AUTOBODY 10, A20, B20, A30, B30
Curriculum Guidelines

A Practical and Applied Art

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Introduction

Within Core Curriculum, the Practical and Applied Arts (PAA) is a major area of study that incorporates five traditional areas of Home Economics Education, Business Education, Work Experience Education/Career Education, Computer Education and Industrial Arts Education. Saskatchewan Education, its educational partners and other stakeholders have collaborated to complete the PAA curriculum renewal. Some PAA curriculum guidelines have been updated by integrating, adapting, or deleting some components; some Locally Developed Courses have been elevated to provincial status; and some new guidelines have been developed.

A companion, *Practical and Applied Arts (PAA) Handbook*, provides background on Core Curriculum philosophy, perspectives and initiatives. The Handbook provides a renewed set of goals for PAA. It presents additional information about the PAA area of study, including guidelines about work study and related transition-to-work dimensions. A *PAA Information Bulletin* provides direction for administrators and others. Lists of recommended resources from all guidelines will be compiled into a PAA Bibliography with periodic updates.

Philosophy and Rationale

Automobiles and other vehicles play major roles in our society. Due to many factors, there will be vehicle collisions and the need for repairs. Sometimes there is a need to refinish or beautify vehicles.

Learning Autobody skills at the Secondary Level may offer students an opportunity for experience and/or employment in the private sector. There may also be an opportunity for students who have completed courses to apply for advanced standing in a post-secondary training program. Students may be granted time credit if they register as an apprentice following high school completion. Some students may choose to study Autobody for personal use.

Aim, Goals and Foundational Objectives

Aim

It is the aim of this curriculum is to provide students with opportunities to acquire knowledge and develop skills used in the Autobody industry and to become aware of related career opportunities.

Goals

Awareness: To create an appreciation for the autobody trade.

Consumer Knowledge: To develop knowledge to evaluate quality workmanship in the field of autobody.

Communication: To develop communication skills when relating to customers and employers in a workplace setting.

Personal Skills: To promote self-esteem and confidence through skill development in the autobody trade.

Entrepreneurship: To allow students to develop entrepreneurial skills and evaluate opportunities in the trade.

Applied Technology: To develop proficiency in the use of various tools through skill development.

Career and Employment: To become aware of careers and opportunities related to autobody in Saskatchewan and other provinces.

Foundational Objectives

Foundational objectives are the major, general statements that guide what each student is expected to achieve for the modules of the PAA curriculum guidelines. Foundational objectives indicate the most important knowledge, skills, attitudes/values and abilities for a student to learn in a subject. Foundational Objectives for Autobody 10, A20, B20, A30, B30 and the Common Essential Learnings (CELs) Foundational Objectives to be emphasized are stated in this document. Statements may be repeated or enhanced in different modules for emphasis. The Foundational Objectives of the Core Modules in Autobody 10, A20, A 30, B30 curriculum include:

- To understand and apply safe work practices in the autobody environment.
- To develop procedures for the safe use of tools and equipment.
- To handle, use and dispose of materials safely.
- To understand the appropriate use, care and maintenance of tools used for autobody repair.
- To evaluate damage to motor vehicles in order to determine corrective work procedures.
- To estimate technical measurements and time for repair.
- To recommend procedures and select appropriate products for use in autobody repair.
- To understand the various types of body construction and components of motor vehicles.
- To evaluate a vehicle in terms of suitability and condition.
- To understand the legal implications of buying and selling vehicles.
- To develop skills that may lead to finding and maintaining employment.
- To become aware of the components of a variety of jobs and career opportunities in the autobody trades.
- To understand the prerequisites required and programs offered in various post-secondary institutions.

Common Essential Learnings (CELs)

The incorporation of the Common Essential Learnings (CELs) into the instruction of the Practical and Applied Arts (PAA) curriculum offers many opportunities to develop students' knowledge, skills and abilities. The purpose of the CELs is to assist students with learning concepts, skills and attitudes necessary to make the transition to career, work and adult life.

The CELs also establish a link between the Transition–to-Work dimensions and Practical and Applied Arts curriculum content. The Transition-to-Work dimensions included in the PAA courses are: apprenticeship, career development, community project, employability skills, entrepreneurial skills, occupational skills, personal accountability, processing information, teamwork and work study/exploration. Throughout the PAA Curricula, the CELs objectives are stated explicitly at the beginning of each module. The CELs are coded in this document, as follows:

COM	=	Communication
NUM	=	Numeracy
CCT	=	Critical and Creative Thinking
TL	=	Technological Literacy
PSVS	=	Personal and Social Values and Skills
IL	=	Independent Learning

It is anticipated that teachers will find additional ways to incorporate the CELs into their classroom instruction.

Course Components and Considerations

Each Practical and Applied Arts credit is based on 100 hours of instructional time. Course configurations, for purposes of articulation with post-secondary programs within the trades (specified in Appendix A), will require the completion of specific modules. Introductory modules must precede Intermediate modules that must precede Advanced modules. See the suggested course configurations chart.

Autobody 10

Module 1: Safety, Module 2: Auto Construction, Module 3: Hand Tools, Module 4: Power Tools, Module 5: Metal Straightening, Module 6: Filling Damage, Module 7: Panel Replacement and Module 8: Contoured Surface Rust Repair could be taught in a multi-purpose work area in a school. Both noise level and availability of the needed tools should be considered. Automotive metal panels mounted on stands could be used instead of complete automobiles if space is a problem. In addition to the Autobody modules, suggested modules from the Practical and Applied Arts *Welding Curriculum Guidelines* will be incorporated to teach basic skills. M.I.G. (110v power supply) and oxy-acetylene welding equipment need to be considered for inclusion in the program, if the student has no previous welding experience.

Autobody A20, B20, A30, B30

Autobody 10 is a prerequisite for Autobody A20. Autobody A20 is a prerequisite for Autobody B20, etc. Autobody A20, B20, A30 and B30 deal primarily with the repair of collision damage to vehicles. Some mechanical knowledge of steering, suspension, electrical and braking systems may be necessary. Consult the *Mechanical, Automotive Studies Curriculum Guidelines* (Saskatchewan Education 1999) and/or teacher. Because specialized tools and facilities may be necessary, Autobody A20, B20, A30 and B30 may need to be taught in cooperation with a community partner. A determining factor when choosing modules will be the specific damage to the vehicles that are chosen or available for repair. Time allocated for each module will need to be adjusted according to the damage being repaired.

Work Study

Work Study provides the opportunity for students to:

- practice skills
- learn industry standards for quality of work
- develop employability skills
- explore possible career choices in the autobody industry
- learn about technical equipment and procedures not available in the school setting.

Sites for work study may include autobody repair businesses, industrial manufacturing plants (painting or finishing), glass replacement businesses, automotive dealerships, automotive sales, automotive cleaning businesses, automotive salvage businesses and insurance claims outlets. Refer to the Work Study Guidelines, a section of the *Practical and Applied Arts Handbook* and the *Career, Work Exploration Curriculum Guidelines* (TBD), for information on required and best practices for student preparation, employer partnerships and teacher responsibilities.

Module Overview

Module Code	Modules	Suggested Time (hours)
AUTB01	Module 1: Safety (Core)	2-4
AUTBO2	Module 2: Auto Design (Core)	4-6
AUTBO3	Module 3: Hand Tools (Core)	4-6
AUTBO4	Module 4: Power Tools (Core)	4-6
AUTBO5	Module 5: Metal Straightening (Core)	20-30
AUTBO6	Module 6: Filling Damage (Core)	4-6
AUTBO7	Module 7: Panel Replacement (Core)	4-6
AUTBO8	Module 8: Contoured Surface Rust Repair (Core)	4-6
AUTB09A, B, C, D	Module 9: Work Study Preparation and Follow-up Activities (Optional)	5-10
AUTB10A, B, C, D	Module 10: Work Study (Optional)	25-50
AUTB11	Module 11: Career Opportunities in Autobody (Core)	2-5
AUTB12	Module 12: Estimating Repair Costs (Optional)	10-20
AUTB13	Module 13: Automobile Refinishing and Repainting (Optional)	35-40
AUTB14	Module 14: Advanced Automotive Structural Design (Core)	15-25
AUTB15	Module 15: Advanced Hand and Power Tools (Core)	8-12
AUTB16	Module 16: Advanced Metal Repair (Core)	15-25
AUTB17	Module 17: Panel Alignment (Core)	15
AUTB18	Module 18: Glass Removal and Installation (Optional)	10-20
AUTB19	Module 19: Air Bags (Optional)	4-6
AUTB20	Module 20: Automobile Detailing (Optional)	10-20
AUTB21	Module 21: Trim Removal and Installation (Core)	4-6
AUTB22	Module 22: Surface Preparation (Core)	20-30
AUTB23	Module 23: Plastic Repair (Optional)	20-30
AUTB24	Module 24: Buying and Selling a Vehicle (Optional)	10-20
AUTB25	Module 25: Automotive Refinishing and Painting (Optional)	45-55

Suggested Course Configurations

Module Code	Suggested Modules	Suggested Time (hours)
	Autobody 10 (1 credit)	
AUTB01	Module 1: Safety (Core)	2-4
AUTBO2	Module 2: Auto Design (Core)	4-6
AUTBO3	Module 3: Hand Tools (Core)	4-6
AUTBO4	Module 4: Power Tools (Core)	4-6
AUTBO5	Module 5: Metal Straightening (Core)	20-30
AUTBO6	Module 6: Filling Damage (Core)	4-6
AUTBO7	Module 7: Panel Replacement (Core)	4-6
AUTBO8	Module 8: Contoured Surface Rust Repair (Core)	4-6
AUTB11	Module 11: Career Opportunities in Autobody (Core)	2-5
WELD01	Module 1: Safety: General, Oxy-Acetylene Welding, and Electric Arc Welding	6-10
WELD05	Module 5: Oxy-Acetylene Welding Start-Up, Shut-Down, and Cutting	2-4
WELD13	Module 13: Plasma Arc Cutting	2-4
WELD29	Module 29: Metal Inert Gas (M.I.G.) Welding Safety and Equipment	3-6
WELD30	Module 30: Start-Up and Shut-Down (M.I.G.) Welding	2-4
WELD31A	Module 31A: M.I.G. Procedures and Practice	10-14
	Minimum	**100**
	Autobody A20 (1 credit)	
AUTB13	Module 13: Automobile Refinishing and Repainting (Optional)	25-40
AUTB15	Module 15: Advanced Hand and Power Tools (Core)	8-12
AUTB17	Module 17: Panel Alignment (Core)	10-20
AUTB21	Module 21: Trim Removal and Installation (Core)	4-6
WELD06	Module 6: Oxy-Acetylene Cutting	5-8
WELD07	Module 7: Advanced Oxy-Acetylene Cutting	3-5
WELD09	Module 9: Oxy-Acetylene Welding	7-10
AUTB09A	Module 9: Work Study Preparation and Follow-up Activities (Optional)	5-10
AUTB10A	Module 10: Work Study (Optional)	25-50
	Minimum	**100**
	Autobody B20 (1 credit)	
AUTB18	Module 18: Glass Removal and Installation (Optional)	10-20
AUTB19	Module 19: Air Bags (Optional)	4-6
AUTB20	Module 20: Automobile Detailing (Optional)	10-20
AUTB24	Module 24: Buying and Selling a Vehicle (Optional)	10-20
AUTB09B	Module 9B: Work Study Preparation and Follow-up Activities (Optional)	5-10
AUTB10B	Module 10B: Work Study (Optional)	25-50
WELD31B	Module 31B: M.I.G. Procedures and Practices	10-20
	Minimum	**100**

	Autobody A30 (1 credit)	
AUTB16	Module 16: Advanced Metal Repair (Core)	15-25
AUTB22	Module 22: Surface Preparation (Core)	20-30
AUTB25	Module 25: Automotive Refinishing and Painting (Optional)	45-55
AUTB09C	Module 9C: Work Study Preparation and Follow-up Activities (Optional)	5-10
AUTB10C	Module 10C: Work Study (Optional)	25-50
	Minimum	**100**
	Autobody B30 (1 credit)	
AUTB14	Module 14: Advanced Automotive Structural Design (Core)	15-25
AUTB12	Module 12: Estimating Repair Costs (Optional)	10-20
AUTB23	Module 23: Plastic Repair (Optional)	20-30
AUTB09D	Module 9D: Work Study Preparation and Follow-up Activities (Optional)	5-10
AUTB10D	Module 10D: Work Study (Optional)	25-50
	Minimum	**100**

Core and Optional Modules

Module 1: Safety (Core)

Suggested time: 2-4 hours **Level: Introductory**

Module Overview
This module provides students with directions for use of the following: particle masks, safety glasses, face shields, chemicals in the workplace, WHMIS symbols, ventilation in the workplace, ear protection and fire hazards.

