 evaluate their assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately 4.3 carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements 4.4 ensure all repaired or replacement components and units conform to the motorcycle operating specification and any legal requirements 4.5 adjust components and units correctly to ensure that they operate to meet system requirements 4.6 use testing methods that are suitable for assessing the performance of the system rectified 4.7 ensure the rectified motorcycle transmission system performs to the motorcycle operating specification and any legal 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 351 Knowledge of routine motorcycle maintenance

UAN:	**F/601/5515**
Level:	2
Credit value:	2
GLH:	20
Relationship to NOS:	This unit is linked to MC01 Carry Out Routine Motorcycle Maintenance.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of conducting routine maintenance, adjustment and replacement activities as part of the periodic servicing of motorcycles.

Learning outcome	**The learner will:**
1. understand how to carry out routine motorcycle maintenance	
Assessment criteria	
The learner can: 1.1 explain how to conduct a scheduled motorcycle routine examination and assessment against the motorcycle manufacturers' specification, legal and road safety requirements 1.2 identify the different systems to be inspected while carrying out motorcycle routine maintenance 1.3 identify adjustments that need to be carried out on a motorcycle routine maintenance.	

Learning outcome	The learner will:
2. understand the procedures required to carry out routine motorcycle maintenance	
Assessment criteria	
The learner can: 2.1 describe the procedures used for checking the condition and serviceability of motorcycle units and components 2.2 describe the procedures used for checking gaps and clearances 2.3 describe the procedures for checking and replenishing fluid levels 2.4 describe the procedures for checking and replacing lubricants 2.5 explain the procedure for reporting cosmetic damage to motorcycle components and units outside normal service items 2.6 Identify the operating specifications for the systems being checked while carrying out motorcycle routine maintenance.	

Unit 351 Knowledge of Routine Motorcycle Maintenance

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.

Motorcycle maintenance, inspection and adjustment and record findings

Motorcycle inspection techniques used in routine maintenance including:
i. aural
ii. visual and functional assessments on engine systems
iii. visual and functional assessments on transmission power train
iv. chassis systems
v. wheels and tyres
vi. electrical and electronic systems
vii. motorcycle frame and components.

The procedures used for inspecting the condition and serviceability of the following:
i. filters
ii. drive belts
iii. cables
iv. brake linings
v. pads
vi. ignition components
vii. hoses
viii. tyres
ix. lights
x. chain and sprockets
xi. steering and suspension
xii. battery and charging.

The procedures used for checking gaps and clearances:
i. ignition components
ii. carburettor
iii. valve clearances
iv. clutch
v. drive train
vi. brakes.

Preparation and appropriate use of equipment to include:
i. test instruments
ii. emission equipment

iii. wheel alignment
iv. beam setting equipment
v. tyre tread depth gauges.

Procedures for checking and replenishing fluid levels:
i. oil
ii. water
iii. hydraulic fluids
iv. greases.

Procedures for checking and replacement of lubricants:
i. replace oil filters
ii. check levels
iii. types of oil
iv. cleanliness
v. disposal of old oil and filters.

Procedures for carrying out adjustments on motorcycle systems or components:
i. clearances
ii. settings
iii. alignment
iv. operational performance (engine idle, exhaust gas).

Procedures for checking electrical systems:
i. operation
ii. security
iii. performance.

Importance and process of detailed inspection procedures:
i. following inspection checklists
ii. checking conformity to manufacturer's specifications
iii. UK and European legal requirements.

Importance and process of completing all relevant documentation relating to motorcycle maintenance:
i. inspection records
ii. job cards
iii. motorcycle repair records
iv. motorcycle service history.

The need to use motorcycle protection prior to service and repair
Requirements and methods used for protecting:
i. motorcycle body panels
ii. paint surfaces
iii. chrome surfaces.

The need to check the motorcycle prior to routine maintenance
The need to inspect the motorcycle following routine maintenance:
i. professional presentation of motorcycle

ii. customer perceptions.

The basic checks of motorcycle following routine maintenance:
i. removal of oil and grease marks
ii. body panels
iii. chrome
iv. paint surfaces
v. motorcycle controls
vi. re-instatement of components.

Different systems to be inspected while carrying out motorcycle routine maintenance.
i. engine and power train systems
ii. chassis systems
iii. wheels and tyres
iv. electrical and electronic systems
v. motorcycle frame and components.

Unit 352 Knowledge of motorcycle internal engine systems

UAN:	**Y/601/5519**
Level:	2
Credit value:	3
GLH:	20
Relationship to NOS:	This unit is linked to MC02 Remove and Replace Motorcycle Engine Units and Components.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the construction and operation of common engine power train systems: mechanical, lubrication and cooling systems. It also covers the clutch and transmission systems. It covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

Learning outcome	**The learner will:**
1. understand how the main motorcycle engine mechanical systems operate	
Assessment criteria	
The learner can: 1.1 identify motorcycle engine mechanical system components 1.2 describe the construction and operation of motorcycle engine mechanical systems. 1.3 compare key engine mechanical system components and assemblies against alternatives to identify differences in construction and operation 1.4 identify the key engineering principles that are related to engine mechanical systems: a. compression ratios b. cylinder capacity c. power d. torque	

1.5 state common terms used in motorcycle engine mechanical system design: a. tdc b. bdc c. stroke d. bore.

Learning outcome	**The learner will:**
2. understand how motorcycle engine lubrication systems operate	
Assessment criteria	
The learner can: 2.1 identify motorcycle engine lubrication system components 2.2 describe the construction and operation of motorcycle engine lubrication components and systems 2.3 compare key motorcycle engine lubrication system components and assemblies to identify differences in construction and operation 2.4 identify the key engineering principles that are related to motorcycle engine lubrication systems: a. classification of lubricants b. properties of lubricants c. methods of reducing friction 2.5 state common terms used in motorcycle engine lubrication system design.	

Learning outcome	**The learner will:**
3. understand how motorcycle engine cooling systems operate	
Assessment criteria	
The learner can: 3.1 identify motorcycle engine cooling system components 3.2 describe the construction and operation of motorcycle engine cooling systems 3.3 compare key motorcycle engine cooling system components and assemblies against alternatives to identify differences in construction and operation 3.4 identify the key engineering principles that are related to motorcycle engine cooling systems a. heat transfer b. linear and cubical expansion c. specific heat capacity d. boiling point of liquids 3.5 state common terms used in key motorcycle engine cooling system design.	

Learning outcome	The learner will:
4. understand how motorcycle clutch and transmission systems operate	
Assessment criteria	
The learner can: 4.1 identify motorcycle clutch and transmission system components 4.2 describe the construction and operation of motorcycle clutch and transmission system components 4.3 compare key motorcycle clutch and transmission system components and assemblies against alternatives to identify differences in construction and operation.	

Learning outcome	The learner will:
5. understand how to check, replace and test power train systems, units and components	
Assessment criteria	
The learner can: 5.1 describe how to remove and replace power train systems, units and components 5.2 describe common types of testing methods used to check the operation of engine power train systems and their purpose 5.3 explain how to test and evaluate the performance of replacement units against motorcycle specification 5.4 explain common faults found in motorcycle power train systems and their causes.	

Unit 352 Knowledge of motorcycle internal engine systems

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.

Engines

a. Engine types and configurations:
   i. inline
   ii. flat
   iii. vee
   iv. four-stroke and two-stroke cycle for spark ignition engines
   v. naturally aspirated and turbo-charged engines.
b. Relative advantages and disadvantages of different engine types and configurations.
c. Engine components and layouts:
   i. single (OHC) and multi camshaft (DOHC)
   ii. single and multi cylinder (2, 3, 4, 6 cylinder types)
   iii. port design: inlet, transfer and exhaust.
d. Cylinder head layout and design, combustion chamber and piston design.
e. The procedures used when inspecting engines.
f. The procedures to assess:
   i. serviceability
   ii. wear
   iii. condition
   iv. clearances
   v. settings
   vi. linkages
   vii. joints
   viii. fluid systems
   ix. adjustments
   x. operation and functionality
   xi. security.
g. Symptoms and faults associated with mechanical engine operation:
   i. poor performance
   ii. abnormal or excessive mechanical noise
   iii. erratic running
   iv. low power
   v. exhaust emissions
   vi. abnormal exhaust smoke
   vii. unable to start
   viii. exhaust gas leaks to cooling system

ix. exhaust gas leaks.

