

Motor Vehicle Body Repairer (Metal and Paint) Level 2

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B1 Trade Related Mathematics

Level: Two

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with an overview of trade related mathematics. Topics include: basic arithmetic and algebra, and the mathematical concepts for paint applications such as calculating and mixing by percentages.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review basic arithmetic.	20%
a. Whole numbers	
b. Rules of brackets	
c. Dimensioning and shop related applications	
d. Fractions and decimals	
e. Metric measurement	
f. Imperial measurement	
g. Percent: practical applications	
h. Ratio	
i. Proportion	
j. Geometry concept applications: shapes and measurement	
2. Review basic algebra.	20%
a. Signed numbers: comparison of signed numbers	
b. Basic equations	
c. Formulas	
3. Demonstrate and apply the mathematical concepts for working with paint applications.	60%
a. Calculations for mixing by percentage	
b. Calculations for mixing by parts	
c. Calculations for mixing by volume	
d. Calculations for mixing by weight	

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B2 Tools and Equipment II

Level: Two

Duration: 7 hours

Theory: 3 hours

Practical: 4 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills for using and maintaining tools and equipment with a focus on their uses and applications for technical training units in Level Two.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify tools and equipment, and describe their applications.	20%
a. Basic hand tools	
b. Power tools	
d. Shop	
e. Welding (metals and plastics)	
f. Measuring	
g. Straightening	
h. Refinishing and detailing	
i. Glass removal and installation tools	
2. Describe and demonstrate care and maintenance procedures related to tools and equipment.	40%
a. Basic hand tools	
b. Power tools	
d. Shop	
e. Welding (metals and plastics)	
f. Measuring	
g. Straightening	
h. Refinishing and detailing	
i. Glass removal and installation tools	
3. Demonstrate the use of various types of tools and equipment.	40%
a. Basic hand tools	
b. Power tools	
d. Shop	
e. Welding (metals and plastics)	
f. Measuring	
g. Straightening	
h. Refinishing and detailing	

i. Glass removal and installation tools

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B3 Trade Related Documents II

Level: Two

Duration: 7 hours

Theory: 4 hours

Practical: 3 hours

Overview:

This unit builds on Trade Related Documents I and is designed to provide the apprentice with an overview of trade related documents required in the trade and presenting information in written form. Topics include: interpreting information found on vehicles, preparing documentation, ordering, organizing, and storing parts and materials.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review sources of related information.	15%
a. Identify and interpret information found on the vehicle. <ul style="list-style-type: none">• Vehicle Identification Number (VIN)• Paint code• Production date	
b. Identify types of documents and describe the procedures used to interpret them. <ul style="list-style-type: none">• Safety data sheets (SDS)• Work orders• Estimates• Technical manuals and bulletins• Incident reports and spill logs	
2. Review the procedures used to prepare documentation.	10%
a. Work orders	
b. Estimates	
c. Ordering parts and materials.	
d. Organizing/storing parts and materials.	
3. Describe original equipment manufacturer (OEM) procedures for activating/inactivating of hybrid and alternative fuel vehicles.	30%
a. Mild hybrid (gas-electric).	
b. Full hybrid (electric only)	
c. Natural gas (compressed and liquefied petroleum)	
d. Propane	
e. Other	

4. **Describe and demonstrate types of tires and their construction.** **15%**
 - a. Codes and sidewall markings
 - b. Inflation
 - c. Sizing
 - d. Tread depth

5. **Describe and demonstrate types of wheels and their construction.** **15%**
 - a. Construction
 - b. Sizing

6. **Identify types of tire pressure monitoring systems (TPMS).** **15%**
 - a. Types (direct, indirect)
 - b. Reset procedures
 - c. Servicing and diagnosing

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B4 Corrosion Protection and Sound Deadening Materials

Level: Two

Duration: 7 hours

Theory: 4 hours

Practical: 3 hours

Overview:

This unit is designed to provide the apprentice with an overview of corrosion protection and sound deadening materials. Topics include: causes of corrosion, environmental and atmospheric conditions, inspection of corrosion related damage, types of corrosion, materials and tools used during repair procedures, Original Equipment Manufacturer (OEM) specifications, corrosion restoration to OEM and corrosion protection to electrical components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with corrosion protection and sound deadening materials.	5%
2. Identify hazards and describe safe work practices pertaining to the application and removal of corrosion protection and sound deadening materials.	5%
3. Identify and describe the types of corrosion protection and sound deadening materials.	15%
a. Corrosion protection	
• OEM	
• Undercoats and topcoats (primers and sealers)	
• Anti-corrosion compounds	
b. Sound deadening materials	
• Foam	
• Sprayable seam sealers	
4. Identify environmental and atmospheric conditions that influence the rate of corrosion and the effectiveness of sound deadening materials.	15%
5. Demonstrate and perform procedures to inspect for corrosion related damage.	10%
a. Methods and tools	
6. Demonstrate and perform procedures to repair and apply corrosion protection.	20%
a. Methods and tools	
b. Types	
c. OEM specifications	
d. Product specifications	