Foundational Objectives
- To understand and apply safe work practices in the autobody environment.
- To develop procedures for the safe use of tools and equipment.

Common Essential Learnings Foundational Objective
- To recognize and practise safety in all situations encountered. (COM)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
1.1	To introduce autobody safety appliances and explain the reason for using them. (COM)	Ensure that students understand the necessity of using safety appliances and know how to test them. Check the Saskatchewan Labour website.
1.2	To use safety appliances without prompting.	Store safety appliances close to the entrance of the work area and establish a routine by putting on safety appliances before any activity begins. Visible storage and the expectation that appliances will be returned to their storage places encourages their use.
1.3	To use safe work procedures. (TL, PSVS)	Ask students to explain what their task is and what precautions they are going to take prior to engaging in an activity. Monitor students closely and insist on safe practices. Demonstrate safe habits as this is often the best safety education. Encourage students to choose not to participate if they are unsure of what they are doing, feel ill, or are distracted. (This is not meant to encourage non-participation, but to question unsafe situations.) Be sure students understand that if they are employed in the future and are asked to perform work they consider unsafe, they have the legal right to refuse without fear of losing their employment. Invite persons who have been injured on the job to speak to students. Meeting someone who has been injured and hearing first hand how it affected his/her life can be very powerful. Model safe practices such as not talking to people while you are engaged in the operation of equipment. Students need to be instructed on what to do if an accident occurs. Outline the procedure to follow when an accident occurs. Outline the procedure to follow with respect to fire drill and evacuation.

Module 2: Auto Design (Core)

Suggested time: 4-6 hours **Level: Introductory**

Module Overview
This module describes the various ways in which automobile bodies are designed and assembled. Topics include body construction, standard or conventional construction, unitized construction, modified unitized construction, laminated auto glass, tempered auto glass and body design.

Foundational Objective
- To understand the various types of construction and components of motor vehicles.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)
- To recognize the impact that societal values have on the design of automobiles. (PSVS)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
2.1	To identify the major exterior parts of an automobile. (COM)	Automobile design is best taught where a hoist is available. If the hoist is not available at the school, arrange to identify exterior auto parts at a community site. Major exterior parts include: roof, floor, 1/4 panels, cowl section, rocker panels, etc.
2.2	To identify the minor exterior parts of an automobile. (TL)	Minor exterior parts include: front fenders, hood, trunk lid, doors, splash pans.
2.3	To define what conventional body construction is.	Body and frame are two separate units that are bolted together.
2.4	To define what unitized body construction is.	Body and frame is one unit that is welded together. Unitized body consists of bolted on strength members to support the power train, running gear and suspension.
2.5	To describe what modified unitized construction is.	
2.6	To identify laminated and tempered glass units.	Laminated auto glass is made up of two layers of glass that have a polyurethane layer between them to act as a safety barrier that prevents shattering on impact. Tempered auto glass is a single layer of glass that has been heated, shaped, cut to measurement and cooled rapidly. This gives the glass strength. On impact, it breaks into thousands of small harmless pieces preventing injury to the occupants.

	Learning Objectives	Notes
2.7	To demonstrate an understanding of some automotive design considerations. (TL)	Design considerations include: safety, ride and comfort, fuel efficiency, vehicle use, styling, ergonomics, etc. Videos depicting the design and manufacture of automobiles are useful. **Discuss some improvements in automotive design that have occurred in recent years. Students may research design changes to a specific type of vehicle over a ten year period and outline improvements. Consult with local dealerships if available. (PSVS)** Students may also wish to access manufacturer's websites on the Internet.

Module 3: Hand Tools (Core)

Suggested time: 5 hours **Level: Introductory**

Module Overview
This module introduces the use of hand tools and their use specific to the autobody industry. The following tools will be introduced: hammers, dolly blocks, body files, pulling tools, picking tools and cutting tools.

Foundational Objectives
- To develop procedures for the safe use of tools and equipment.
- To understand the appropriate use, care and maintenance of tools used for autobody repair.

Common Essential Learnings Foundational Objective
- To learn industry-related vocabulary and use it in context. (COM)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
To identify, select and use:	Demonstrate wrenches: box end, open end, combination, flare nut, adjustable wrench, pipe wrench and Allen® wrench.
3.1 small basic hand tools, both metric and imperial measures;	
3.2 a ratchet wrench;	
3.3 screw drivers;	Show the students standard (slotted), Phillips®, Robertson® and Torx® screwdrivers. Note that some have colour-coded handles to indicate size.
3.4 pliers;	Show the students combination, needle nose, vice grip and adjustable (channel lock) pliers.
3.5 hammers;	Show the students ball-peen, rubber and sledge hammers. **When using a hammer use safety glasses and gloves.**
3.6 chisels;	Chisels are used to mark, remove and scrape metal in conjunction with a hammer. **Always wear safety glasses when using a hammer and chisel.**
3.7 body hammer for a specific job;	The weight of the hammer is important in relation to the damage being corrected. **Body hammers are to be used only on sheet metal, not on punches or chisels**
3.8 dolly blocks for a specific job;	Demonstrate the use of the all-purpose dolly, heel dolly, toe dolly and drop dolly.

	Learning Objectives	Notes
3.9	files needed for a specific job;	Demonstrate the use of the flat steel file, half round file and sandpaper file.
3.10	pulling tools for various situations to remove a dent;	Demonstrate the use of the slide puller and the Unispot® puller. (optional)
3.11	picking tools needed for a specific job; and	Demonstrate the use of picking tools for a specific job.
3.12	hand cutting tools. (TL, COM)	Demonstrate the use of metal shears and hacksaws. Be sure to demonstrate to the student the different types of metal shears for straight cuts and left and right cuts. **Emphasize the use of safety glasses when using all hand tools. Often there is a perception that non-power tools do not require safety precautions.**

Module 4: Power Tools (Core)

Suggested time: 4-6 hours **Level: Introductory**

Module Overview
This module provides an introduction to the safe use of the following tools: disc sanders (grinders), drills, drill press, nibbler, die grinders, side grinder (high speed cutters), air file and feather edger.

Foundational Objectives
- To understand the appropriate use, care and maintenance of tools used for autobody repair.
- To develop procedures for the safe use of tools and equipment.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
To identify and use safely:	**For Learning Objectives 4.1 to 4.11, necessary safety equipment will include eye protection, hearing protection and dust masks.**
	Discarded fenders or hoods can be obtained from autobody shops for demonstration.
4.1 an electric grinder; (TL)	Demonstrate removal of paint from the surface and from grinding metal and metal welds.
4.2 an air sander for various situations;	Instruct the students on the maintenance of the air and electric disc sander.
4.3 an electric or air drill;	Include instruction on how to change drill bits and maintain both types of drills.
4.4 the drill press;	Demonstrate how to use the drill press vice. Explain the relationship between the belt settings and drill speed. Identify the speed to be used in various materials. **Wear a face shield or eye protection.**
4.5 an air or electric nibbler;	Demonstrate nibblers and explain advantages of using them.
4.6 an air or electric die grinder;	Demonstrate how to change the different attachments and the care, use and maintenance of both types of die grinders.
4.7 an air or electric high speed cutter;	Demonstrate how to change the different cutters and how to oil and maintain both types. **Wear a face shield when using a high speed cutter.**

Learning Objectives	Notes
4.8 an air file;	Demonstrate how the feather edger is used, how to change the sandpaper disks and how to oil it. Explain how often it should be oiled. Demonstrate and discuss choice of sandpaper. **Disconnect the air or power supply when changing sanding discs.** **Wear a particle mask when using the feather edger.**
4.9 a feather edger;	
4.10 an air ratchet; and	Demonstrate how an air ratchet is used to loosen and tighten nuts and bolts.
4.11 an air impact wrench. (COM, TL)	Demonstrate how an impact wrench is used to remove and install bolts or nuts. **Caution students that wheel nuts are tightened to torque specifications and that they not use an impact wrench as it may cause brake rotors to warp.**

Module 5: Metal Straightening (Core)

Suggested time: 20-30 hours Level: Introductory

Module Overview
Students will practise using the various hand and power tools necessary in autobody operations.

Foundational Objectives
- To evaluate damage to motor vehicles in order to determine corrective work procedures.
- To estimate technical measurements and time for repair.

Common Essential Learnings Foundational Objective
- To choose tools, products and procedures appropriate for the work required. (TL, CCT)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
5.1	To rough the metal to a prescribed contour with the use of an all-purpose dolly. (TL)	Check the contour of the metal using a template. Use the all-purpose dolly and light dinging hammer to raise small low areas.
5.2	To raise the metal to a crown using the template as a pattern.	Check the shape of the contour frequently with both the template and hands for high and low spots. Refer to resource materials for a full description of on dolly and off dolly methods.
5.3	To remove minor low spots in the metal using an all purpose dolly in conjunction with a flat-faced hammer.	
5.4	To examine the metal to detect what a stretched area feels and looks like and how to shrink the area. (CCT, TL)	Shrinking is used to remove any stretched areas on the sheet metal as a result of damage. Refer to resource materials for detailed information.
5.5	To file sheet metal with a steel body file to show up high and low spots in the metal.	Refer to resource materials for detailed information about filing sheet metal.

Module 6: Filling Damage (Core)

Suggested time: 4-6 hours **Level: Introductory**

Module Overview
Students will learn how to fill a damaged area with body filler.

Foundational Objectives
- To understand the appropriate use, care and maintenance of tools used for autobody repair.
- To estimate technical measurements and time for repair.
- To develop skills that may lead to finding and maintaining employment.