Lubrication

a. The advantages and disadvantages of wet and dry systems.
b. Engine lubrication system:
    i. splash and pressurised systems
    ii. pumps
    iii. pressure relief valve
    iv. filters
    v. oil ways
    vi. oil coolers.
c. Terms associated with lubrication and engine oil:
    i. full-flow
    ii. hydrodynamic
    iii. boundary
    iv. viscosity
    v. multi-grade
    vi. natural and synthetic oil
    vii. viscosity index
    viii. multi-grade.
d. The requirements and features of engine oil:
    i. operating temperatures
    ii. pressures
    iii. lubricant grades
    iv. viscosity
    v. multi-grade oil
    vi. additives
    vii. detergents
    viii. dispersants
    ix. anti-oxidants inhibitors
    x. anti-foaming agents
    xi. anti-wear
    xii. synthetic oils
    xiii. organic oils
    xiv. mineral oils.
e. Symptoms and faults associated with lubrication systems:
    i. excessive oil consumption
    ii. oil leaks
    iii. oil in water
    iv. low or excessive pressure
    v. oil contamination.
f. The procedures used when inspecting lubrication system

Cooling

a. The components, operating principles, and functions of engine cooling systems.
b. Procedures used to remove, replace and adjust cooling system components:
    i. cooling fans and control devices
    ii. fins and cowlings

iii. header tanks, radiators and pressure caps
iv. expansion tanks hoses, clips and pipes
v. thermostats impellers and coolant.

c. The preparation and method of use of appropriate specialist equipment used to evaluate system performance following component replacement:
i. system pressure testers
ii. pressure cap testers
iii. anti-freeze testing equipment
iv. chemical tests for the detection of combustion gas.

d. Symptoms and faults associated with cooling systems:
i. water leaks
ii. water in oil
iii. blocked fins
iv. excessively low or high coolant temperature.

e. The procedures used when inspecting cooling systems.

Clutch

a. The components, operating principles, and functions of clutches:
i. wet clutch
ii. dry clutch
iii. centrifugal
iv. cable control
v. hydraulic control.

b. Procedures used to remove, replace and adjust clutch systems and components.

c. The preparation and method of use of appropriate specialist equipment used to evaluate system performance following component replacement.

d. Symptoms and faults associated with clutch systems:
i. slip
ii. drag.

Transmission

a. The components, operating principles, and function of transmission systems:
i. conventional gear
ii. CVT
iii. automatic.

b. The operating components within transmission systems:
i. gears
ii. shafts
iii. selectors
iv. shift lever and drum mechanisms
v. bearings
vi. pulleys.

c. The preparation and method of use of appropriate specialist equipment used to evaluate transmission system performance following component replacement.

d. Procedures used to remove, replace and adjust transmission systems and components.

e. Symptoms and faults associated with transmission systems:
    i. abnormal noises
    ii. vibration
    iii. fluid leaks
    iv. wear
    v. gear selection.

General

a. The preparation, testing and use of tools and equipment used for:
    i. dismantling
    ii. removal and replacement of engine mechanical and power train system components.
b. Appropriate safety precautions:
    i. PPE
    ii. motorcycle protection when dismantling
    iii. removal of and replacing engine mechanical and power train units and components.
c. The importance of logical and systematic processes.
d. The inspection and testing of engine mechanical and power train units and components.
e. The preparation of replacement units for re-fitting or replacement.
f. The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance and safety requirements.
g. Re-fitting procedures.
h. The inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements.
i. The inspection and re-instatement of the motorcycle following repair to ensure customer satisfaction:
    i. cleanliness of motorcycle
    ii. security of components and fittings
    iii. re-instatement of components and fittings.
j. Construction and operation of motorcycle engine mechanical systems
    i. four stroke
    ii. two stroke.
k. Key engineering principles that are related to engine mechanical systems
    i. compression ratios
    ii. volumetric efficiency
    iii. cylinder capacity.
l. Common terms used in motorcycle engine mechanical system design
    i. tdc
    ii. bdc
    iii. stroke
    iv. ibore
    v. ports.
m. Construction and operation of motorcycle engine lubrication components and systems
    i. full flow
    ii. by pass
    iii. wet sump

iv. dry sump
v. total loss.

n. Key engineering principles that are related to motorcycle engine lubrication systems
   i. classification of lubricants
   ii. properties of lubricants
   iii. methods of reducing friction.
o. Common terms used in motorcycle engine lubrication system design
p. Identify motorcycle engine cooling system components
   i. air cooling
   ii. liquid cooling
q. Key engineering principles that are related to motorcycle engine cooling systems
   i. heat transfer
   ii. linear and cubical expansion
   iii. specific heat capacity
   iv. boiling point of liquids.
r. Construction and operation of motorcycle clutch and transmission system components
   i. dry clutch
   ii. wet clutch
   iii. constant mesh
   iv. CVT
   v. automatic
   vi. chain and sprocket
   vii. shaft and gear
   viii. belt and pulley.

Unit 353 Knowledge of removing and replacing motorcycle electrical units and components

UAN:	**H/601/5555**
Level:	2
Credit value:	6
GLH:	45
Relationship to NOS:	This unit is linked to MC03 Remove and Replace Motorcycle Electrical Units and Components.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the principles, construction and operation and testing methods of common electrical and electronic systems and components. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

Learning outcome	**The learner will:**
1. understand motorcycle electrical and electronic principles	
Assessment criteria	
The learner can: 1.1 identify electrical symbols and units found in motorcycle circuits 1.2 describe how to interpret motorcycle wiring diagrams 1.3 describe the operation of key motorcycle circuit safety protection devices and why these are necessary 1.4 describe motorcycle earthing principles and earthing methods 1.5 identify the use of different cables and connectors used in motorcycle circuits 1.6 describe the operation of electrical and electronic sensors and actuators and their application 1.7 describe the key electrical and electronic control principles that are related to motorcycle electrical circuits 1.8 state common terms used in motorcycle electrical circuits.	

Learning outcome	The learner will:
2. understand how motorcycle batteries, starting and charging systems operate	
Assessment criteria	
The learner can: 2.1 identify motorcycle batteries, starting and charging system components 2.2 describe the construction and operation of motorcycle batteries, starting and charging system components 2.3 compare motorcycle batteries, starting and charging system components and assemblies against alternatives to identify differences in construction and operation 2.4 state common terms used in conjunction with motorcycle batteries, starting and charging systems.	

Learning outcome	The learner will:
3. understand how motorcycle auxiliary electrical systems operate	
Assessment criteria	
The learner can: 3.1 identify motorcycle auxiliary system components 3.2 describe the construction and operation of motorcycle auxiliary systems 3.3 compare key motorcycle auxiliary system components and assemblies against alternatives to identify differences in construction and operation 3.4 state common terms used in motorcycle auxiliary system design.	

Learning outcome	The learner will:
4. understand how to check, replace and test electrical and electronic systems, units and components	
Assessment criteria	
The learner can: 4.1 describe how to remove electrical and electronic systems, units and components 4.2 describe common types of testing methods used to check the operation of electrical and electronic systems and their purpose 4.3 explain how to test and evaluate the performance of replacement units against motorcycle specification 4.4 Identify common faults found in motorcycle electrical and electronic systems and their causes.	

Unit 353 Knowledge of removing and replacing motorcycle electrical units and components

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.

Electrical/electronic principles

a. Electrical units:
   i. volt (electrical pressure)
   ii. ampere (electrical current)
   iii. OHM (electrical resistance)
   iv. watt (power).
b. The requirements for an electrical circuit:
   i. battery
   ii. cables
   iii. switch
   iv. current consuming device
   v. continuity.
c. The direction of current flow and electron flow.
d. Series and parallel circuits to include:
   i. current flow
   ii. voltage of components
   iii. volt drop
   iv. resistance
   v. the effect on circuit operation of open circuit component(s).
e. Earth and insulated return systems.
f. Cable sizes and colour codes.
g. Different types of connectors, terminals and circuit protection devices.
h. Common electrical and electronic symbols.
i. The meaning of:
   i. short circuit
   ii. open circuit
   iii. bad earth
   iv. high resistance
   v. electrical capacity.
j. The principles of vehicle electronic systems and components.
k. Interpret vehicle wiring diagrams to include:
   i. vehicle lighting
   ii. auxiliary circuits

iii. indicators
iv. starting and charging systems.

l. Function and construction of electrical components including:
    i. circuit relays
    ii. bulb types
    iii. cooling fan
    iv. circuit protection.
m. The safety precautions when working on electrical and electronic systems to include:
    i. disconnection and connection of battery
    ii. avoidance of short circuits
    iii. power surges
    iv. prevention of electric shock
    v. protection of electrical and electronic components
    vi. protection of circuits from overload or damage.
n. The set-up and use of:
    i. digital and analogue multi-meters
    ii. voltmeter
    iii. ammeter
    iv. ohmmeter
    v. oscilloscope
    vi. manufacturer's dedicated test equipment.
o. Electrical and electronic checks for electrical and electronic systems to include:
    i. connections
    ii. security
    iii. functionality
    iv. performance to specifications
    v. continuity, open circuit
    vi. short circuit
    vii. high resistance
    viii. volt drop
    ix. current consumption
    x. output patterns (oscilloscope).
p. Symptoms and faults associated with electrical and electronic systems to include:
    i. high resistance
    ii. loose and corroded connections
    iii. short circuit
    iv. excessive current consumption
    v. open circuit
    vi. malfunction
    vii. poor performance
    viii. battery faults to include flat battery
    ix. failure to hold charge
    x. low state of charge
    xi. overheating
    xii. poor starting.