- e. Electrical components
- 7. **Demonstrate and perform procedures to inspect sound deadening materials.** **10%**
- 8. **Demonstrate and perform procedures to repair and apply sound deadening materials.** **20%**
 - a. Methods and tools
 - b. Types
 - c. OEM specifications

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B5 Stationary and Moveable Glass

Level: Two

Duration: 14 hours

Theory: 8 hours

Practical: 6 hours

Overview:

This unit is designed to provide the apprentice with an overview of stationary and moveable glass. Topics include: describing characteristics of stationary and moveable glass, structure/integrity of stationary and moveable glass, determining whether or not to repair or replace stationary and moveable glass, installation methods, the use of components, accessories, tools, and equipment in replacing stationary glass, removal and installation of stationary and moveable glass, and detecting leaks around stationary and moveable glass.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with stationary and moveable glass.	10%
2. Identify hazards and describe safe work practices when working with stationary and moveable glass.	5%
a. Removal	
b. Installation	
c. Cleanup	
3. Describe the types and characteristics of stationary and moveable glass.	10%
4. Identify the installation methods for stationary and moveable glass, and describe the associated components and accessories.	15%
a. Tools and equipment	
b. Fasteners and adhesives	
• Mechanical	
• Pressure fitted	
c. Other materials	
d. Moveable glass hardware	
• Motors	
• Regulators	
• Channels and guides	
4. Demonstrate and perform damage analysis and inspection of stationary and moveable glass.	20%

5. **Demonstrate and perform the procedures used to service and repair stationary and moveable glass.** 20%
- a. Detection and repair of leaks around stationary and moveable glass
 - Wind
 - Water
 - Dust
 - Noise
 - b. Adjustment of moveable glass
6. **Demonstrate and perform procedures to remove and install stationary and moveable glass.** 20%
- a. Tools and equipment
 - b. Hardware and accessories
 - c. Methods for removing and installing
 - d. Post-repair/installation inspections

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B6 Metal Panels and Components II

Level: Two

Duration: 49 hours

Theory: 7 hours

Practical: 42 hours

Overview:

This unit builds on Metal Panels and Components I and is designed to provide the apprentice with the knowledge and skills for working with metal panels and components as they relate to the fundamentals of collision repair. Topics include: types of vehicle construction and characteristics of metal panels and components; control and reference points; procedures for vehicles body repair; types of damage; damage analysis and inspection; and procedures to service and repair metal panels and components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with metal panels and components.	5%
2. Identify hazards and describe safe work practices when working with metal panels and components.	5%
3. Describe the types of vehicle construction and characteristics of metal panels and components.	10%
a. Unibody vehicle	
b. Space frame vehicles	
c. Body-over-frame vehicles	
d. Vehicle manufacturing processes	
• Taylor rolled	
• Taylor welded	
• Hydroforming	
• Bonded panels	
• Fasteners (riveted, bolted-on, welded-on)	
4. Identify and describe control and reference points.	10%
a. Quick checks using a tram gauge	
b. Production tolerances	
c. Repair tolerance	
5. Describe the procedures for vehicle body repair.	15%
a. Vehicle construction	
• Pillar designs (A, B, C and D pillars)	
• Rocker panel designs	

- Front and rear rail designs
 - Structural and non-structural components
 - Mechanical components
- b. Material
 - c. Collision energy management and crush zones

6. Identify and describe types of damage. 15%

- a. Direct
- b. Indirect
- c. Mass inertia
- d. Previous improper repairs
- e. Claim-related damage
- f. Pre-existing damage

7. Demonstrate and perform damage analysis and inspection of metal panels and components. 20%

- a. OEM repair recommendations
- b. Kink versus bend
- c. Amount and location of damage
- d. Basic measuring
- e. Corrosion protection

8. Demonstrate and perform the procedures used to service and repair metal panels and components. 20%

- a. Basic measuring
- b. OEM repair recommendations
- c. Align and adjust

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B7 Plastic and Composite Panels II

Level: Two

Duration: 35 hours

Theory: 12 hours

Practical: 23 hours

Overview:

This unit builds on Plastic and Composite Panels I and is designed to provide the apprentice with the knowledge and skills for working with plastic and composite panel repairs. Topics include: types and characteristics of plastic and composite panels; products and materials used in plastics and composite repair; International Organization for Standardization codes; procedures for plastics and composite repairs; procedures for repairing plastic and composite panels; and procedures for fiberglass and composite repairs.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with plastic and composite panels, and their components.	5%
2. Identify hazards and describe safe work practices when working with plastic and composite panels, and their components.	5%
3. Describe the types and characteristics of plastic and composite panels, and their components. a. Plastics b. Fiberglass c. Composites	10%
4. Identify products and materials used in non-metal/plastics and composite repair.	10%
5. Identify International Organization for Standardization (ISO) codes.	10%
6. Describe the procedures and tools used for plastics and composite repairs. a. Tools and equipment b. Methods	10%
7. Demonstrate and perform removal and installation of plastic and composite panels, and their components.	10%
8. Demonstrate and perform plastic repair procedures. a. OEM repair recommendations b. Set-up procedures for plastic welding c. Shutdown procedures for plastic welding	25%

d. Adhesive repair

9. Demonstrate and perform fiberglass and composite repair procedures.

15%

a. OEM repair recommendations

b. Fill fiberglass

c. Bonding procedures

d. Adhesive repair

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B8 Interior Components

Level: Two

Duration: 7 hours

Theory: 3 hours

Practical: 4 hours

Overview:

This unit is designed to provide the apprentice with the knowledge and skills for repairing interior components. Topics include: types of interior components; procedures to inspect and repair interior components; and procedures to remove and replace interior components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with interior components.	10%
2. Identify hazards and describe safe work practices pertaining to interior components. a. Personal b. Vehicle	10%
3. Identify and describe the types of interior components.	20%
4. Demonstrate and perform procedures to inspect and repair interior components. a. Misalignment b. Noises	20%
5. Demonstrate and perform procedures to remove and replace interior components.	40%

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B9 Refinishing Equipment Preparation II

Level: Two

Duration: 7 hours

Theory: 4 hours

Practical: 3 hours

Overview:

This unit builds on Refinishing Equipment Preparation I and is designed to provide the apprentice with the knowledge and skills for refinishing equipment preparation with a focus on performing the procedures used to set-up, operate and maintain the spray gun, and the procedures related to paint booth and spray gun setup and preparation.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with refinishing equipment preparation.	5%
2. Review hazards and describe safe work practices when preparing refinishing equipment.	5%
a. Personal	
b. Shop/facility	
c. Equipment	
d. Environmental	
3. Demonstrate and perform the procedures used to set-up, operate and maintain the spray booth.	30%
a. Setup and preparation	
• Position air movers	
• Adjust spray booth temperature and air pressure	
b. Operate	
c. Maintenance	
• Clean and drain air line system	
• Inspect and replace air filter	
d. Shutdown	
4. Demonstrate and perform the procedures used to set-up, operate and maintain the spray gun.	30%
a. Setup and preparation	
• Install recommended fluid tip needle and air cap	
• Attach cups and hose coupler	
• Adjust fluid delivery, air pressure, and fan width	
b. Operate	
c. Maintenance	

- Identify, troubleshoot and correct spray pattern problems
- Cleaning
- Lubricating

5. Demonstrate and perform complete paint booth and spray gun setup and preparation procedures. 30%

- a. Paint booth setup and preparation procedures
- b. Spray gun pattern problem identification and correction
 - Heavy on the top or bottom
 - Heavy in the middle
 - Hourglass
 - Crescent

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B10 Refinishing Materials II (Prepares)

Level: Two

Duration: 14 hours

Theory: 4 hours

Practical: 10 hours

Overview:

This unit builds on Refinishing Materials I and is designed to provide the apprentice with the knowledge and skills for working with Refinishing Materials with a focus on performing colour adjustments (colour matching and blending techniques) on automotive panels.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with substrate preparation for refinishing materials.	5%
2. Review hazards and describe safe work practices when performing substrate preparation for refinishing materials.	5%
3. Review the types of refinishing materials, their characteristics, preparation, and procedures for use.	40%
a. Characteristics	
• Waterborne	
• Solvent borne	
b. Undercoats	
• Epoxy-based	
• Polyester	
• Urethane	
• Transparent	
• Tintable	
• Non-tintable	
c. Topcoat applications	
• Sealers	
• Topcoats (single-stage, two-stage, multi-stage)	
• Clearcoats	
4. Demonstrate and perform colour adjustments on an automotive panel.	50%
a. Colour matching	
b. Various blending techniques	

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B11 Refinishing Materials III (Applies)

Level: Two

Duration: 35 hours

Theory: 7 hours

Practical: 28 hours

Overview:

This unit builds on Refinishing Materials II and is designed to provide the apprentice with the knowledge and skills for working with Refinishing Materials with a focus on performing colour adjustments (basecoat applications and other blending techniques) and the application of refinishing materials on automotive panels.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with application of refinishing materials.	10%
2. Review hazards and describe safe work practices related to the application of refinishing materials.	10%
3. Review the types of refinishing materials, their characteristics, applications, and procedures for use.	30%
a. Characteristics	
• Waterborne	
• Solvent borne	
b. Types	
• Epoxy-based	
• Polyester	
• Urethane	
• Transparent	
• Tintable	
• Non-tintable	
c. Applications	
• Sealers	
• Topcoats (single-stage, two-stage, multi-stage)	
• Clearcoats	
d. Additives	
• Flattening agents	
• Blending agents	
• Accelerators	
• Retarders	
• Adhesion promoters	
• Flex agents	

- Solvents
- Hardeners

- 4. Demonstrate and perform colour adjustments on an automotive panel. 20%**
 - a. Basecoat application
 - b. Various blending techniques
- 5. Demonstrate and perform application of refinishing materials on an automotive panel. 30%**

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B12 Post-Refinishing Functions II

Level: Two

Duration: 7 hours

Theory: 4 hours

Practical: 3 hours

Overview:

This unit builds on Post-Refinishing Functions I and is designed to provide the apprentice with the knowledge and skills about post-refinishing functions with a focus on the exterior of the vehicle.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with post-refinishing functions.	5%
2. Review hazards and describe safe work practices when performing post-refinishing functions.	5%
3. Describe and demonstrate the post-refinishing functions for the exterior of the vehicle. a. Topcoat defects b. Overspray c. Techniques for correcting defects and imperfections	20%
4. Describe and demonstrate equipment and products used in the post-refinishing of the vehicle exterior.	20%
5. Perform post-refinishing procedures on the vehicle exterior. a. Wash b. Polish	50%

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B13 Electrical Fundamentals

Level: Two

Duration: 14 hours

Theory: 10 hours

Practical: 4 hours

Overview:

This unit is designed to provide the apprentice with an overview of electrical fundamentals. Topics will include: basic electrical theory, trade related terminology, safety precautions, electrical and electronic components and component operation, electrical and electronic circuits, testing electrical and electronic components, electrical schematics/diagrams and interpreting electrical schematics/diagrams in repair.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with electrical fundamentals.	10%
a. Basic electrical theory	
b. Basic electrical components	
c. Basic electronic components	
d. Basic electrical and electronic component operation	
2. Identify hazards and describe safe work practices when working with electrical and electronic components.	5%
3. Describe and interpret basic electrical wiring diagrams and their use.	15%
4. Describe and demonstrate the use of instruments used to test basic electrical and electronic circuits and components and their procedures for use.	20%
a. Test light	
b. Multi-meter	
5. Apply Ohm's law to calculate values in a basic electrical circuit.	10%
6. Demonstrate and perform the procedures used to test and repair basic electrical and electronic circuits and their components.	20%
a. Test tools	
• Test light	
• Multi-meter	
b. Repair techniques	
• Splicing	
• Soldering	

7. **Demonstrate and perform the procedures used to interpret basic electrical wiring diagrams when repairing electrical and electronic systems and their components.** 20%
- a. Repair techniques
 - Splicing
 - Soldering
 - b. Other materials used when repairing electrical and electronic systems
 - Shrink tube
 - Butt-splice connectors

Motor Vehicle Body Repairer (Metal and Paint)

Unit: B14 Gas Metal Arc Welding (GMAW [MIG]) II

Level: Two

Duration: 28 hours

Theory: 7 hours

Practical: 21 hours

Overview:

This unit builds on Gas Metal Arc Welding (GMAW[MIG]) I and is designed to provide the apprentice with the knowledge and skills on gas metal arc welding techniques as they apply to performing various welds and joints on steel coupons, and performing destructive testing to determine weld quality on steel coupons.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Review terminology associated with GMAW.	5%
2. Review hazards and describe safe work practices pertaining to GMAW.	5%
3. Review use of GMA (MIG) welding equipment.	5%
a. Current output	
b. Voltage output	
c. Gas Metal-Arc Welding (GMAW) / Metal Inert Gas (MIG) welding	
d. Reverse polarity	
e. Straight polarity	
f. Transfer process	
4. Review techniques for welding automotive steels.	10%
a. Travel speed	
b. Welding gun angle	
c. Travel angle	
d. Work angle	
e. Pull/push technique	
f. Welding position	
g. Proper joint fit-up	
5. Describe heat management procedures pertaining to GMAW.	10%
6. Describe and perform various types of welds and joints on steel coupons.	35%
a. Joint	
• Lap	
• Butt with backing	

- Open butt
- b. Welds
 - Plug
 - Tack
 - Stitch
- c. Positions
 - Flat
 - Vertical
 - Horizontal
 - Overhead

7. Describe and perform destructive testing to determine weld quality on steel coupons. 30%

- a. Visual
 - Penetration
 - Defects
- b. Destructive
 - Penetration
 - Defects