Common Essential Learnings Foundational Objective
- To choose tools, products and procedures appropriate for the work required. (TL, CCT)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
6.1	To grind the area with a disc sander. (TL)	Demonstrate how the area to be filled must first be roughed with a disc sander using a 24 grit disc to ensure that the body filler will adhere to the metal properly. **A particle mask, eye and ear protection must be worn.**
6.2	To estimate how much body filler is needed to fill a given area. (NUM)	Discuss how the amount of body filler needed depends on the amount of damage.
6.3	To estimate how much hardener is needed to set a given amount of body filler.	Mix the body filler with the desired amount of hardener using the product manufacter's guidelines (usually a 10 cm puddle of filler to a 3 cm strip of hardener) on a scrap piece of metal or plastic plate. Note that the body filler is all one color when well mixed. (Hardener is coloured to show it has been mixed in to the body filler.) **Rubber gloves must be worn when mixing and applying body fillers.**
6.4	To mix the hardener and the body filler.	
6.5	To spread the body filler over the damaged area. (TL)	Demonstrate how to spread the body filler over the damaged area with a 12 cm putty knife to create a smooth appearance giving it the appearance of a finished panel. Students must wait until the body filler has cured before it is ready to file. This can be done with the finger nail test (e.g., if your finger nail catches and digs into the body filler, it is too soft to file; if your finger nail only marks the body filler and does not dig into the body filler, it is ready to file with a steel file).

	Learning Objectives	Notes
6.6	To file the body filler with a steel file and a sandpaper file to the desired contour.	Demonstrate with a steel file how to cut the body filler close to the contour of the panel. Demonstrate how to cross file to get the true contour of the panel. Demonstrate how to sandpaper file the surface with 40 grit sandpaper until the surface is smooth. Finish filing the area with 80 or 120 grit sandpaper to smooth and cut down the 40 grit scratches. Students will usually have to refill where necessary and refinish to produce a repair that follows the true contour. (CCT) The area is now ready to be refinished.

Module 7: Panel Replacement (Core)

Suggested time: 4-6 hours **Level: Introductory**

Module Overview
Students will learn how to repair rust damage to a flat surface.

Foundational Objectives
- To estimate technical measurements and time for repair.
- To recommend procedures and select appropriate products for use in autobody repair.
- To develop skills that may lead to finding and maintaining employment.

Common Essential Learnings Foundational Objectives
- To recognize and practise safety in all situations encountered. (PSVS)
- To develop the willingness and confidence to make decisions and proceed with necessary repairs. (CCT)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
7.1	To estimate how much of the area should be cut out to do a panel repair. (NUM)	Have a rusted door or fender available with an area that is flat and needs replacing. Help the student estimate how much of the panel is to be cut out so that the repair is free of any rust and so that one is not welding the repair panel to rusted metal. The student should cut out the rusted area with a high speed cutter.
7.2	To make a repair patch to replace the area that was cut out. (TL)	Demonstrate how to measure the area to produce a replacement panel. The patch should overlap the repair area and be put in with a flange joint. The patch is held in place with screws that are removed as welding takes place.
7.3	To weld the patch in place.	Refer to the appropriate Welding Module(s) for guidance as to welding procedure(s).
7.4	To grind the weld and prepare the patch for filling.	
7.5	To fill the area with body filler and file and sand the body filler to the desired contour.	
7.6	To judge when the job is finished and ready for refinishing and painting. (CCT)	Encourage students to examine the patch in good light and to use their sense of touch to determine if the patch is satisfactory.
7.7	To work safely with the tools necessary for the repair. (PSVS)	See Module 1.

Module 8: Contoured Surface Rust Repair (Core)

Suggested time: 4-6 hours **Level: Introductory**

Module Overview
The students will learn how to repair rust damage on a contoured surface.

Foundational Objectives
- To develop procedures for the safe use of tools and equipment.
- To develop skills that may lead to finding and maintaining employment.

Common Essential Learnings Foundational Objectives
- To recognize and practise safety in all situations encountered. (COM)
- To develop the willingness and confidence to make decisions and proceed with necessary repairs. (CCT)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
8.1	To make a repair panel for a contoured surface. (TL)	Use a rusted quarter panel or fender with an area that is contoured but that needs replacing. Help the student estimate how much of the panel is to be cut out so that the repair is free of any rust and so that she/he is not welding the repair panel to rusted metal. (NUM) Cut out the rusted area with a high speed cutter. Measure the area to be replaced and transfer the measurements to a metal panel. Cut the replacement panel. Shape the metal panel to the contour of the area being replaced. The patch should overlap the repair area and be put in with a flange joint. The patch is held in place with screws that are removed as welding takes place. Refer to Welding Module(s) for guidance as to welding procedure(s).
8.2	To weld the patch in place.	See Module 6.
8.3	To grind the weld and prepare the patch for filling.	
8.4	To fill the area with body filler and file and sand the body filler to the desired contour.	
8.5	To judge when the job is finished and ready for refinishing and painting. (CCT)	Encourage students to examine the patch in good light and to use their sense of touch to determine if the patch is satisfactory.
8.6	To work safely with the tools necessary for the repair. (PSVS)	See Module 1.

Module 9A, B, C, D: Work Study Preparation and Follow-up Activities (Optional)

Suggested time: 5-10 hours **Level: Introductory**

Module Overview:
This module will prepare students for a work study placement. Learning objectives include pre-placement information, preparation for interviews and expectations for the workplace experience.

Foundational Objective
- To develop skills that may lead to finding and maintaining employment.

Common Essential Learnings Foundational Objective
- To learn industry-related vocabulary and use it in context. (COM)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
9.1	To be aware of the expectations of each of the partners in the work study component.	In order to establish a successful working relationship with all of the partners involved in the workplace, it is important to define the expectations of each partner. Refer to the Guidelines for Work Study, a section of the *Practical and Applied Arts (PAA) Handbook* for expectations of business, student, teacher monitor and school.
9.2	To determine factors that may affect the student's contributions in the workplace. (CCT)	The students may formulate a list of what they can bring to the workplace and how each factor may impact on their jobs; e.g., school subjects, past experiences, self-concept and personality, needs, values and interests, knowledge skills and attitudes, career goals and plans, etc.
9.3	To understand the importance of building good communication in the workplace.	Ask students to do a self-assessment of skills using the factors in the above list as a guide and explain how these attributes would be valuable to the autobody industry. Try to incorporate the value of communication and teamwork in the discussion. Discuss verbal and non-verbal communication. List some ways in which negative non-verbal communication may be displayed. Encourage students to role play ways of demonstrating effective techniques of verbal communication on the job, when giving or receiving instructions and resolving conflict. Divide the students into groups and role play case studies to show how effective communication may be used to resolve conflict on the job.

Learning Objectives	Notes
9.4 To develop a résumé and cover letter that may be forwarded to a potential employer.	The student will develop a résumé and cover letter using the correct format. Autobody teachers may work with other staff members to ensure résumé and cover letter preparation is taught. The résumé and cover letter is currently suggested *in English Language Arts 20 and 30A*, *Information Processing* and *Work Experience Education 20*. Students should develop the résumé on a computer disk and update the résumé as references are accumulated. If students have already completed the résumé and cover letter in another course, the teacher may do a review and encourage students to update their résumés. Students shall submit a résumé for teacher approval prior to going to the workplace.
9.5 To determine student guidelines in preparation for an interview.	The résumé and cover letter may be used as an introduction to the employer in a workplace site prior to an interview with the student. Working as a class or in groups, students may discuss and list guidelines for an interview. After the students formulate their list, the instructor may add missing items to the list. Outline and describe the **three stages of an interview.** Point out to the students in what stage each of the guidelines previously discussed will be used. The **greeting** involves an introduction between the student and employer. Discuss or demonstrate how this should be done. The **exchange** is where the employer asks a series of questions and engages in a conversation with the student about information on the résumé and other matters relating to the job placement. The **parting** brings the interview to a close. It can be just as important as the greeting. Explain how this may be done.
9.6 To develop procedural guidelines for the work site.	Provide the students with a list of questions frequently asked by employers or ask students to formulate a list in a group and role play the stages of the interview.
9.7 To discuss the post interview.	After the student has completed the interview with the employer, do a follow-up activity. Review the interview with the student using the three stages as points for discussion.

	Learning Objectives	Notes
9.8	To discuss related feedback from the work placement. (COM)	Discuss the following work site issues with students: • transportation • hours of work • absence and tardiness • procedures for conflict resolution • role of the student, teacher and workplace supervisor • dress code • job description • school and employer expectations. Ensure that students understand these issues and how they may be handled. Students provide feedback about work placement regarding: • where they were placed • type of business • duties • most rewarding experience • most difficult situation and how they handled it.
9.9	To relate feedback from the work placement. (CCT)	Students provide feedback about work placement including where they were placed, type of business, duties, most rewarding experience, most difficult situation and how they handled it. It is recommended that each student send a thank you note or card to the employer upon the completion of each work placement.

Module 10A, B, C, D: Work Study (Optional)

Suggested time: 25-50 hours

Module Overview
Students will be placed in an Autobody shop for a time (not less than 25 hours) as determined by an agreement involving the student, the teacher monitor and the employer supervisor. Such a placement must follow the Work Study Guidelines in the *PAA Handbook.*

Foundational Objectives
- To be aware of the careers and opportunities in the field of autobody that exist in Saskatchewan, other provinces, or the world.
- To integrate classroom learning with work-related learning.
- To increase awareness of employability skills as they relate to the work environment.

Common Essential Learnings Foundational Objectives
- To engage in a work study experience and develop entry level workplace skills that may lead to sustainable employment. (PSVS)
- To expand career research beyond the classroom setting. (IL)

Note: Other CELs may be emphasized.

See the Training Plans in Appendix B.

Module 11: Career Opportunities in Autobody (Core)

Suggested time: 2-5 hours

Foundational Objectives

- To develop skills that may lead to finding employment.
- To become aware of the components of a variety of jobs and career opportunities in the autobody trades.
- To understand the prerequisites required and programs offered in various post-secondary institutions.

Common Essential Learnings Foundational Objectives

- To learn industry-related vocabulary and use it in context. (COM)
- To use various means to access and share information regarding post-secondary training and career opportunities in the autobody trades. (COM)

Note: Other CELs may be emphasized.

	Learning 0bjectives	Notes
11.1	To explore apprenticeship trades. (COM)	Students will define apprenticeship. Have students generate a list of apprenticeship trades. Outline the advantages and disadvantages of pursuing a career through apprenticeship.
11.2	To explore how the high school curriculum articulates with Level One of apprenticeship.	Show students the training plan(s). Explain how completing all the objectives and covering the appropriate modules may prepare them to challenge the Level One exam.
11.3	To list career opportunities related to the autobody trade.	Students will list different career opportunities in the autobody trade. Encourage students to use a variety of sources for information: guidance counsellors, career software packages, personal interviews, government resources, websites, etc. For example, check the website at sasknetwork.gov.sk.ca.
11.4	To identify personal skills and interests and link them to careers. (PSVS, IL)	Ask each student to create an inventory of activities and interests. Once students have determined an area of interest related to the autobody trade, students should research career possibilities using available resources in the library, in the community and on the Internet.

Learning 0bjectives	Notes
11.5 To determine skills and interests that enhance career choices.	From the list created in Learning Objective 11.3, ask the students to select two choices of possible careers for further research. Investigate the career choices including: • description of work duties • what personal qualities individuals should possess • process to become certified within the trade/career • length of education and training • school locations • cost of education and upgrading • trends within the business or career • the best and worst parts of the job • beginning salary • opportunities for advancement. If a student engages in a work study, he or she may investigate career links within the community for possible work study placements. The student may conduct an interview with the professional/tradesperson as part of his or her experience.

Module 12: Estimating Repair Costs (Optional)

Suggested time: 10-20 hours **Level: Advanced**

Module Overview
Students will learn the procedures for identifying necessary repairs. They will use flat rate manuals for labour costs and parts manuals to price parts. Additional factors such as towing, shop supplies, applicable taxes, new or used parts and parts depreciation will be explained and included in estimates.