Battery and charging

a. The construction and operation of vehicle batteries including:
    i. low maintenance and maintenance free
    ii. lead acid and nickel cadmium types
    iii. cells
    iv. separators
    v. plates
    vi. electrolyte.
b. The operation of the vehicle charging system:
    i. alternator
    ii. rotor
    iii. stator
    iv. slip ring
    v. brush assembly
    vi. three phase output
    vii. diode rectification pack
    viii. voltage regulation
    ix. phased winding connections
    x. cooling fan
    xi. alternator drive.

Starting

a. The layout, construction and operation of engine starting systems.
b. The function and operation of the following components:
    i. starter motor
    ii. starter clutch mechanism
    iii. pinion
    iv. starter solenoid
    v. clutch and gear safety switch
    vi. ignition/starter switch
    vii. stand switches
    viii. starter relay (if appropriate).

Lighting

a. Function and construction of electrical components including:
    i. front and tail lamps
    ii. main and dip beam headlamps
    iii. lighting and dip switch
    iv. directional indicators
    v. flash.
b. The circuit diagram and operation of components for:
    i. side and tail lamps
    ii. headlamps
    iii. direction indicators.
c. The statutory requirements for vehicle lighting when using a vehicle on the road.
d. Headlamp adjustment and beam setting.

Auxiliary systems

a. Function and construction of electrical components including:

i. anti theft devices
ii. horn
iii. heated grips
iv. power screen.

b. The circuit diagram and operation of components for:
i. anti theft devices
ii. horn
iii. heated grips
iv. power screen.

General

a. The preparation, testing and use of:
i. tools and equipment
ii. electrical meters and equipment used for dismantling
iii. removal and replacement of electrical and electronic systems and components.

b. Appropriate safety precautions:
i. PPE
ii. motorcycle protection when dismantling
iii. removal of and replacing electrical and electronic components and systems.

c. The importance of logical and systematic processes.

d. Preparation of replacement units for re-fitting or replacement electrical and electronic components and systems.

e. The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance, safety requirements.

f. Re-fitting procedures.

g. The inspection and testing of units and systems to ensure compliance with manufacturer's, legal and performance requirements.

h. Inspection and re-instatement of the vehicle following repair to ensure:
i. customer satisfaction
ii. cleanliness of vehicle interior and exterior
iii. security of components and fittings
iv. re-instatement of components and fittings.

i. Construction and operation of motorcycle auxiliary systems. Auxiliary systems to include:
i. lighting systems
ii. security and alarm systems
iii. comfort and convenience systems
iv. information system
v. communication systems
vi. monitoring and instrumentation systems.

Unit 354 Knowledge of removing and replacing motorcycle chassis units and components

UAN:	**T/601/5558**
Level:	2
Credit value:	6
GLH:	45
Relationship to NOS:	This unit is linked to MC04 Remove and Replace Motorcycle Chassis Units and Components.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the construction and operation of common steering, suspension and braking systems (including wheels and tyres). It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

Learning outcome	**The learner will:**
1. understand how motorcycle steering and suspension systems operate	
Assessment criteria	
The learner can: 1.1 identify motorcycle and suspension system components 1.2 describe the construction and operation of motorcycle steering and suspension systems 1.3 compare key motorcycle steering and suspension system components and assemblies against alternatives to identify differences in construction and operation 1.4 identify the key engineering principles that are related to motorcycle steering and suspension systems: a. steering angles b. hydraulic forces c. stress and strain 1.5 state common terms used in motorcycle steering and suspension system design.	

Learning outcome	The learner will:
2. understand how motorcycle braking systems operate	
Assessment criteria	
The learner can: 2.1 identify motorcycle braking system components 2.2 describe the construction and operation of motorcycle braking systems 2.3 compare key motorcycle braking system components and assemblies against alternatives to identify differences in construction and operation 2.4 identify the key engineering principles that are related to motorcycle braking systems: a. laws of friction b. hydraulics c. properties of fluids d. properties of air e. braking efficiency 2.5 state common terms used in motorcycle braking system design.	

Learning outcome	The learner will:
3. understand how motorcycle wheel and tyre systems operate	
Assessment criteria	
The learner can: 3.1 identify motorcycle wheel and tyre components 3.2 describe the construction and operation of motorcycle wheels and tyres 3.3 compare key motorcycle wheel and tyre components and assemblies against alternatives to identify differences in construction and operation 3.4 identify the key engineering principles that are related to motorcycle wheel and tyre systems: a. friction b. un-sprung weight c. dynamic and static balance 3.5 state common terms used in motorcycle wheel and tyre design.	

Learning outcome	The learner will:
4. understand how to check, replace and test chassis units, parts, and components	
Assessment criteria	
The learner can: 4.1 describe how to remove and replace chassis units and components 4.2 describe common types of testing methods used to check the operation of chassis units and components and their purpose 4.3 explain how to test and evaluate the performance of replacement units against vehicle specification 4.4 identify common faults found in motorcycle chassis units and components.	

Unit 354 Knowledge of removing and replacing motorcycle chassis units and components

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.

Steering

a. The action and purpose of steering geometry:
   i. castor angle
   ii. trail angle
   iii. wheel alignment.
b. The following terms associated with steering:
   i. castor angle
   ii. trail angle
   iii. rake angle
   iv. wheel alignment.
c. The components and layout of steering systems:
   i. handlebar
   ii. conventional steering head
   iii. leading link
   iv. bearings
   v. steering stem
   vi. yolk.
d. The procedures used for inspecting the serviceability and condition of:
   i. conventional steering head
   ii. leading link.
e. Steering system defects to include:
   i. uneven tyre wear
   ii. steering vibrations
   iii. wear in linkage
   iv. bearing failure
   v. damage linkage
   vi. excessive play
   vii. incorrect fork alignment
   viii. incorrect steering geometry.

Suspension

a. The layout and components of suspension systems:
   i. conventional telescopic fork and tube
   ii. upside down telescopic fork and tube
   iii. hossack/Fior (Duolever) fork

iv. springer fork
v. leading link.

b. The operation of suspension systems and components:
i. conventional telescopic fork and tube
ii. upside down telescopic fork and tube
iii. hydraulic damper
iv. double swinging arm
v. single swing arm
vi. mono shock
vii. adjustable damper
viii. adjustable spring.

c. The advantages of different systems including:
i. conventional telescopic fork and tube
ii. upside down telescopic fork and tube
iii. hydraulic damper
iv. double swinging arm
v. single swing arm
vi. mono shock
vii. adjustable damper
viii. adjustable spring.

d. The forces acting on suspension systems during braking, riding and cornering.

e. The methods of locating the road wheels against braking, driving and cornering forces.

f. Suspension terms:
i. rebound
ii. bump
iii. dive.

g. The procedures used for inspecting the serviceability and condition of the suspension system.

h. Suspension system defects:
i. wheel hop
ii. ride height
iii. wear
iv. noises under operation
v. fluid leakage
vi. excessive travel
vii. excessive tyre wear
viii. poor handling
ix. worn dampers
x. worn joints
xi. damaged linkages.

Brakes

a. The construction and operation of drum brakes:
i. leading and trailing shoe construction
ii. drum designs
iii. cable
iv. hydraulic
v. self-servo action

vi. adjustment.

b. The construction and operation of disc brakes:
   i. disc pads
   ii. calliper
   iii. brake disc
   iv. ventilated disc
   v. disc pad retraction.
c. The construction and operation of the hydraulic braking system:
   i. master cylinders
   ii. disc brake calliper and pistons
   iii. brake pipe
   iv. warning lights.
d. The principles and components of electronic ABS systems, electrical and electronic components.
e. The requirements and hazards of brake fluid:
   i. boiling point
   ii. hygroscopic action
   iii. manufacturer's change periods
   iv. fluid classification and rating
   v. potential to damage paint surfaces.
f. Terms associated with mechanical and hydraulic braking systems:
   i. braking efficiency
   ii. brake fade
   iii. ABS.
g. The procedures used for inspecting the serviceability and condition of the braking system.
h. Braking system defects:
   i. worn brake shoes or pads
   ii. worn or scored brake drums
   iii. worn or scored brake discs
   iv. abnormal brake noises
   v. brake judder
   vi. brake adjustments
   vii. fluid contamination of brake surfaces
   viii. antilock brake failure
   ix. fluid leaks
   x. poor braking efficiency
   xi. brake bind
   xii. brake grab
   xiii. brake fade.

Wheel and tyres

a. The construction of different types of tyre:
   i. radial
   ii. tread patterns
   iii. tyre mixing regulations
   iv. tyre applications.
b. Tyre markings:
   i. tyre and wheel size markings
   ii. speed rating

iii. direction of rotation
iv. profile
v. tread-wear indicators.

c. Wheel construction:
   i. light alloy
   ii. wire wheels
   iii. bearing arrangement
   iv. roller ball
   v. taper.

d. The procedures used for inspecting the serviceability and condition of:
   i. tyres and wheels
   ii. bearings.

e. The defects associated with tyres and wheels:
   i. abnormal tyre wear
   ii. cuts
   iii. side wall damage
   iv. wheel vibrations.