Foundational Objectives
- To evaluate damage to motor vehicles in order to determine corrective work procedures.
- To estimate technical measurements and time for repair.
- To recommend procedures and select appropriate products for use in autobody repair.

Common Essential Learnings Foundational Objectives
- To recognize and practise safety in all situations encountered. (COM)
- To explore numeracy as it applies to the autobody industry. (NUM)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
12.1 To identify the role of insurance in the industry.	Discuss terms such as: • Insurance • Liability • Waiver • write-off • premium • deductible • package policy, etc.
12.2 To estimate damage repair costs. (NUM, TL)	Record preliminary information such as: • the name of the owner • insurance coverage available • who will pay the bill • plate number • mileage • make • model • year • serial number • body style • date of the estimate The written estimate should include: a detailed description of all labour operations that must be performed; complete list of parts and materials needed for the repair; and a total price including labour, parts, materials and taxes. **Before any work is done, the vehicle owner, the insurance company and the shop performing the repair must authorize the work to be done.**

Learning Objectives	Notes
	In Saskatchewan, most vehicles are appraised by Saskatchewan Government Insurance (SGI) and a printed estimate is provided to the owner of the vehicle. The owner then takes the estimate to an autobody shop. The owner must be aware of the portion of the bill for which he/she may be responsible. **If, during the repair, damage that was not included in the original estimate is found, do not continue with the work until authorization for the additional repairs has been obtained from all parties.** Sometimes a decision to replace rather than repair is more cost efficient. Estimates must include allowance for additional time for: • setting up the vehicle on a frame-straightening machine • accessing (pushing, pulling or cutting) damaged parts • straightening and aligning parts • removing undercoating • repairing corrosion to adjacent parts • removing parts that are encrusted with rust • drilling mounting holes • filling unneeded holes in parts • repairing a replacement part • doing suspension or wheel alignment • removing damaged glass • applying sound-deadening material • restoring corrosion protection • removing and replacing accessories (trailer hitch, sun roof, roof rack, mirrors, fender flares, etc.).
12.3 To determine the extent of the damage. (NUM, CCT)	Most appraisers start from the outside of the vehicle and work inward, listing everything by section that is bent, broken, or missing. Conditions to look for include: • direct body damage at point of impact • improper alignment of body parts • hidden structural damage to outer body panels (cracked undercoat or sealer indicates structural damage) • indirect damage from shock wave traveling through parts • mechanical damage to engine, drive train, suspension, etc. • interior damage (air bags deployed, dash damage, etc.) • bent wheels • damaged tires • broken glass • broken mirrors.

Learning Objectives	Notes
12.4 To identify conditions that make the vehicle a total loss. (CCT)	Total loss occurs when the cost of repairing the vehicle exceeds the market value of the vehicle. Owners may wish to have a third party assess the market value of their vehicles if they do not agree with the value suggested by the insurer. Consider a work study placement or a field trip to an autobody shop or a placement with a mentor working as an insurance damage estimator, in order to see several appraisals done. Encourage career development discussions.

Module 13: Automobile Refinishing and Repainting (Optional)

Suggested time: 35-40 hours **Level: Introductory**

Module Overview
Students will learn the procedures for preparing and painting automobile surfaces. Topics include refinishing, sandpapers, feather edging, paint removal, thinners and reducers, metal preparations, paint guns, air compressors, regulators, air lines, spray booths, using a spray gun, types of primers and uses, types of sealers and uses, types of paint and uses and masking and removal of masking.

Foundational Objectives
- To understand the appropriate use, care and maintenance of tools used for autobody repair.
- To estimate technical measurements, recommend procedures and select appropriate products for use in autobody repair.
- To handle, use and dispose of materials safely.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)
- To understand and practise the safe handling of hazardous materials. (TL)
- To develop the willingness and confidence to make decisions and proceed with necessary repairs. (IL)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
13.1 To understand the steps required to refinish and paint part of an automobile. (COM, TL)	Review the steps involved in refinishing an automobile and explain the many procedures and products as follows: • wash the car to see any imperfections • clean the inside of the car • clean the surface of the car with a quality wax and grease remover (paint products will not adhere to wax or grease) • feather edge all broken edges on the painted surface (e.g., stone chips, scratches, areas where body work was done and all edges on the automobile, around glass areas, etc.) • sand the whole automobile • rough mask the automobile where it is to be primed • metal prep all bare metal areas • apply vinyl wash primer to all bare metal areas • prime all bare metal areas, feather edged areas and body work areas • body putty any scratches or marks that the primer will not fill • block sand body work and primed areas to get rid of waves in the body work • reprime any area that needs it (e.g., waves, bare metal, etc.) • sand the whole car and remove all masking • blow off all dust inside and out until clean • mask the whole car • wet down the paint booth and move the car in; blow dust off the car again • wipe the whole car with a high quality wash and wipe (wipe with a tack rag to remove any lint) • apply colour coats.

Learning Objectives		Notes
13.2	To choose the correct type and grit of sandpaper for the job.	Discuss: grit number, wet and dry sandpaper, direction to sand an automobile, grit of sand paper to start with and grit to end with. Refer to resource materials for more detail. Sandpaper is used to rough up the surface of the paint so the top coats will have something to adhere to and to sand down the primer so that it will fill any scratches in the surface. An automobile is always sanded back to front or horizontal to the ground. Start with 320 grit to cut down the surface so the primer will adhere.
13.3	To remove paint from a surface. (TL)	Explain that the grit of sandpaper for final sanding depends on what type of paint is being used. For example, if the paint used is acrylic enamel, 400 grit to 600 grit should be used so as not to create any sand scratches. Color tends to magnify any imperfection under it. Therefore, if black or a dark colour is used, 600 grit should be used instead of 400 grit. Removal of paint can be accomplished with a paint remover, by sandblasting, or by grinding. Demonstrate how paint remover is used safely. **Rubber gloves, safety glasses and a respirator must be worn.**
13.4	To feather edge imperfections in a painted surface. (TL)	Demonstrate how the sandblaster works and how it removes paint from the surface by shooting it with sand at high pressure. The feather edger is used to taper the broken edges of paint so they cannot be seen or felt. Refer to resource materials for detailed information about correct use.
13.5	To understand the use of reducers and thinners.	Reducers and thinners are used to thin paint to spraying viscosity and for cleaning up paint materials and equipment. A reducer is a petroleum product used to thin enamels and polyurethanes to the appropriate spraying viscosity. Thinners are used to thin lacquers to spraying viscosity and for cleaning paint materials and spraying equipment. Refer to resource materials and manufacturer's information sheets for detailed information. (IL)

Learning Objectives		Notes
13.6	To understand the use of metal preps.	Metal prep is a phosphoric acid used to clean and etch bare metal of flash rusting and to insure that no rust will develop before applying vinyl wash primer. Refer to resource materials and manufacturer's information sheets for detailed information.

13.7 To understand how a paint gun works and the various types that are in use in body shops. (TL, COM)	Use a diagram to discuss the parts of a spray gun (gun body, air cap, air horns, fluid tip, needle valve and packing, fluid adjustment, spreader adjustment, trigger, air valve, fluid inlet, air inlet) and how they work. Discuss the different types of spray guns on the market (suction feed, pressure feed, gravity feed and HVLP). Demonstrate the safe use of a suction feed spray gun and spraying technique. Refer to resource materials for detailed information.
13.8 To be knowledgeable about the use of air compressors, air hoses and air regulators (transformers). (TL)	The student will become familiar with and be able to identify the major parts of the compressor and understand air pressure drop in relation to the length of line used. It is important to know that the byproduct of compression is water that must be drained off regularly so as not to get into the air tools or paint gun. If that is not done, the results can be costly in repairs to tools and a ruined paint job. Refer to resource materials for more information. Make arrangements to use a local autobody shop if the equipment is not available in the school. Community projects or work study are possibilities.
13.9 To describe the types of spray booths used and their advantages.	A spray booth is used to isolate the vehicle while painting it. It provides a clean area in which to paint an automobile and provides a safe area to contain the overspray and paint fumes that are explosive and toxic. See resource materials for descriptions of the various types of spray booths.

Learning Objectives	Notes
13.10 To understand the use of primer and spray primer on the surfaces to be refinished and painted.	Discuss the many different types of primer on the market today. It is not necessary to have used them. Vinyl wash primer is sprayed on bare metal to promote adhesion for the primer coat that follows. Primer is used to fill scratches and minor imperfections in the surface and to give the paint something to adhere to.
13.11 To understand the use of sealers and how to apply them.	Demonstrate how to spray primer. Primer is applied only on a surface that is clean, dry and free of oil and wax. Explain the functions of sealers. Sealer is used to: • make the car one colour (easier to cover or hide the undercoats) • reduce sand scratch swelling (fresh paint tends to swell sand scratches) • provide even holdout so the new paint will not sink into the old substrate. Sealers are always used immediately under the top coat only. Explain the functions of body putty. Body putty is used to fill scratches and imperfections that primer cannot fill. Outline two main types of body putty: • air dry (It dries at room temperature; sands and fills very well, but **should not be used under two part paint and putty.)** • two part putty (This type of putty needs a hardener to cure. It dries very fast and sands and fills extremely well. It should only be used under two part paint and putty.).
13.12 To be knowledgeable about the different types of automotive paints on the market and their uses. (TL)	Types of automotive paints include: • Acrylic lacquer (seldom used in the automotive industry). • Acrylic enamel (uses a hardener to cure and dry and an enamel reducer to thin to spraying viscosity. It needs 3 coats to cover and shine well but dries in about 24 hours. It is very durable, stands up to weather elements and is easy to maintain). • Polyurethane (uses a hardener to cure and dry; uses a reducer to thin to spraying viscosity; dries in about 10 hours; needs only two coats to cover and shine well; often called the wet look; is very durable; stands up to weather elements; and is easy to maintain). • Base coat/Clear coat. Base coat is used as the colour; clear coat is used to cover the base and give it a high durable shine. **NOTE: Wear a fresh air mask when applying any of the above paint products.** When demonstrating painting, the teacher should use enamel or lacquer products, as they are reasonable in price and yet give the student practice with the spray gun technique.

Learning Objectives	Notes
13.13 To mask for painting part or all of a vehicle and to remove masking upon completion of the painting.	Masking is used to cover anything that is not to be painted. The best method used in masking is the paper-tape method. It does not collect dust and dirt easily and is easy to keep clean.

	(TL)	Demonstrate how to make a straight line with masking tape and to cover only the trim piece to be protected. Over-masking or under-masking can ruin a paint job. Once the automobile has been painted and is dry, the masking shall be removed slowly and at right angles to the surface that was painted so as not to damage or pull off the paint.
13.14	To prepare the different types of automotive paints for use.	Mix various types of paints according to manufacturers instructions. When mixing paints, students must wear rubber gloves, a respirator and work in a well-ventilated area.
13.15	To apply the different types of automotive paints.	The students must learn to regulate the air pressures for application. The student must also be able to set the paint gun. Note: students must wear proper attire and a respirator for painting.

Module 14: Advanced Automotive Structural Design (Core)

Suggested time: 15-25 hours **Level: Intermediate**

Module Overview
Students will review automobile body construction types. Students will identify body types, construction, passenger/driver side, front section components, centre section components, rear section components and bumper construction. Students will identify the appropriate automotive manual and use the manual to find part numbers, prices, installation time and procedures. It is recommended that students complete Module 2: Auto Design before taking this module.

Foundational Objectives
- To understand the various types of body construction and components of motor vehicles.
- To estimate technical measurements and time for repair.
- To recommend procedures and select appropriate products for use in autobody repair.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
To demonstrate an understanding of:	
14.1 body types and construction;	See Module 2 Auto Design. (TL)
14.2 left/right side of vehicles;	The left side of North American vehicles is sometimes referred to as the driver side and the right as the passenger side. Vehicles made in Britain may be right-hand drive, which can result in confusion.
14.3 the front section components of a vehicle;	Front section components include: • cowl and related parts • shock towers • radiator and supports • fire wall • fenders • hood • etc.
14.4 the centre section components;	Centre section components include: • floor pan • pillars • rocker panels • rear shelf • doors • glass • hinges • side impact beam • roof panel • instrument panel • dash • etc.

Learning Objectives	Notes
14.5 the rear section components;	Rear section components include: • trunk floor • trunk lid • ¼ panels • lower rear panels • rear shock towers • inner wheel housings • upper body panels • etc.
14.6 differences between body construction types;	See resource materials for detailed information.
14.7 plastic bumpers and their construction. (COM, TL)	Discuss plastic bumpers, their construction and safety features. Many newer vehicles will have air bags sensors. **Air bag systems can be dangerous if tampered with or set off accidentally.** See Module 18.
14.8 To use shop and Mitchell manuals for reference.	Shop and Mitchell manuals have information such as part numbers, prices, flat rate installation time, part location and installation procedures. (IL)

Module 15: Advanced Hand and Power Tools (Core)

Suggested time: 8-12 hours **Level: Intermediate**

Module Overview
Students will review basic autobody tools and learn the maintenance and safe use of more advanced air, hydraulic and electric tools. It is recommended that students have completed Module 3: Hand Tools and Module 4: Power Tools.

Foundational Objectives
- To understand the appropriate use, care and maintenance of tools used for autobody repair.
- To understand and apply safe work practices in the autobody environment.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)
- To choose tools, products and procedures appropriate for the work required. (TL, CCT)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
15.1	To follow safe procedures when using autobody hand tools. (TL, COM)	See Module 3: Hand Tools. See Module 4: Power Tools.
15.2	To follow safe procedures when using common air and electrical power tools. (TL, COM)	Introduce the following: • Pneumatic chisel used to cut metal sections out of a panel. • Air ratchet wrenches used to remove nuts or bolts. • Air impact wrenches used to remove heavy nuts or bolts. • Air polishers used to polish paint and clear coats to a high luster. Great care must be used when using polish as one can wear right through the paint. • Air sand blaster used to remove old paint and rust. **A hood and respirator should be worn when sand blasting**. • Blow gun used to blow dust and dirt from a surface. • Air metal shears used to cut sheet metal. • Air power riveter used to set a pop rivet. • Floor jacks. Show students the safe points on a vehicle to place the jack. Note that hydraulic jacks may leak. Safety stands are to be used at all times. • Safety stands. Demonstrate placement. • Hydraulic rams and attachments used to straighten damage. **Emphasize that great care must be taken to secure chains, etc. as the forces needed to straighten are considerable.**

Module 16: Advanced Metal Repair (Core)

Suggested time: 15-25 hours **Level: Intermediate**

Module Overview
Students will review basic autobody metal repair. They will then assess damage. Using dent pullers, suction cups and hydraulic tools, they will straighten metal panels. Students will learn to use body filler, lead and fiberglass products to produce smooth contours on vehicle panels. It is recommended that students have completed Module 5: Metal Straightening and Module 6: Filling Damage.

Foundational Objectives
- To understand the appropriate use, care and maintenance of tools used for autobody repair.
- To develop procedures for the safe use of tools and equipment.
- To estimate technical measurements and time for repair and recommend repair procedures.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)
- To understand and practise the safe handling of hazardous materials. (TL)
- To choose tools, products and procedures appropriate for the work required. (TL, CCT)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
16.1	To identify and use hand tools and common power tools used for autobody repair and to perform basic metal straightening procedures. (TL, COM)	See Module 3: Hand Tools, Module 4: Power Tools, Module 5: Metal Straightening and Module 6: Filling Damage. Review body hammers, on dolly blows, off dolly blows, pulling tools, picking tools, cutting tools, checking contours, shrinking, etc.
16.2	To use body fillers.	Review using body fillers, mixing body fillers and filling to contour.
16.3	To identify the direct and indirect damage to a panel. (TL, CCT)	Direct damage is the damage in the impact area. Indirect damage is the damage spreading away from the point of impact. It is important to identify all damage in order to execute a repair in correct order and to estimate accurately the cost of repair. Damage is always removed in the reverse order from which it occurred. Work from the least damage to the worst damage. Working in this sequence, materials will begin to flex back to their original shape. Straightening should not be attempted until glass, trim, etc. has been removed. Major damage may require the use of one or more of the following: picking tools, dent pullers, body spoons, suction cups and hydraulic rams. Be sure that students have the opportunity to use all of these tools. Use a community project or a work study.

Module 17: Panel Alignment (Core)

Suggested time: 15 hours **Level: Intermediate**

Module Overview
Complete panels often need to be replaced in order to repair a vehicle. This module deals with the alignment of the hood, doors, quarter panel and trunk lid of vehicles.

Foundational Objectives
- To evaluate damage to motor vehicles in order to determine corrective work procedures.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)
- To choose tools, products and procedures appropriate for the work required. (TL)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
To replace and align:	
17.1 a hood on an automobile;	Refer to reference materials.
17.2 a door on an automobile;	
17.3 a trunk lid on an automobile;	
17.4 a fender on an automobile;	Consult a manual.
17.5 a quarter panel on an automobile. (COM, TL)	This is a major panel that is welded in place. Refer to resource materials for detailed directions.

Module 18: Glass Removal and Installation (Optional)

Suggested time: 10-20 hours **Level: Advanced**

Module Overview
Students will gain knowledge about types of glass, glass removal and replacement and the safe disposal of materials.

Foundational Objectives
- To handle, use and dispose of materials safely.
- To recommend procedures and select appropriate products for use in autobody repair.

Common Essential Learnings Foundational Objectives
- To understand and practise the safe handling of hazardous materials. (TL)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
18.1 To identify types of glass and retaining systems used in the automobile industry.	Tempered glass is heated and then cooled rapidly. This results in glass that has great strength and that breaks into small particles when broken. Laminated glass is made of two layers of glass that have a polyurethane layer between them. This is usually used for windshields. Impact results in cracks but the polyurethane layer holds the pieces of glass together so that occupants of the vehicle are not subjected to flying glass particles. Retaining systems vary with make, model and year of vehicles. Manuals should be consulted to determine the correct procedure for removal and replacement. Windshields are an integral part of the roof structure of modern vehicles and must be installed to specification in order to perform properly.
18.2 To understand the safe procedures for handling and disposing of glass and glass installation products. (TL, PSVS)	**Gloves, long sleeved apparel and eye protection are necessary. Some installation materials may be hazardous and labels should be read to determine precautions that need to be taken. Clean-up and disposal of broken glass requires safe procedures.** Installation varies. Refer to reference materials before preceeding. (TL)

Learning Objectives		Notes
18.3	To remove and replace front and back windshields on an automobile.	It is recommended that following these procedures, vehicles should remain overnight before being moved. Any movement may break the bond between structure and windshield. Non-moving side glass, can be retained in a variety of ways. Consult a manual when in doubt.
18.4	To replace side glass on an automobile. (TL, CCT)	When ordering side glass, be careful to note the tint. Manufacturers may vary tint by model and some windows have been tinted with after-market products. Refer to manuals for removal procedures.

Module 19: Air Bags (Optional)

Suggested time: 4-6 hours **Level: Advanced**

Module Overview
Students will learn about air bags and associated sensors through observation and discussion.

Note: It should be stressed that the students should only become familiar with air bags and not actually disassemble or remove air bag components. Only a technician, who is certified to diagnose and repair air bag systems, should conduct needed repairs.

No work should be done on vehicles with intact air bags until they have been deactivated by certified technicians.

Foundational Objectives
- To understand and apply safe work practices in the autobody environment.
- To evaluate damage to motor vehicles in order to determine corrective work procedures.

Common Essential Learnings Foundational Objective
- To understand the safety features of auto design. (TL)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
19.1 To identify and explain the location and function of the components of an air bag system. (TL, COM)	Some vehicles have air bags in the steering wheel only. Others have air bags for both the driver and passenger. Some vehicles have side impact air bags. Some have air bags in the headrests. Some air bags can be deactivated by the driver if an infant seat is being used on the front seat. If a rear seat is available, the infant seat should always be placed on the rear seat. Generally, seats should be as far away from the dash or steering wheel as is practical. Air bags are not a substitute for seat belts. Impact sensors detect a collision. "Safing" and arming sensors ensure the deployment of the air bag when the collision is severe enough to warrant it. Sensors detect rapid deceleration. Some have a metal ball that is propelled forward when a collision occurs. Others have a weight attached to a spring with the weight being propelled forward during a collision. **When repairing body damage on vehicles equipped with air bags, the system must be deactivated. Refer to shop manuals for the appropriate procedure.** **Disconnecting the battery is not sufficient. "Safing" or dis-arming the air bag sensors must be done before the vehicle is worked on or any repair work begins.** **Important: Students should not work on air bag systems. Only certified technicians should diagnose and repair air bag systems.**

Module 20: Automobile Detailing (Optional)

Suggested time: 10-20 hours **Level: Intermediate**

Module Overview
Students will learn skills associated with restoring and enhancing exterior finishes for automobiles.

Foundational Objectives
- To recommend procedures and select appropriate products for use in autobody repair.
- To develop skills that may lead to finding and maintaining employment.

Common Essential Learnings Foundational Objectives
- To choose tools, products and procedures appropriate for the work required. (TL, CCT)
- To understand the advantages of using environment-friendly products. (PSVS)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
20.1 To identify and use products to restore and enhance the exterior finish of vehicles. (TL, COM)	Students should understand the hazards and environmental concerns associated with cleaning products. Students should detail paint, glass, vinyl, rubber and engine parts. It is sometimes necessary to remove trim before enhancing a surface. Clean the engine compartment first. Some areas may require the application of paint or coatings. Only paint designated for use on an auto engine should be used. Any leaks should be repaired and an oil change completed. All fluid levels should be inspected and topped up if necessary. The air filter should be replaced. The battery should be removed and the battery tray and battery terminals cleaned. Wash the exterior of the vehicle. Inspect the paint for surface flaws that can be corrected without spray painting. Spot repair stone chips, minor rust, etc. and then polish the paint surface using a cleaner or rubbing compound. Take great care if a power polisher is used so as not to work through the layer of paint at the edges where the paint is thinnest. Wax should be applied to the renewed finish. Inspect the glass and have any stone chips repaired. Clean any chrome with an appropriate product. Inspect the lights and replace bulbs as necessary. Inspect the headlight and turn signal glass and replace if necessary. Inspect the tires. Replace them if they are badly worn. Many dealerships replace all four tires in order that all the tires are the same make. Clean tires last.