General

The procedures for dismantling, removal and replacement of motorcycle chassis units, parts and system components

a. The preparation:
   i. testing and use of tools and equipment
   ii. electrical meters and equipment used for dismantling.

b. Appropriate safety precautions:
   i. PPE
   ii. vehicle protection when dismantling
   iii. removing and replacing chassis motorcycle chassis units, parts and system components.

c. The importance of logical and systematic processes.

d. The inspection and testing of systems and components.

e. The preparation of replacement units for re-fitting or replacement of motorcycle chassis units, parts and system components. Identify the reasons why replacement components and units must meet the original specifications (OES):
   i. warranty requirements
   ii. to maintain performance
   iii. safety requirements.

f. Re-fitting procedures.

g. The inspection and testing of units and systems to ensure compliance with manufacturer's, legal and performance requirements.

h. The inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:
   i. cleanliness of motorcycle
   ii. security of components and fittings
   iii. re-instatement of components and fittings.

i. Construction and operation of motorcycle steering and suspension systems:
   i. conventional steering head
   ii. leading link
   iii. swinging arm

iv. single swing arm.

j. Key engineering principles that are related to motorcycle steering and suspension systems:
   i. steering geometry
   ii. steering angles
   iii. hydraulic damping
   iv. stress and strain.

k. Key engineering principles that are related to motorcycle steering and suspension systems:
   i. steering geometry
   ii. steering angles
   iii. hydraulic damping
   iv. stress and strain.

l. Construction and operation of motorcycle braking systems:
   i. cable
   ii. hydraulic braking
   iii. electronic ABS system.

m. Key engineering principles that are related to motorcycle braking systems:
   i. laws of friction
   ii. hydraulics
   iii. properties of fluids
   iv. braking efficiency.

n. Construction and operation of motorcycle wheels and tyres:
   i. tyre construction
   ii. tyre markings
   iii. wheel construction.

o. Key engineering principles that are related to motorcycle wheel and tyre systems:
   i. friction
   ii. un-sprung weight
   iii. dynamic and static balance.

Unit 355 Knowledge of motorcycle preparation and inspection

UAN:	**F/601/5563**
Level:	2
Credit value:	2
GLH:	20
Relationship to NOS:	This unit is linked to MC05 Carry Out Motorcycle Preparation and Inspections.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the assembly and pre delivery inspection preparation of both new and used motorcycles.

Learning outcome	**The learner will:**
1. understand how to carry out preparation activities and inspections of motorcycles	
Assessment criteria	
The learner can: 1.1 explain the difference between the various motorcycle preparation activities and inspections 1.2 identify the different systems to be inspected when using inspection methods 1.3 identify the procedures involved in carrying out the preparation and inspection of motorcycles 1.4 identify correct conformity of motorcycle systems and condition on motorcycle inspections 1.5 compare test and inspection results against motorcycle specifications and legal requirements 1.6 explain how to record and complete the preparation and inspection results in the format required 1.7 identify the recommendations that can be made based on results of the motorcycle inspections 1.8 explain the implications of failing to carry out motorcycle preparation and inspection activities correctly 1.9 explain the implications of signing workplace documentation and motorcycle records 1.10 explain the procedure for reporting cosmetic damage to motorcycle components and units outside normal inspection items.	

Unit 355 Knowledge of motorcycle preparation and inspection

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.

Assembly, pre and post work motorcycle inspections

a. PPE and motorcycle protection relating to:
   i. motorcycle body panels and frame
   ii. paint surfaces
   iii. polished surfaces
   iv. seats.

b. Assembly, pre and post work motorcycle inspection procedures:
   i. aural
   ii. visual and functional assessments on engine
   iii. engine systems
   iv. chassis systems
   v. wheels and tyres
   vi. transmission system
   vii. electrical and electronic systems
   viii. exterior motorcycle body panels and frame.

c. The methods for carrying out inspections for: damage, corrosion, fluid leaks, wear, security, mounting security and condition to include:
   i. engines and engine systems
   ii. chassis systems
   iii. transmission systems
   iv. brakes
   v. steering
   vi. suspension
   vii. wheels
   viii. tyres
   ix. body panels and frame
   x. electrical and electronic systems and components
   xi. motorcycle seating and mirrors
   xii. motorcycle instrumentation
   xiii. driver controls.

d. Check conformity to manufacturer's specifications and legal requirements.

e. Completion of documentation to include:
   i. inspection records
   ii. job cards
   iii. motorcycle records.

f. Make recommendations based on results of motorcycle inspections.

g. The checks necessary to ensure customer satisfaction for:

i. motorcycle body panels
ii. paint surfaces
iii. polished surfaces
iv. chromed surfaces
v. seats and mirrors.

h. Prepare and use appropriate inspection equipment and tools.
i. Inspection procedures following inspection checklists.
j. Various motorcycle preparation activities and inspections to include:-
    i. new motorcycle assembly
    ii. pre and post work
    iii. pre-delivery on new and used motorcycles
    iv. MOT test
    v. safety
    vi. post repair.

Unit 357 Knowledge of diagnosis and rectification of motorcycle engine faults

UAN:	**R/601/5566**
Level:	3
Credit value:	6
GLH:	45
Relationship to NOS:	This unit is linked to MC07 Diagnose and Rectify Motorcycle Engine and Component Faults.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the diagnosis and rectification of motorcycle power train and related system faults.

Learning outcome	**The learner will:**
1. understand how motorcycle engine systems operate	
Assessment criteria	
The learner can: 1.1 explain the construction and operation of motorcycle engine systems 1.2 explain the interaction between electrical, electronic and mechanical components within motorcycle engine systems 1.3 explain how electrical systems interlink and interact, including multiplexing and fibre optics 1.4 compare motorcycle engine system components and assemblies against alternatives to identify differences in construction and operation 1.5 identify the engineering principles that are related to motorcycle engine systems: a. volumetric efficiency b. flame travel, pre ignition and detonation c. fuel properties d. composition of carbon fuels e. combustion process.	

Learning outcome	The learner will:
2. understand how to diagnose and rectify faults in motorcycle engine systems	
Assessment criteria	
The learner can: 2.1 describe how to analyse symptoms and causes of faults found in motorcycle engine systems 2.2 explain systematic diagnostic techniques used in identifying engine system faults 2.3 explain how to examine, measure and make suitable adjustments to the components 2.4 explain how to carry out the diagnosis and rectification activities in order to correct the faults in motorcycle engine systems 2.5 explain how to select, prepare and use diagnostic and rectification equipment for motorcycle engine systems 2.6 explain how to evaluate and interpret test results found in diagnosing motorcycle engine system faults against vehicle manufacturer specifications and settings 2.7 explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance.	

Unit 357 Knowledge of diagnosis and rectification of motorcycle engine faults

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.

Single cylinder and multi-cylinder fuel injection systems

a. The operation and construction of injection systems including:
   i. types of air flow/mass sensor
   ii. fuel supply system
   iii. fuel pump
   iv. filter
   v. fuel regulator
   vi. injectors
   vii. electronic control unit (ECU)
   viii. injector pulse width
   ix. sensors.
b. The operation of each system under various operating conditions including:
   i. cold starting
   ii. warm up
   iii. hot starting
   iv. acceleration
   v. deceleration
   vi. cruising
   vii. full load.
c. Engine speed limiting and knock sensing.

Engine management

a. The function and purpose of engine management systems.
b. The difference between analogue, digital, programmable and non-programmable systems.
c. Open loop and closed loop control, types of input and output devices.
d. The function and operation of digital components and systems.
e. The operation of engine management systems under various conditions.

Valve mechanisms

a. The reasons for variable valve timing and multi-valve arrangements and the effect on performance.
b. Layout of multi-valve arrangements, components, operation and drive arrangements.

c. Construction features and operation of variable valve timing engines and electronic control.

Terms associated with combustion

a. Flame travel, pre-ignition and detonation.
b. Fuel properties:
    i. octane rating
    ii. flash point
    iii. fire point
    iv. volatility
    v. composition of petrol fuels
    vi. hydro-carbon content.
c. Composition of carbon fuels
d. Combustion process for spark ignition engines:
    i. air fuel ratio
    ii. lambda ratio
    iii. stoichiometric ratio.
e. The by-products of combustion for different engine conditions and fuel mixtures:
    i. CO
    ii. CO2
    iii. O
    iv. N
    v. H2O
    vi. NOx.
f. Describe the legal requirements for exhaust emissions:
    i. MOT requirements
    ii. EURO regulations.