Learning Objectives		Notes
20.2	To install a trim or accessory according to standard practice. (TL)	Dealers often enhance a vehicle by applying after-market products such as glass tints, decals/pin strips, or moulding. Sometimes moulding is placed down the side of a car to conceal small parking lot dints or to allow the lower part of the vehicle to be painted in a two tone scheme.
20.3	To detail the interior of a vehicle. (TL)	Begin by vacuuming the vehicle. Inspect the interior and remove any after-market attachments that may be worn or loose. If the vehicle has an after-market radio, make sure the installation is rattle free. The radio should not have gaps around it and there should be no wires hanging down under the dash. Cleaners are available for: leather, cloth, vinyl, rubber, plastic and polyurethane foam. Empty the glove and other storage compartments. Clean and return only the owner's manual to the storage area. For a first-rate detailing job, the seats and some interior trim such as the arm rests may need to be removed. Inspect the carpet and seats and use spot remover if necessary. Identify the nature of the stain (soil, grease, chocolate, oil, candy, road tar, or blood) to select a cleaning product. Clean the seats and carpets. Pay particular attention to creases. Any rips or tears should be repaired. Vinyl repair products can be used to repair cracks or splits. Clean the dash and door side panels. Empty all ash trays and clean them. The steering wheel, seat belts and door handles require special attention. Inspect and clean the headliner and sun visors. Inspect the door and window weather stripping. Repair if necessary. Clean the glass exterior and interior. Clean the door frames. Clean the gas flap interior. Remove everything from the trunk and clean with suitable cleaning products. Return the spare and jack to the trunk and store properly. Detailing involves being very observant and exacting. It is not unusual to use a small tool to clean a groove. Discuss entrepreneurial opportunities for students.

Module 21: Trim Removal and Installation (Core)

Suggested time: 4-6 hours **Level: Intermediate**

Module Overview
Students learn to remove and replace trim without damaging it.

Foundational Objectives

- To evaluate damage to motor vehicles in order to determine corrective work procedures.
- To develop skills that may lead to finding and maintaining employment.

Common Essential Learnings Foundational Objectives

- To choose tools, products and procedures appropriate for the work required. (TL)
- To understand the aesthetic features of auto design. (PSVS)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
21.1	To identify interior and exterior trim materials and the various fastening systems used to attach them and to describe the process for removing the trim. (COM, TL)	Fasteners include: clips, adhesives and screws. **Caution students about the hazards of working with trim and the adhesives and cleaners associated with them. Read labels and adhere to safe-use guidelines.**
21.2	To remove vinyl, overlays and decals.	
21.3	To remove weather stripping around a door and install new material.	Demonstrate how to test the seal and adjust the door as necessary.
21.4	To suggest and install an after-market trim enhancement. (PSVS)	Trim accessories include items such as: mirrors, luggage racks, lights, bras, locks, etc.
21.5	To adjust and service trim accessories.	

Module 22: Surface Preparation (Core)

Suggested time: 20-30 hours **Level: Intermediate**

Module Overview
Students will practise skills associated with surface preparation.

Foundational Objectives
- To evaluate damage to motor vehicles in order to determine corrective work procedures.
- To recommend procedures and select appropriate products for use in autobody repair.

Common Essential Learnings Foundational Objectives
- To understand and practise the safe handling of hazardous materials. (TL)
- To choose tools, products and procedures appropriate for the work required. (TL, CCT)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
22.1 To identify types of metal and treatments and to choose materials and tools to be used with each. (COM, TL)	Before preparing a surface, the material needs to be identified. Automobile manufacturers use steel, aluminum, galvanized metal, anodized aluminum, stainless steel, etc. When doing spot repairs, the materials used should match adjacent panels.
22.2 To identify various types of plastic and choose compatible materials and tools.	Plastics include: • flexible plastic • rigid plastic • interior and exterior plastic. Cleaners, adhesives, primers, etc. must be matched to the plastic.
22.3 To perform spot repair and surface preparation for metal or plastic surfaces. (CCT, TL)	This may involve sanding, using a compound on a surface, spot blasting, chemical treatment, or using bonding agents or cleaners. It is important that students understand the properties of chemicals and primers. Explain why a product is used, not just which product is used. **Stress reading labels before using products. Be aware of label warnings and their meaning. When in doubt, check with suppliers.**

Module 23: Plastic Repair (Optional)

Suggested time: 20-30 hours **Level: Advanced**

Module Overview
Students will practise skills associated with plastic repair.

Foundational Objectives
- To recommend procedures and select appropriate products for use in autobody repair.
- To handle, use and dispose of materials safely.

Common Essential Learnings Foundational Objective
- To recognize and practise safety in all situations encountered. (COM)

Note: Other CELs may be emphasized.

	Learning Objectives	Notes
23.1	To understand how plastic is made. (TL, COM)	See reference materials.
23.2	To discuss the role of plastic in the manufacturing of automobiles.	Plastic is used for bumpers, fenders, doors, dash, etc. Weight reduction is possible because of the use of plastic. Outline some advantages and disadvantages of using plastic.
23.3	To identify the two types of plastics used in automotive construction.	Discuss thermoplastic and thermosetting plastics.
23.4	To determine when a bumper repair is needed.	
23.5	To identify the types used in bumper construction. (TL)	See reference materials for information on identification and repair.
23.6	To complete a satisfactory repair. (TL, CCT)	Safety rules when repairing plastics: • Use an approved mask and gloves, as resins and related ingredients can irritate your skin and stomach lining as curing agents or hardeners produce harmful vapours. • Read all label instructions and warnings carefully. • Wear an approved dust mask when cutting, sanding, or grinding plastic material. • **Wear rubber gloves and safety glasses when working with fiberglass.** • Work in a well-ventilated area.

Module 24: Buying and Selling a Vehicle (Optional)

Suggested time: 10-20 hours **Level: Advanced**

Module Overview
Students will learn skills required to make informed decisions about buying and selling vehicles.

Note: This module complements an optional module in the PAA *Life Transitions Curriculum Guidelines*. When both Autobody and Life Transitions are offered in the same school, teachers should collaborate.

Foundational Objectives
- To evaluate a vehicle in terms of suitability and condition.
- To understand the legal implications of buying and selling vehicles.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)
- To understand and estimate vehicle value. (NUM)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
24.1 To select an appropriate vehicle to meet specific needs/wants. (PVSV)	Discuss types of vehicles such as economy, sedan, sports, luxury, trucks and sports utility. Discuss advantages/disadvantages of each type. (COM) Other considerations include: • cost of insurance and registration • yearly operating costs • resale value • depreciation • service • etc. Check sources for purchasing a vehicle: • dealerships (check reputation) • car lots (check warranty) • private sales (check newspaper ads, etc.) • auctions • repossessions (check banks, etc.) • salvage (How much will it cost to repair?) • friends (They may know of a vehicle for sale.)

Learning Objectives	Notes
24.2 To evaluate a vehicle's condition. (TL, CCT)	Always examine the vehicle in daylight, never at night or in the evening. Walk around the vehicle and make notes recording any problems. Things to look for include: • paint condition (check for corrosion, stone ships, oxidation, etc.) • body (check for rust, dents, body work, door alignment, etc.) • tires (check for even wear and tread depth) • exterior trim; glass (check for stone chips, etc.) • interior (check cleanliness, remove seat covers to see original upholstery) • engine (check oil leaks, battery posts, battery age, oil, air cleaner, electrical wiring, etc.) • trunk (check spare tire, jack, rust, weather seal) • accessories (check to be sure they all work) Ask about work that has been done on the vehicle. Are there any recent invoices? If buying from a dealer, ask about warranty, etc. During the test drive: • Start the engine. Does it start easily? Lift the hood and listen for unusual noises. • Check the automatic transmission fluid level while the engine is running. • Is the oil dirty or discolored? • Look under the vehicle for leaks; check the exhaust system for leaks. • Have the owner or salesperson drive the vehicle while you listen for unusual noises and then drive the vehicle yourself. (Does the engine hesitate? How do the brakes feel? Does the car steer well? Does the transmission shift properly? Are there any squeaks or rattles? How does the vehicle feel on rough roads? Is there excessive wind noise? Are there clicking sounds when you turn hard right or left?). • Have a reputable mechanic inspect the vehicle and give you a written estimate for any repairs deemed necessary.
24.3 To understand the legal implications of purchasing a vehicle.	Does the seller own the vehicle? Check the Garage Liens Registry to determine if there are any liens or loans registered against the vehicle. (Dealers will have performed this function.) Has the vehicle been registered in Saskatchewan? If not, the buyer has to pay the provincial sales tax when registering the vehicle. Get a receipt from the seller. This is your "Bill of Sale." You must have one to register the vehicle. In Saskatchewan, the vehicle registration has a tear off portion that is recognized as a Bill of Sale.

	Learning Objectives	Notes
24.4	To consider the options of purchasing or leasing a vehicle. (NUM)	Most dealers provide information about leasing a vehicle. Most lending institutions will provide consumer information about financing a vehicle. Students may do a comparison between buying and leasing a vehicle. Several Internet sites or computer software programs may be used to do cost comparisons. Students should be encouraged to determine what the cost of the vehicle, including the financing costs, will be. People often compare monthly payments, but do not look at the total cost.
24.5	To be knowledgeable about selling a vehicle.	Prepare the vehicle for sale. See Module 19: Automobile Detailing. Outline guidelines for selling a vehicle. (CCT)

Module 25: Automotive Refinishing and Painting (Optional)

Suggested time: 45-55 hours **Level: Advanced**

Module Overview
Students will learn the procedures leading to the refinishing of a total automotive body. The vehicle to be refinished will be examined and a plan developed for repairing all corrosion, panel dents, stone chips, etc. After all damage has been repaired and the car is ready for painting, the vehicle will be refurbished using appropriate automotive paint products. It is recommended that the student has completed Module 22: Surface Preparation.

Foundational Objectives
- To handle, use and dispose of materials safely.
- To recommend procedures and select appropriate products for use in autobody repair.

Common Essential Learnings Foundational Objectives
- To learn industry-related vocabulary and use it in context. (COM)
- To demonstrate an attention to detail and standard of craftsmanship expected in the industry. (TL, PSVS)

Note: Other CELs may be emphasized.

Learning Objectives	Notes
25.1 To identify corrosion damage and its cause.	Three factors lead to corrosion: exposed metal, moisture and oxygen.
25.2 To identify and apply products that protect against corrosion. (TL, CCT)	Three types of corrosion protection are used: • galvanized or zinc coating • anti-corrosion compounds (petroleum-based or wax-based) • paint The sequence for finishing used by the major automotive manufacturers is: • use galvanized metal • clean and rinse using appropriate chemicals • apply conversion coating • apply epoxy primer • apply a second seal • apply primer-surfacer • apply colour coats • bake colour coats • apply anti-corrosion products. Procedures will include: • metal treatment • wax and grease removers • metal conditioners (Phosphoric acid chemically cleans the metal, removes corrosion and helps prevent further corrosion.) • conversion coating (Spray on surface; leave two to five minutes; rinse with water; wipe dry.) • etch primer (One to two coats. Most manufacturers do not recommend the use of metal conditioners or corrosion coating before application.)

Learning Objectives	Notes
	• two part epoxy primer. (Follow manufacturer's recommendations on mixing, reducing and spraying.) • sealer. • undercoating. (optional)

See Module 6 and 8.

25.3 To perform basic surface preparations.

See Module 13.

25.4 To identify the steps for preparing an automobile for painting. (TL, COM)

25.5 To understand the uses of primer and paint.

Discuss parts of the spray gun, spraying technique, safety, air lines, compressors and advantages/disadvantages of a suction feed gun.

25.6 To use and maintain a suction feed spray gun.

Demonstrate measuring thinners, reducers and hardeners.