Assessment, repair and restoration of mechanical engine components

a. How engine mechanical components are assessed and measured for wear and serviceability:
    i. cylinder bores
    ii. cylinder heads
    iii. crankshaft journals
    iv. valve faces
    v. valve guides
    vi. valve seats
    vii. camshafts.
b. The methods used for the repair and restoration of engine components.

Symptoms and faults in engine mechanical systems and components

a. Symptoms and faults related to:
    i. worn cylinders
    ii. cylinder liners
    iii. pistons
    iv. piston rings
    v. crankshaft

vi. camshaft
vii. bearings
viii. cylinder head and gasket
ix. valves
x. valve seats and valve guides
xi. cambelts tensioned and pulleys
xii. cam chains tension systems and guides
xiii. lubrication system and components
xiv. oil pump
xv. relief valve
xvi. filter.

Diagnosis of faults in engine mechanical systems and components

a. Interpret information for:
   i. diagnostic tests
   ii. manufacturer's motorcycle and equipment specifications
   iii. use of equipment
   iv. testing procedures
   v. test plans
   vi. legal requirements.
b. The preparation of tools and equipment for use in diagnostic testing and assessment.
c. Systematic assessment, testing and inspection of engine components and systems including:
   i. mechanical system and component condition
   ii. engine balance
   iii. power balance
   iv. performance and operation
   v. wear
   vi. run out
   vii. alignment.
d. Use of appropriate tools and equipment including:
   i. compression gauges
   ii. leakage testers
   iii. cylinder balance tester
   iv. pressure gauges
   v. micrometers
   vi. vernier gauges.
e. Evaluate and interpret test results from diagnostic testing.
f. Compare test result and values with motorcycle manufacturer's specifications and settings.
g. The procedures for dismantling, components and systems and the use of appropriate equipment and procedures.
h. Assess, examine and measure components including:
   i. settings
   ii. values
   iii. condition
   iv. wear and performance of components and systems.
i. Probable faults:
   i. malfunctions

ii. incorrect settings
iii. wear.

j. Rectification or replacement procedures.

Evaluate operation of components and systems following diagnosis and repair to confirm system performance.

Faults and symptoms in ignition systems

a. Ignition system failure or malfunctions including:
i. no spark
ii. misfiring
iii. backfiring
iv. cold or hot starting problems
v. poor performance
vi. pre-ignition
vii. detonation
viii. exhaust emission levels
ix. fuel consumption
x. low power
xi. unstable idle speed.

Faults and symptoms in electronic petrol injection systems

a. Petrol injection system failures or malfunctions including:
i. cold or hot starting problems
ii. poor performance
iii. exhaust emissions
iv. high fuel consumption
v. erratic running
vi. low power
vii. unstable idle speed.

Faults and symptoms in petrol carburetion systems

a. Petrol carburetion system failures or malfunctions including:
i. cold or hot starting problems
ii. poor performance
iii. exhaust emissions
iv. high fuel consumption
v. erratic running
vi. low power
vii. unstable idle speed.

Faults and symptoms in engine management systems

a. Engine management system failure or malfunctions including:
i. misfiring
ii. backfiring
iii. cold or hot starting problems
iv. poor performance
v. pre-ignition
vi. detonation
vii. exhaust emission levels
viii. fuel consumption

ix. low power
x. unstable idle speed.

Diagnosis of faults in electronic engine management systems

a. Locate and interpret information for:
   i. diagnostic tests
   ii. manufacturer's vehicle and equipment specifications
   iii. use of equipment
   iv. testing procedures
   v. test plans
   vi. fault codes
   vii. legal requirements.
b. The preparation of tools and equipment for use in diagnostic testing and assessment.
c. Conduct systematic assessment, testing of engine systems including:
   i. component condition and performance
   ii. component settings
   iii. component values
   iv. electrical and electronic values
   v. system performance and operation
   vi. use of appropriate tools and equipment including gauges
   vii. multi-meter
   viii. breakout box
   ix. oscilloscope
   x. diagnostic tester
   xi. manufacturer's dedicated equipment
   xii. exhaust gas analyser
   xiii. pressure gauges.
d. Evaluate and interpret test results from diagnostic testing.
e. Compare test result, values and fault codes with motorcycle anufacturer's specifications and settings.
f. The procedures for dismantling, components and systems using appropriate equipment.
g. Assess, examine and measure components including:
   i. settings
   ii. input and output values
   iii. voltages
   iv. current consumption
   v. resistance
   vi. output patterns with oscilloscope
   vii. condition
   viii. wear and performance of components and systems.
h. Identify probable faults and indications of:
   i. faults
   ii. malfunctions
   iii. incorrect settings
   iv. wear
   v. values
   vi. inputs and outputs
   vii. fault codes.

i. Rectification or replacement procedures.
j. Evaluation and the operation of components and systems following diagnosis and repair to confirm system performance.
    i. speed controls
    ii. control systems.
k. Use of appropriate tools and equipment including:
    i. pressure gauges
    ii. multi-meter
    iii. breakout box
    iv. oscilloscope
    v. diagnostic tester
    vi. manufacturer's dedicated equipment
    vii. flow meter.
l. Evaluate and interpret test results from diagnostic testing.
m. Compare test result, values and fault codes with motorcycle manufacturer's specifications and settings.
n. How to dismantle, components and systems using appropriate equipment and procedures.
o. How to assess, examine and measure components including: settings, input and output, values, voltages, current consumption, resistance, output patterns with oscilloscope, pressures, condition, wear and performance of components and systems.
p. Identification of probable faults and indications of faults, malfunctions, incorrect settings, wear, values, inputs and outputs, fault codes, pressures and leaks.
q. Rectification or replacement procedures.
r. Evaluation and operation of components and systems following diagnosis and repair to confirm system performance.

Construction and operation of motorcycle engine systems to include:

a. engine mechanical
b. lubrication systems
c. fuel systems
d. ignition systems
e. cooling system
f. air and exhaust systems
g. engine management.

Engineering principles that are related to motorcycle engine systems

a. volumetric efficiency
b. flame travel, pre ignition and detonation
c. fuel properties
d. composition of carbon fuels
e. combustion process
f. legal requirements for exhaust emissions.

Symptoms and causes of faults found in motorcycle engine systems to include:

a. engine mechanical
b. lubrication systems

c. fuel systems
d. ignition systems
e. cooling system
f. air and exhaust systems
g. engine management.

Examine, measure and make suitable adjustments to the components including:

a. settings
b. input and output values
c. voltages
d. current consumption
e. resistance
f. output patterns with oscilloscope
g. pressures
h. condition
i. wear and performance.

Unit 358 Knowledge in diagnosis and rectification of motorcycle chassis faults

UAN:	**D/601/5568**
Level:	3
Credit value:	6
GLH:	45
Relationship to NOS:	This unit is linked to MC08 Diagnose and Rectify Motorcycle Chassis System Faults.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the diagnosis and rectification of chassis system faults.

Learning outcome	**The learner will:**
1. understand how the motorcycle chassis systems operate	
Assessment criteria	
The learner can: 1.1 explain the construction and operation of motorcycle chassis systems 1.2 explain the interaction between electrical, electronic and mechanical components within motorcycle chassis systems 1.3 explain how motorcycle chassis electrical systems interlink and interact, including multiplexing 1.4 compare motorcycle chassis system components and assemblies against alternatives to identify differences in construction and operation 1.5 identify the engineering principles that are related to motorcycle chassis systems: a. inertia force, mass and acceleration b. laws of friction c. statics (springs and torsion) d. hydraulic machines.	

Learning outcome	The learner will:
2. understand how to diagnose and rectify faults in motorcycle chassis systems	
Assessment criteria	
The learner can: 2.1 explain symptoms and causes of faults found in motorcycle chassis systems 2.2 explain systematic diagnostic techniques used in identifying motorcycle chassis system faults 2.3 explain how to examine, measure and make suitable adjustments to the components 2.4 explain how to carry out the diagnosis and rectification activities in order to correct the faults in motorcycle chassis systems 2.5 explain how to select, prepare and use diagnostic and rectification equipment for motorcycle chassis systems 2.6 explain how to evaluate and interpret test results found in diagnosing motorcycle chassis system faults against manufacturer specifications and settings 2.7 explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance.	

Unit 358 Knowledge in diagnosis and rectification of motorcycle chassis faults

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.

Electrical and electronic principles of motorcycle chassis systems

a. The operation of electrical and electronic systems and components related to motorcycle chassis systems including:
   i. ECU
   ii. sensors and actuators
   iii. electrical inputs
   iv. voltages
   v. oscilloscope patterns
   vi. digital principles.
b. The interaction between the electrical/electronic system and mechanical components of chassis systems.
c. Electronic and electrical safety procedures.

Operation of electronic ABS and traction control systems

a. Layout of:
   i. ABS and traction control systems
   ii. warning systems.
b. Operation of:
   i. hydraulic and electronic control units
   ii. wheel speed sensor
   iii. hoses
   iv. cables and connectors.
c. The relationship and interaction of braking with other motorcycle systems – traction control.

Steering geometry for motorcycle applications

a. Front/rear wheel geometry.

Symptoms and faults in braking systems

a. Symptoms and faults associated with braking systems:
   i. mechanical
   ii. hydraulic
   iii. electrical and electronic systems
   iv. fluid leaks
   v. warning light operation
   vi. poor brake efficiency

vii. wheel locking under braking.

Diagnosis and faults in braking systems

a. Locate and interpret information for:
    i. diagnostic tests
    ii. motorcycle and equipment specifications
    iii. use of equipment
    iv. testing procedures
    v. test plans
    vi. fault codes
    vii. legal requirements.
b. Prepare equipment for use in diagnostic testing.
c. Conduct systematic testing and inspection of:
    i. braking system
    ii. ABS
    iii. traction control
    iv. mechanical
    v. hydraulic
    vi. electrical and electronic systems.
d. Using appropriate tools and equipment including:
    i. multi-meters
    ii. oscilloscope
    iii. pressure gauges.
e. Evaluate and interpret test results from diagnostic testing.
f. Compare test result and values with motorcycle manufacturer's specifications and settings.
g. How to dismantle, components and systems using appropriate equipment and procedures.
h. Assess, examine and evaluate the operation, settings, values, condition and performance of components and systems.
i. Probable faults, malfunctions, incorrect settings.
j. Rectification or replacement procedures.
k. Operation of systems following diagnosis and repair to confirm operation and performance.

Symptoms and faults associated with steering systems

a. Symptoms and faults associated with steering systems:
    i. mechanical
    ii. steering joints and bushes
    iii. bearings.

Diagnosis and faults in steering systems

a. Locate and interpret information for:
    i. diagnostic tests
    ii. motorcycle and equipment specifications
    iii. use of equipment
    iv. testing procedures
    v. test plans
    vi. legal requirements.
b. How to prepare equipment for use in diagnostic testing.

c. Conduct systematic testing and inspection of:
    i. steering systems
    ii. mechanical.
d. Using appropriate tools and equipment including:
    i. wheel alignment equipment.
e. Evaluate and interpret test results from diagnostic testing.
f. Compare test result and values with motorcycle manufacturer's specifications and settings.
g. How to dismantle, components and systems using appropriate equipment and procedures.
h. Assess, examine and evaluate the:
    i. operation
    ii. settings
    iii. values
    iv. condition and performance of components and systems.
i. Probable faults, malfunctions, and incorrect settings.
j. Rectification or replacement procedures.
k. Operation of systems following diagnosis and repair to confirm operation and performance.

Symptoms and faults associated with suspension systems

a. Symptoms and faults associated with suspension systems:
    i. mechanical
    ii. hydraulic
    iii. ride height
    iv. wear
    v. noises under operation
    vi. fluid leakage
    vii. excessive travel
    viii. excessive tyre wear.

Diagnosis and faults in suspension systems

a. Locate and interpret information for:
    i. diagnostic tests
    ii. motorcycle and equipment specifications
    iii. use of equipment
    iv. testing procedures
    v. test plans
    vi. legal requirements.
b. How to prepare equipment for use in diagnostic testing.
c. How to conduct systematic testing and inspection of:
    i. suspension systems
    ii. mechanical
    iii. hydraulic.
d. Using appropriate tools and equipment including:
    i. alignment equipment
e. Evaluate and interpret test results from diagnostic testing.
f. Compare test result and values with motorcycle manufacturer's specifications and settings.
g. How to dismantle, components and systems using appropriate equipment and procedures.

h. Assess, examine and evaluate the operation, settings, values, condition and performance of components and systems.
i. Probable faults, malfunctions and incorrect settings.
j. Rectification or replacement procedures.
k. Operation of systems following diagnosis and repair to confirm operation and performance.

Construction and operation of motorcycle chassis systems to include:

a. steering
b. suspension
c. anti-lock-braking system (ABS)
d. traction control
e. front and rear wheel geometry.

Engineering principles that are related to motorcycle chassis systems

a. inertia force, mass and acceleration
b. laws of friction
c. statics
d. hydraulic machines.

Examine, measure and make suitable adjustments to the components including:

a. settings
b. input and output values
c. voltages
d. current consumption
e. resistance
f. output patterns with oscilloscope
g. pressures
h. condition
i. wear and performance.

Unit 362 Knowledge of diagnosis and rectification of motorcycle transmission and driveline faults

UAN:	**L/601/5582**
Level:	3
Credit value:	4
GLH:	30
Relationship to NOS:	This unit is linked to MC12 Diagnosis and Rectification of Motorcycle Transmission and Drive System Faults.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit allows the learner to develop the knowledge to diagnose and rectify faults within motorcycle transmission systems.

Learning outcome	**The learner will:**
1. understand how the motorcycle transmission and driveline systems operate	
Assessment criteria	
The learner can: 1.1 explain the construction and operation of motorcycle transmission and driveline systems 1.2 explain the interaction between electrical, electronic and mechanical components within motorcycle transmission and driveline systems 1.3 compare motorcycle transmission and driveline system components and assemblies against alternatives to identify differences in construction and operation 1.4 identify the advanced engineering principles that are related to motorcycle transmission and driveline systems: a. friction b. torque transmission c. materials d. fluids and energy e. potential and kinetic energy.	

Learning outcome	The learner will:
2. understand how to diagnose and rectify faults in motorcycle transmission and driveline systems	
Assessment criteria	
The learner can: 2.1 explain the symptoms and causes of faults found in motorcycle transmission and driveline systems 2.2 explain systematic diagnostic techniques used in identifying advanced transmission and driveline system faults 2.3 explain how to examine, measure and make suitable adjustments to components 2.4 explain how to carry out the rectification activities in order to correct the faults in the motorcycle transmission and driveline systems 2.5 explain how to select, prepare and use diagnostic and rectification equipment for motorcycle transmission and driveline systems 2.6 explain how to evaluate and interpret test results found in diagnosing motorcycle transmission and driveline system faults against manufacturer specifications and settings 2.7 explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance.	

Unit 362 Knowledge of diagnosis and rectification of motorcycle transmission and driveline faults

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.

Electrical and electronic principles related to motorcycle transmission systems

a. The operation of electrical and electronic systems and components related to motorcycle transmission systems including:
   i. Control units
   ii. sensors and actuators
   iii. electrical inputs & outputs
   iv. voltages
   v. oscilloscope patterns
b. The interaction between the electrical/electronic system, and mechanical components of the transmission systems.
c. Electronic and electrical safety procedures.

The operation of motorcycle clutches

a. The construction and operation of friction clutches (wet, and dry) including single and multi-plate clutch designs.

The operation of motorcycle transmissions and driveline systems

a. The construction and operation of manual gearboxes:
   i. gear arrangements
   ii. shaft and bearing arrangements
   iii. selector mechanisms
   iv. linkages
   v. lubrication.
b. The construction and operation of automatic gearboxes and method for achieving different gear ratios.
c. Interaction between mechanical, electrical and electronic components
d. The construction and operation of continuously variable transmissions (CVT) and the benefits of this type of gearbox design.
e. The construction and operation of final drive systems including:
   i. chain and sprocket
   ii. belt systems
   iii. conventional crown wheel and pinion.
f. The construction and operation of motorcycle hub arrangements.

g. The construction and operation of:
    i. drive shafts and couplings.

Symptoms and faults in motorcycle transmissions and drive-line systems

a. Clutch and coupling faults:
    i. abnormal noises
    ii. vibrations
    iii. fluid leaks
    iv. slip
    v. judder
    vi. grab
    vii. failure to release.
b. Gearbox faults:
    i. abnormal noises
    ii. vibrations
    iii. loss of drive
    iv. difficulty engaging or disengaging gears
    v. automatic gear box types
    vi. failure to engage gear
    vii. failure to disengage gear
    viii. leaks
    ix. failure to operate
    x. incorrect shift patterns
    xi. electrical and electronic faults.
c. Final drive faults:
    i. abnormal noises
    ii. vibrations
    iii. loss of drive
    iv. oil leaks
    v. failure to operate
d. Drive-lines and couplings:
    i. abnormal noises
    ii. vibrations
    iii. loss of drive.

Faults in motorcycle transmission systems

a. Interpret information for diagnostic tests, vehicle and equipment specifications, use of equipment, testing procedures, test plans, fault codes and legal requirements.
b. How to prepare equipment for use in diagnostic testing.
c. How to conduct systematic testing and inspection of transmission system, mechanical, hydraulic, electrical and electronic systems using appropriate tools and equipment including, mullet-meters,
d. How to carry out workshop based and road testing of vehicle and transmission system.
e. Evaluate and interpret test results from diagnostic and/or road testing
f. Compare test result and values with vehicle manufacturer's specifications and settings.
g. How to dismantle, components and systems using appropriate equipment and procedures.

h. Assess, examine and evaluate the operation, settings, values, condition and performance of components and systems.
i. Probable faults, malfunctions and incorrect settings.
j. Rectification or replacement procedures.
k. Operation of systems following diagnosis and repair to confirm operation and performance.