There are three methods of measuring viscosity of paint:

- Ford cup (This is very accurate but expensive.)
- Zahn cup (A plastic cup with a hole in the bottom. The cup is filled and the time it takes for the paint to flow out the bottom is recorded.)
- Measuring stick. (Each paint manufacturing company has its own easy-to-use stick. Students may practise with water until they are comfortable with the process.).

Thinners and reducers come in three types: slow dry for hot conditions (24 degrees C); medium dry (20 degrees C to 23 degrees C); and fast dry (19 degrees C or below). **Temperatures may vary with different manufacturers**.

25.7 To thin primer to the correct viscosity for spraying and to add the appropriate amount of hardener to the primer. (NUM)

Temperature is important as it affects how the paint atomizes and how it spreads on the surface being painted.

All paints must be strained before being put through the paint gun.

Notes

Demonstrate the use of ratios to reduce paints.

Refer to manufacturer's information sheets for recommended ratios for the product being used. (IL)

Learning Objectives

Paint that has had hardener or a catalyst added to it will harden in the paint gun.

25.8 To adjust the amount and choose the type of solvent appropriate for the temperature in the shop. (TL, NUM)

Acrylic enamel has a pot life of 3 to 8 hours.

High solid primer has a pot life of about 3 hours.

25.9 To identify the pot life of paint or primer.

As soon as a student is finished applying a product, the gun should be thoroughly cleaned with a solvent inside and out. Failure to do so may ruin the paint gun or at the very least result in a long, tedious cleaning job.

Discuss pattern problems and refer to the paint gun manufacturer's information sheet for correction procedure.

25.10 To identify spray pattern problems, explain the problem and take corrective action. (CCT, TL, COM)

Problems that may be encountered include:

- cracking
- checking
- allegatoring
- pin holing
- lifting
- wrinkling
- peeling
- blushing
- runs
- sags
- crazing dirt in the finished paint
- bleeding
- acid spotting
- blistering
- dulled finish
- fish eyes
- feather edge splitting
- orange peel
- etc.

See reference materials for corrective procedures.

25.11 To identify imperfections in the finished paint job and correct them.

Recommended Welding Modules for Autobody

Module 1: Safety: General, Oxy-Acetylene Welding, and Electric Arc Welding
Suggested time: 1 hour

Module 5: Oxy-Acetylene Welding Start-up and Shut-down and Cutting
Suggested time: 2-4 hours

Module 6: Oxy-Acetylene Cutting
Suggested time: 5-8 hours

Module 7: Advanced Oxy-Acetylene Cutting
Suggested time: 3-5 hours

Module 9: Oxy-Acetylene Welding
Suggested time: 7-10 hours

Module 13: Plasma Arc Cutting
Suggested time: 3-5 hours

Module 29: Metal Inert Gas (MIG) Welding Safety and Equipment
Suggested time: 3-6 hours

Module 30: Start-Up and Shut-Down (MIG)
Suggested time: 2-4 hours

Module 31: MIG Procedures
Suggested time: 10-14 hours

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Appendix A: Determining the Trade Pathway for Students

During the renewal of the Practical and Applied Arts (PAA), Saskatchewan Education signed an articulation agreement for Autobody with Saskatchewan Post-Secondary Education and Skills Training (SPEST), Apprenticeship and Trade Certification Commission (ATCC) and Saskatchewan Institute of Applied Science and Technology (SIAST). Before school divisions renew the program in Autobody or start such a program, the partners in the agreement must be aware of the following processes and procedures – in summary.

1. As Autobody requires a certain level of maturity, it is recommended that certain modules for Middle Level be made available to grade 9 students only, as part of a Survey course. Autobody modules available for grade 9 students are listed in the PAA Handbook.

2. Pure 100 hour courses are available in Autobody beginning at the grade 10 Level. Autobody modules may also be configured into a PAA Survey course(s) at the 10, 20 or 30 levels.

3. Students may take Autobody with no intent to pursue a mechanical career. Therefore, no articulation procedures need be followed.

Articulation

Saskatchewan Education, in consultation with the PAA Reference Committee, has agreed to develop adequate hours of provincial curriculum in the various designated trades areas of high school curriculum; along with limited practical experience, to meet the Level I requirements (or their equivalent) as outlined by the Apprenticeship and Trade Certification Commission (ATCC) of Saskatchewan Post-Secondary Education and Skills Training (SPEST) in collaboration with the Trade Board (TB). Articulation agreements among these educational partners have been established to accommodate high school graduates who have met the Level I requirements outlined in the high school curricula and who have followed the procedures specified by the ATCC *High School to Apprenticeship*. Those students may challenge the Level I trade exam. Successful students will receive Level I theory advanced standing in appropriate SIAST programs and Prior Learning Prior Learning Assessment Recognition (PLAR) time credit hours for time spent with a journeyperson in the workplace toward apprenticeship standing in the trade.

Training plans included in Appendix B have been designed to provide direction for Level I skill development in the classroom and in the workplace.

School divisions/schools seeking Autobody articulation with Apprenticeship for students graduating from high school may register and challenge the Level I exam, by completing the following steps:

- Everyone must have studied *High School to Apprenticeship: Link to the Future* (1999*).*

- The Level I theory identified below in Appendix A of this Autobody guideline must be covered thoroughly by the certified teacher and students.

- Practical experiences must be simulated in the school setting or through the optional work study modules used in partnership with local businesses and journeypersons.

- **If the teacher is not a journeyperson, the teacher must take an approved certification course. This will provide the necessary background skills to evaluate Level I theory and practice in their school for students who are following the trade pathway to apprenticeship. The course would require the approval of each of the following, Saskatchewan Education, ATCC, SIAST and the STF.**

- To challenge Level I, the teacher should recommend only those students who have successfully completed the Level I practical and who have aspirations in pursuing further training in the apprenticeship trade. Registration for the Level I exam is managed by ATCC. Students challenging the Level I apprenticeship theory exam must attain a mark of 70% to pass, therefore should probably be achieving at the 80% range or higher in all aspects of the modules that are identified for Level I trade articulation.

- The students must state their intention to write the Level I exam prior to the successful completion of the final high school course(s) and they must receive permission to proceed.

- The teacher must notify ATCC at least 2 months prior to the writing of the Level I exam, stating the intent to have students write and indicating the number of exams required. Verification of the high school trade course marks and the examination fee must be submitted for each student eligible to write.

- The ATCC will administer the Level I exams to high school students during the January and June Departmental Examination writing sessions, as arranged. The dates for the writing weeks are established annually and distributed to the schools in the *Registrar's Handbook for School Administrators*. Contact the Registrar's Office, Student Records at Saskatchewan Education.

- Apprenticeship exams will be returned to the ATCC for grading and evaluation.

- Marks will be mailed to the student/school. ATCC will record the marks for the Level I exams. For more information about trade articulation and guidelines see the *High School to Apprenticeship: Link to the Future* document developed by ATCC.

- SIAST and ATCC notification of changes to the Level I apprenticeship requirements in the trade will be communicated to teachers via the Evergreen Curriculum area on the Saskatchewan Education website (www.sasked.gov.sk.ca).

- A high school graduate who has already received all the Secondary Level credits for Autobody and who passes the Level I exam will receive advanced standing in the Autobody program at SIAST. Those students will also receive time credit recognition for practical experience under a journeyperson provided appropriate documentation has been maintained.

The following Saskatchewan Education PAA Autobody Modules must be successfully completed in order to meet the Level I requirements in the trade:

Modules Required for Level I

Auto Body 10

AUTB01	Module 01: Safety
AUTB02	Module 02: Auto Design
AUTB03	Module 03: Hand Tools
AUTB04	Module 04: Power Tools
AUTB05	Module 05: Metal Straightening
AUTB06	Module 06: Filling
AUTB07	Module 07: Panel Replacement
AUTB08	Module 08: Contoured Surface Rust Repair
AUTBT10	Module 10: Work Study
WELD01	Module 01: Safety/ General/ Oxy-Acetylene/ Electric Arc Welding
WELD13	Module 13: Plasma Arc Cutting
WELD29	Module 29: Metal Inert Gas (MIG) Welding/ Safety and Equipment
WELD30	Module 30: Start-Up and Shut-Down (MIG)
WELD31	Module 31: MIG Procedures and Practice

Autobody A20

AUTB09	Module 09: Automobile Refinishing and Painting
AUTB14	Module 14: Advanced Hand and Power Tools
AUTB20	Module 20: Trim Removal and Installation
WELD01	Module 01: Safety/ General/ Oxy-Acetylene/ Electric Arc Welding
WELD05	Module 05: Oxy-Acetylene Welding Start-Up/ Shut-Down and Cutting
WELD06	Module 06: Oxy-Acetylene Cutting
WELD07	Module 07: Advanced Oxy-Acetylene Cutting
WELD09	Module 09: Oxy-Acetylene Welding
WELD31B	Module 31B: MIG Procedures and Practice

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AUTB14	Module 14: Advanced Automotive Structural
AUTB19	Module 19: Air Bags
AUTB20	Module 20: Automotive Detailing
AUTB11	Module 11: Work Study

Autobody A30

Autobody B30

AUTB22	Module 22: Surface Preparation
AUTB25	Module 25: Automotive Refinishing and Painting

The above Autobody Modules have fidelity with the following SIAST Modules.

Articulated SIAST Modules

WELD 165A	General Shop Safety
WELD 165B	Oxy-Acetylene Welding
WELD 165C	M.I.G. Welding
WELD 165D	Plasma Arc Cutting
METL 122A	Basic Metal Work
METL 122B	Repair Minor Dents
METL 122C	Metal Finish with Body Filler
PTNG 122A	Preparation of Bare Metal for Colour Coating
PTNG 122B	Spray Guns
PTNG 122C	MIL Thickness Gauges
PTNG 122D	Colour Application
PTNG 122E	Preparation of Painted Surfaces for Top Coating
PTNG 122F	Service Air Supply Systems
PTNG 122G	Surface Preparation for Complete Vehicle Repair
PTNG 122H	Final Detailing
PTNG 122I	Paint Problems and Defects
PTNG 122J	Automobile Upholstry and Exterior Cleaning

Appendix B: Training Plans

Checklist for Autobody 10

Student's Name _____ Date _____

Business _____

Signature _____

Module Component	Observed	Assisted	Demonstrated	Checked by
Module 1: Safety				
Module 2: Automotive Design				
Module 3: Hand Tools				
Module 4: Power Tools				
Module 5: Metal Straightening				
Module 6: Filling Damage				
Module 7: Panel Replacement				
Module 8: Contoured Surfaces Rust Repair				
Module 1: Oxy-Acetylene Safety (Welding 1)				
Module 13: Plasma Arc Cutting (Welding 13)				
Module 29: Metal Inert Gas M.I.G. Safety and Equipment (Welding 29)				
Module 30: Start-up and Shut-Down M.I.G. Welding (Welding 30)				
Module 31: MIG Procedures and Practice • Flat position butt weld • Flat position lap weld • Flat position plug weld (buttonhole)				
***Note**: The three types of welds are to be done with each of the gauges.*				
• 16 gauge				
• 20 gauge				
• 22 gauge				