Construction and operation of motorcycle transmission and driveline systems to include:

a. clutches
b. manual gearboxes
c. automatics
d. electronic control
e. CVT (continuously variable transmission)
f. chain and sprocket
g. belt and pulley
h. drive shaft
i. final drive unit
j. hubs.

Advanced engineering principles that are related to motorcycle transmission and driveline systems:

a. friction
b. torque transmission
c. material
d. potential and kinetic energy.

Symptoms and causes of faults found in motorcycle transmission and driveline systems to include:

a. clutches
b. manual gearboxes
c. automatics
d. electronic control
e. CVT (continuously variable transmission)
f. chain and sprocket
g. drive shaft
h. final drive unit
i. hubs.

Examine, measure and make suitable adjustments components including:

a. settings
b. input and output values
c. voltages
d. current consumption
e. resistance
f. output patterns with oscilloscope
g. pressures
h. condition
i. wear and performance.

Unit 372 Knowledge of motorcycle fuel, ignition, air and exhaust system units and components

UAN:	**T/601/5527**
Level:	2
Credit value:	3
GLH:	20
Relationship to NOS:	This unit is linked to MC02 Remove and Replace Motorcycle Engine Units and Components.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the construction and operation of common fuel, ignition, air and exhaust systems. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

Learning outcome	**The learner will:**
1. understand how motorcycle engine fuel systems operate	
Assessment criteria	
The learner can: 1.1 identify motorcycle engine fuel system components 1.2 describe the construction and operation of motorcycle engine fuel systems 1.3 compare key motorcycle engine fuel system components and assemblies against alternatives to identify differences in construction and operation 1.4 identify the key engineering principles that are related to motorcycle engine fuel systems: a. properties of fuels b. combustion processes c. exhaust gas constituents 1.5 state common terms used in motorcycle engine fuel system design.	

Learning outcome	The learner will:
2. understand how motorcycle engine ignition systems operate	
Assessment criteria	
The learner can: 2.1 identify motorcycle engine ignition system components 2.2 describe the construction and operation of fundamental motorcycle engine ignition systems 2.3 compare key motorcycle engine ignition system components and assemblies against alternatives to identify differences in construction and operation 2.4 identify the key engineering principles that are related to motorcycle engine ignition systems a. flame travel b. ignition timing 2.5 state common terms used in key motorcycle engine ignition system design.	

Learning outcome	The learner will:
3. understand how motorcycle engine air supply and exhaust systems operate	
Assessment criteria	
The learner can: 3.1 identify motorcycle engine air supply and exhaust system components 3.2 describe the construction and operation of motorcycle engine air supply and exhaust systems 3.3 compare key motorcycle air supply and exhaust system components and assemblies against alternatives to identify differences in construction and operation 3.4 identify the key engineering principles that are related to motorcycle engine air supply and exhaust systems: a. sound absorption b. reduction of harmful emissions 3.5 state common terms used in key motorcycle engine air supply and exhaust system design.	

Learning outcome	The learner will:
4. understand how to check, replace and test fuel, ignition, air and exhaust systems, units and components	
Assessment criteria	
The learner can: 4.1 describe how to remove and replace fuel, ignition, air and exhaust systems, units and components 4.2 describe common types of testing methods used to check the operation of fuel, ignition, air and exhaust systems and their purpose 4.3 explain how to test and evaluate the performance of replacement units against motorcycle specification 4.4 explain common faults found in motorcycle fuel, ignition, air and exhaust systems, units and components and their causes.	

Unit 372 Knowledge of motorcycle fuel, ignition, air and exhaust system units and components

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.

Fuel - petrol

a. The function and layout of carburettor systems:
   i. carburettor, single and multi-type
   ii. fuel tank and control lever
   iii. fuel pumps.

b. The operation of carburettor systems:
   i. carburettor, single and multi-type
   ii. float chamber and designs
   iii. vacuum and piston assembly
   iv. needles and jets
   v. adjustment for idle and mixture
   vi. choke and enrichment device
   vii. fuel tank and control lever
   viii. fuel pumps.

c. The function of petrol injection systems and components:
   i. petrol injection systems
   ii. injection components
   iii. injection pump
   iv. pump relay
   v. injector valve
   vi. air flow sensor
   vii. throttle potentiometer
   viii. idle speed control valve
   ix. coolant sensor
   x. MAP and air temperature sensors
   xi. mechanical control devices
   xii. electronic control units.

d. The operation petrol injection systems and components:
   i. injection pump
   ii. pump relay
   iii. injector valve
   iv. air flow sensor
   v. throttle potentiometer
   vi. idle speed control valve
   vii. coolant sensor
   viii. MAP and air temperature sensors
   ix. electronic control units
   x. fuel pressure regulators

xi. fuel pump relays
xii. lambda exhaust sensors
xiii. flywheel and camshaft sensors
xiv. air flow sensors (air flow meter and air mass meter).

e. The procedures used when inspecting petrol system.
f. The chemically correct air/fuel ratio for petrol engines.
g. Weak and rich air/fuel ratios for petrol engines.
h. Exhaust composition and by-products for chemically correct, rich and weak air/fuel ratios of petrol engines:
    i. water vapour (H_2O)
    ii. nitrogen (N)
    iii. carbon monoxide (CO)
    iv. carbon dioxide (CO_2)
    v. carbon (C)
    vi. hydrocarbon (HC)
    vii. oxides of nitrogen (NOx, NO_2, NO) and particulates.
i. Symptoms and faults associated with fuel systems:
    i. erratic running
    ii. weak mixture
    iii. rich mixture
    iv. two stroke mixtures
    v. excessive smoke
    vi. leaks
    vii. failure to start
    viii. poor economy
    ix. failure to meet emission control.

Ignition

a. The layout of ignition systems.
b. Ignition circuits and components:
    i. LT Circuit
    ii. battery
    iii. ignition switch
    iv. electronic trigger devices
    v. HT Circuit
    vi. spark plugs (reach, heat range, electrode features
    vii. ignition leads
    viii. ignition coil
    ix. ignition timing advance system.
c. The operation electronic system components:
    i. amplifiers
    ii. triggering systems
    iii. inductive pick-ups
    iv. amplifier units.
    v. control units.
d. Ignition terminology:
    i. dwell angle
    ii. dwell time
    iii. advance and retard of ignition timing
    iv. static and dynamic ignition timing.
e. The operation of electronic ignition systems under various conditions and loads to include:

i. engine idling
ii. during acceleration
iii. under full load
iv. cruising
v. overrun
vi. cold starting.

f. Basic principle of engine management systems:
i. closed loop system
ii. integrated ignition
iii. injection systems
iv. sensors.

g. The procedures used when inspecting:
i. ignition system
ii. engine management
iii. sensors.

h. Symptoms and faults associated with ignition system operation:
i. failure to start hot or cold
ii. exhaust emissions
iii. poor performance
iv. ignition noise
v. misfire
vi. damp.

Air supply and exhaust systems

a. The construction and purpose of air filtration systems.
b. The operating principles of air filtration systems.
c. The construction and purpose of the exhaust systems.
d. The operating principles of the systems.
e. Exhaust system design to include silencers and catalytic converters.
f. The procedures used when inspecting induction, air filtration and exhaust systems.
g. Symptoms and faults associated with air and exhaust systems.

General

a. The preparation, testing and use of tools and equipment used for:
i. dismantling
ii. removal and replacement of engine units and components.

b. Appropriate safety precautions:
i. PPE
ii. vehicle protection when dismantling
iii. removal and replacing engine units and components.

c. The importance of logical and systematic processes.
d. The inspection and testing of engine units and components.
e. The preparation of replacement units for re-fitting or replacement.
f. The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance and safety requirements.
g. Re-fitting procedures.
h. The inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements.
i. The inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:

i. cleanliness of vehicle interior and exterior
ii. security of components and fittings
iii. re-instatement of components and fittings.

j. Construction and operation of motorcycle engine fuel systems
i. carburettor
ii. multi point injection.

k. Key engineering principles that are related to motorcycle engine fuel systems:
i. properties of fuels
ii. combustion processes
iii. exhaust gas constituents.

l. Key engineering principles that are related to motorcycle engine ignition systems:
i. flame travel
ii. ignition timing
iii. voltages.

m. Construction and operation of motorcycle engine air supply and exhaust systems
i. manifolds
ii. filters
iii. silencers, including two stroke
iv. catalytic converter.

n. Key engineering principles that are related to motorcycle engine air supply and exhaust systems
i. sound absorption
ii. reduction of harmful emissions.

Unit 436 Skills in diagnosing and rectifying motorcycle electrical faults

UAN:	**K/601/5590**
Level:	3
Credit value:	3
GLH:	25
Relationship to NOS:	This unit is linked to AE06MC Diagnose and Rectify Motorcycle Electrical Faults.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop the skills to diagnose and rectify motorcycle electrical systems and their units. It also covers the evaluation of performance of the systems. This includes SI, CI, hybrid and alternative fuel vehicles.

Learning outcome	**The learner will:**
1. be able to work safely when carrying out motorcycle electrical diagnostic and rectification activities	
Assessment criteria	
The learner can: 1.1 wear suitable personal protective equipment and use suitable motorcycle coverings throughout when carrying out electrical diagnostic and rectification activities 1.2 work in a way which minimises the risk of damage or injury to the motorcycle, 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 motorcycle diagnostic and rectification activities including: a. motorcycle technical data b. diagnostic test procedures 2.2 use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of motorcycle electrical system faults.	

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 diagnostic and rectification activities 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements 3.3 use the equipment required, correctly and safely throughout all motorcycle electrical diagnostic and rectification activities.	

Learning outcome	The learner will:
4. be able to carry out motorcycle electrical diagnosis, rectification and test activities	
Assessment criteria	
The learner can: 4.1 use diagnostic methods that are relevant to the symptoms presented 4.2 evaluate their assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately 4.3 carry out all diagnostic and rectification activities following: a. manufacturers' instructions b. recognised researched repair methods c. workplace procedures d. health and safety requirements 4.4 ensure all repaired or replacement components and units conform to the motorcycle operating specification and any legal requirements 4.5 adjust components and units correctly to ensure that they operate to meet system requirements 4.6 use testing methods that are suitable for assessing the performance of the system rectified 4.7 ensure the rectified motorcycle electrical system performs to the motorcycle operating specification and any legal 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 486 Knowledge of diagnosis and rectification of motorcycle electrical faults

UAN:	**M/601/5512**
Level:	3
Credit value:	4
GLH:	30
Relationship to NOS:	This unit is linked to AE06MC Diagnose and Rectify Motorcycle Electrical Faults.
Assessment requirements specified by a sector or regulatory body:	This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.
Aim:	This unit enables the learner to develop an understanding of the diagnosis and rectification of motorcycle electrical systems and their units. It also covers the evaluation of performance of the systems. This includes SI, CI, hybrid and alternative fuel vehicles.

Learning outcome	**The learner will:**
1. understand motorcycle electrical and electronic principles	
Assessment criteria	
The learner can: 1.1 explain the principles of electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics 1.2 explain the principles of sensor inputs, computer processing and actuator outputs 1.3 identify sensor types (passive and active) 1.4 identify the electrical principles that are related to motorcycle electrical circuits.	

Learning outcome	The learner will:
2. understand how motorcycle electrical systems operate	
Assessment criteria	
The learner can: 2.1 identify motorcycle electrical system components 2.2 explain the construction and operation of motorcycle electrical systems 2.3 explain the interaction between electrical, electronic and mechanical components within the system defined 2.4 explain how electrical systems interlink and interact, including multiplexing and fibre optics. 2.5 compare motorcycle electrical system components and assemblies against alternatives to identify differences in construction and operation	

Learning outcome	The learner will:
3. understand how to diagnose and rectify faults in motorcycle electrical systems	
Assessment criteria	
The learner can: 3.1 explain the symptoms and causes of faults found in motorcycle electrical systems 3.2 explain systematic diagnostic techniques used in identifying motorcycle electrical system faults 3.3 explain how to examine, measure and make suitable adjustments to components 3.4 explain how to carry out the rectification activities in order to correct the faults in the motorcycle electrical systems 3.5 explain how to select, prepare and use diagnostic and rectification equipment for motorcycle electrical systems 3.6 explain how to evaluate and interpret test results found in diagnosing motorcycle electrical system faults against motorcycle manufacturer specifications and settings 3.7 explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance.	

Unit 486 Knowledge of diagnosis and rectification of motorcycle electrical faults

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 electrical principles that are related to motorcycle electrical circuits:

a. Ohms law
b. Voltage
c. Power
d. Current (AC and DC)
e. Resistance
f. Magnetism
g. Electromagnetism and electromagnetic induction
h. Digital and fibre optic principles
i. Electrical units and symbols
j. Electrical and electronic terminology
k. Relevant electrical safety.

Charging

a. The operation of the motorcycle charging system:
    i. alternator
    ii. rotor
    iii. stator
    iv. slip ring
    v. brush assembly
    vi. three phase output
    vii. diode rectification pack
    viii. voltage regulation
    ix. phased winding connections
    x. cooling fan
    xi. alternator drive.

Starting

a. The layout, construction and operation of engine starting systems:
b. The function and operation of the following components:
    i. starter motor
    ii. starter clutch mechanism
    iii. pinion
    iv. starter solenoid
    v. clutch and gear safety switch

vi. ignition/starter switch
vii. stand switches
viii. starter relay (if appropriate).

Common faults and testing methods associated with charging and starting systems

a. fault code identification
b. wiring faults
c. component failure
d. earth problems
e. sensor faults.

Lighting systems and technology

a. Lighting systems should include:
    i. Xenon lighting
    ii. gas discharge lighting
    iii. ballast system
    iv. LED
    v. intelligent front lighting
    vi. blue lights
    vii. complex reflectors
    viii. fibre optic
    ix. optical patterning.
b. Circuits must include:
    i. sidelights
    ii. dipped beam
    iii. main beam
    iv. dim/dip.

Common faults and testing methods associated with external lighting system

a. Fault diagnosis for:
    i. lighting systems failing to operate correctly
    ii. switches
    iii. relays
    iv. bulbs failing to operate.

The operating principles of external lighting systems and multiplexing systems

a. To include all external lighting systems and a good knowledge of multiplexing systems.

The different types of auxiliary electrical components

a. Components should include:
    i. heated grip
    ii. electrically operated screens
    iii. horn
    iv. multi-functional switches
    v. relays
    vi. heated mirrors.

Common faults and testing methods associated with heated mirror systems

a. Faults must include:
    i. screen elements not operating
    ii. timer relays not operating and staying on permanently.

The different types of entertainment and information systems and components

a. Systems and components must include:
    i. radio CD and multi play units
    ii. MP3 players
    iii. speakers
    iv. aerial systems
    v. amplifiers
    vi. Satellite Navigation
    vii. communication units.

Common faults and testing methods associated with entertainment and information systems

a. Faults to include:
    i. entertainment and navigation units not operating
    ii. speaker, aerial and amplifier systems not functioning correctly
    iii. excessive radio interference (suppression)
    iv. use of diagnostic computers and systems.

The different types of integrated security/warning systems and components

a. Components to include:
    i. control units
    ii. alarm modules
    iii. audible warning units
    iv. immobiliser units
    v. sensing units
    vi. horn
    vii. audible warning speakers.

The function of component parts in integrated security and warning systems

a. Components to include
    i. control units
    ii. alarm modules
    iii. audible warning units
    iv. immobiliser units
    v. relays
    vi. diodes
    vii. horns.

The relevant legislation relevant to security and warning systems

a. Find and apply all relevant legislation for the fitment and use of security and warning systems.

Common faults and testing methods associated with security and warning systems

a. Components to include:
    i. control units
    ii. audible warning units
    iii. immobiliser units
    iv. horns
    v. relays
    vi. diodes
    vii. wiring
    viii. connections and protection devices
    ix. removal and refitting procedures
    x. using computer diagnostics to identify faults
    xi. use of manufacturers diagnostic equipment.

How to examine, measure and make suitable adjustments to components:

a. Settings
b. Input and output values
c. Voltages
d. Current consumption
e. Resistance
f. Input and output patterns with oscilloscope (including frequency and duty cycle measurements)
g. Condition
h. Wear and performance.

How to select, prepare and use diagnostic and rectification equipment for motorcycle auxiliary electrical systems:

a. Voltmeters
b. Ammeters
c. Ohmmeters
d. Multi-meters
e. Battery testing equipment
f. Dedicated and computer based diagnostic equipment
g. Oscilloscopes.

Appendix 1 Relationships to other qualifications

Links to other qualifications

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

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

These qualifications have connections to the:

- 4270 Level 2/3 VCQs in Light Vehicle Maintenance and Repair
- 4270-32 and 33 Level 2 and 3 Diplomas in Motorcycle Maintenance and Repair Competence

Literacy, language, numeracy and ICT skills development

These qualifications can develop skills that can be used in the following qualifications:

- Functional Skills (England) – see **www.cityandguilds.com/functionalskills**
- Essential Skills (Northern Ireland) – see **www.cityandguilds.com/essentialskillsni**
- Essential Skills Wales (from September 2010).

Appendix 2 Sources of general information

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

Providing City & Guilds qualifications – a guide to centre and qualification approval contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification. Specifically, the document includes sections on:

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

Ensuring quality contains updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document contains information on:

- Management systems
- Maintaining records
- Assessment
- Internal verification and quality assurance
- External verification.

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

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

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

Useful contacts

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

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

About City & Guilds

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

City & Guilds Group

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

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