Checklist for Autobody A20

Student's Name _____ Date _____

Business _____

Signature _____

Module Component	**Observed**	**Assisted**	**Demonstrated**	**Checked by**
Module 13 Automobile Refinishing and Repainting: *complete the steps required to refinish and paint a vehicle*				
Module 15 Advanced Hand and Power Tools: *demonstrate safe use of air, hydraulic and electric tools*				
Module 17 Panel Alignment: *demonstrate the ability to align doors, hood, trunk, fenders and quarter panels*				
Module 21 Trim Removal and Installation: *remove and install exterior and interior trim materials*				
Module 1 Oxy-Acetylene Welding / Cutting Safety: *understand safety rules that apply to gas welding and cutting*				
Module 5 Oxy-Acetylene Welding and Cutting- Start-up and Shut-down: *show the proper sequencing of safe operation of OA equipment*				
Module 6 Oxy-Acetylene Cutting: *carry out proper procedures to cut various thickness of material*				
Module 7 Advanced Oxy-Acetylene Cutting: *cut holes, bevel edges and circles in light gauge and heavy steel plate*				
Module 9 Oxy-Acetylene Welding: *complete butt and edge welds in the flat position* - 14 gauge steel - 20 gauge steel - 16 gauge steel - 22 gauge steel				
Module 9A Work Study Preparation and Follow-up Activities: *be aware of and understand the importance of written and verbal communication*				
Module 10A Work Study				

Checklist for Autobody B20

Student's Name _____ Date _____

Business _____

Signature _____

Module Component	**Observed**	**Assisted**	**Demonstrated**	**Checked by**
Module 19 Air bags: *show an understanding of the operation and safety concerns about the operation and handling of air bags*				
Module 20 Automobile Detailing: *use proper products to restore or enhance the exterior of a vehicle*				
Module 24 Buying and Selling a Vehicle: *make appropriate consumer decisions about the sale or purchase of a vehicle*				
Module 31B M.I.G. Welding Procedures and Practice: *build skills with the M.I.G. welding system (refer to Module 31)*				
Module 9B Work Study Preparation and Follow-up Activities: *understand and be aware of the importance of verbal and non-verbal communications*				
Module 10B Work Study				

Checklist for Autobody A30

Student's Name _____ Date _____

Business _____

Signature _____

Module Component	**Observed**	**Assisted**	**Demonstrated**	**Checked by**
Module 16 Advanced Metal Repair: *identify and repair direct and indirect damage by using a variety of tools methods and procedures*				
Module 22 Surface Preparation: *identify and repair various body construction materials*				
Module 25 Automotive Refinishing and Painting: *select and apply appropriate products for metal protection and to mix and apply the final finish*				
Module 9C Work Study Preparation and Follow-up Activities: *understand the importance of verbal and non-verbal communication*				
Module 10C Work Study				

Checklist for Autobody B30

Student's Name _____ Date _____

Business _____

Signature _____

Module Component	**Observed**	**Assisted**	**Demonstrated**	**Checked by**
Module 14 Advanced Automotive Structural Design: *demonstrate knowledge of design components and body construction*				
Module 12 Estimating Repair Costs: *identify extent of damage and estimate cost to repair*				
Module 23 Plastic Repair: *identify different plastic types and demonstrate ability to repair*				
Module 9D Work Study Preparation and Follow-up Activities: *understand the importance of written and verbal communication*				

Appendix C: Recordkeeping Charts

Autobody 10

Student Name: _____

Student Number: _____

Module Code	Module	Date	Teacher Initial
AUTB01	Module 1: Safety (Core)		
AUTBO2	Module 2: Auto Design (Core)		
AUTBO3	Module 3: Hand Tools (Core)		
AUTBO4	Module 4: Power Tools (Core)		
AUTBO5	Module 5: Metal Straightening (Core)		
AUTBO6	Module 6: Filling Damage (Core)		
AUTBO7	Module 7: Panel Replacement (Core)		
AUTBO8	Module 8: Contoured Surface Rust Repair (Core)		
AUTBO11	Module 11: Career Opportunities in Autobody (Core)		
WELD01	Module 1: Safety: General, Oxy-Acetylene Welding, and Electric Arc Welding		
WELD13	Module 13: Plasma Arc Cutting		
WELD29	Module 29: Metal Inert Gas (M.I.G.) Welding Safety and Equipment		
WELD30	Module 30: Start-Up and Shut-Down (MIG) Welding		
WELD31A	Module 31A: M.I.G. Procedures and Practice		

Autobody A20

Student Name: _____

Student Number: _____

Module Code	Module	Date	Teacher Initial
AUTB13	Module 13: Automobile Refinishing and Repainting (Optional)		
AUTB15	Module 15: Advanced Hand and Power Tools (Core)		
AUTB17	Module 17: Panel Alignment (Core)		
AUTB18	Module 18: Glass Removal and Installation (Optional)		
AUTB21	Module 21: Trim Removal and Installation (Core)		
WELD05	Module 5: Oxy-Acetylene Welding Start-Up, Shut-Down and Cutting		
WELD06	Module 6: Oxy-Acetylene Cutting		
WELD07	Module 7: Advanced Oxy-Acetylene Cutting		
WELD09	Module 9: Oxy-Acetylene Welding		
AUTB09A	Module 9: Work Study Preparation and Follow-up Activities (Optional)		
AUTB10A	Module 10: Work Study (Optional)		

Autobody B20

Student Name: _____

Student Number: _____

Module Code	Module	Date	Teacher Initial
WELD40	Module 40: Soldering		
AUTB19	Module 19: Air Bags (Optional)		
AUTB20	Module 20: Automobile Detailing (Optional)		
AUTB24	Module 24: Buying and Selling a Vehicle (Optional)		
AUTB09B	Module 9B: Work Study Preparation and Follow-up Activities (Optional)		
AUTB10B	Module 10B: Work Study (Optional)		

Autobody A30

Student Name: _____

Student Number: _____

Module Code	Module	Date	Teacher Initial
AUTB16	Module 16: Advanced Metal Repair (Core)		
AUTB22	Module 22: Surface Preparation (Core)		
AUTB25	Module 25: Automotive Refinishing and Painting (Optional)		
AUTB09C	Module 9C: Work Study Preparation and Follow-up Activities (Optional)		
AUTB10C	Module 10C: Work Study (Optional)		

Autobody B30

Student Name: _____

Student Number: _____

Module Code	Module	Date	Teacher Initial
AUTB14	Module 14: Advanced Automotive Structural Design (Core)		
AUTB12	Module 12: Estimating Repair Costs (Optional)		
AUTB23	Module 23: Plastic Repair (Optional)		
AUTB09D	Module 9D: Work Study Preparation and Follow-up Activities (Optional)		
AUTB10D	Module 10D: Work Study (Optional)		

Appendix D: Checklists for Assessment(s)

The following are classroom-ready checklists with criteria that may be useful to teachers and students. Some assessment strategies for the classroom include: having students rate themselves; having students rate team members; using the same checklist at the beginning and near the end of a course or module to indicate growth; indicating a simple yes/no; creating a rating scale (0-4); including checklists in the student's portfolio; conducting random checks during class time; and highlighting strengths and areas to check in the Notes.

Set I

Class ____________________________________ Date(s) _________________________

√	Student: ________________________________	Notes
	arrives on time	
	has books, pens, etc.	
	has shop coat/apron	
	stays on task	
	follows directions	
	is polite	
	works independently	

√	Student: ________________________________	Notes
	arrives on time	
	has books, pens, etc.	
	has shop coat/apron	
	stays on task	
	follows directions	
	is polite	
	works independently	

√	Student: _________________________________	Notes
	arrives on time	
	has books, pens, etc.	
	has shop coat/apron	
	stays on task	
	follows directions	
	is polite	
	works independently	

√	Student: ________________________________	Notes
	arrives on time	
	has books, pens, etc.	
	has shop coat/apron	
	stays on task	
	follows directions	
	is polite	
	works independently	

Set II

Class ________________________________ Date(s) ______________________________

√	Student: __________________________	Notes
	meets timelines	
	uses materials as directed	
	stores materials and tools properly	
	uses safe procedures	
	sets own timelines	
	begins work without prompting	
	cleans up without prompting	

√	Student: __________________________	Notes
	meets timelines	
	uses materials as directed	
	stores materials and tools properly	
	uses safe procedures	
	sets own timelines	
	begins work without prompting	
	cleans up without prompting	

√	Student: __________________________	Notes
	meets timelines	
	uses materials as directed	
	stores materials and tools properly	
	uses safe procedures	
	sets own timelines	
	begins work without prompting	
	cleans up without prompting	

√	Student**:** __________________________	Notes
	meets timelines	
	uses materials as directed	
	stores materials and tools properly	
	uses safe procedures	
	sets own timelines	
	begins work without prompting	
	cleans up without prompting	

Set III

Class ________________________________ Date(s) ___________________________

√	Student: _________________________	Notes
	cooperates with others	
	provides positive leadership	
	assists others	
	respects the opinions of others	
	participates in discussions	
	encourages others	
	makes positive comments	

√	Student: _________________________	Notes
	cooperates with others	
	provides positive leadership	
	assists others	
	respects the opinions of others	
	participates in discussions	
	encourages others	
	makes positive comments	

√	Student: _________________________	Notes
	cooperates with others	
	provides positive leadership	
	assists others	
	respects the opinions of others	
	participates in discussions	
	encourages others	
	makes positive comments	

√	Student: _________________________	Notes
	cooperates with others	
	provides positive leadership	
	assists others	
	respects the opinions of others	
	participates in discussions	
	encourages others	
	makes positive comments	

Set IV

Class____ Date(s) __________________________

√	Student: ___________________________	Notes
	uses technical language in context	
	listens during discussions	
	does not interrupt	
	can interpret technical drawings	
	seeks perfection	
	works at an acceptable rate	
	seeks help when needed	

√	Student: ___________________________	Notes
	uses technical language in context	
	listens during discussions	
	does not interrupt	
	can interpret technical drawings	
	seeks perfection	
	works at an acceptable rate	
	seeks help when needed	

√	Student: ___________________________	Notes
	uses technical language in context	
	listens during discussions	
	does not interrupt	
	can interpret technical drawings	
	seeks perfection	
	works at an acceptable rate	
	seeks help when needed	

√	Student: ___________________________	Notes
	uses technical language in context	
	listens during discussions	
	does not interrupt	
	can interpret technical drawings	
	seeks perfection	
	works at an acceptable rate	
	seeks help when needed	

Set V

Class _____ Date(s) _____

√	Student: _____	Notes

√	Student: _____	Notes

√	Student: _____	Notes

√	Student: _____	Notes

See the *Design Studies 10, 20 Curriculum Guidelines* for other boxes of criteria/statements that may be used to create classroom checklists.

Rating Scale Rubric

	Rubric - criteria - value	Project	Problem Solving	Use of tools and materials	Quality	Teamwork
0	Incomplete work.	Incomplete.	Unable to solve problems even with help.	Used inappropriately.	Unacceptable.	Uncooperative.
1	Meets minimum expectations.	Complete.	Consistently needs assistance.	Limited range of tools**,** materials and processes.	Acceptable.	Cooperative.
2	Meets expectations with limited assistance.	Complete.	Plans and solves problems with limited assistance.	Tools, materials and/or processes used appropriately.	Quality and production reasonably consistent.	Works to achieve team goals.
3	Meets expectations in a self-directed manner.	Complete.	Plans and solves problems in a self-directed manner.	Works efficiently.	Good, consistent quality.	Works cooperatively and participates in a positive manner.
4	Exceeds expectations. Creative, self-directed, leader.	Exceeds expectations.	Plans creatively.	Very effective and efficient use of material, tools and/or processes.	Exceptional quality.	Leads others.

Rating Form

Student Name: _____

Student Number: _____

Module: _____

Criteria	Rating (Circle)
Work habits	0 1 2 3 4
Teamwork	0 1 2 3 4
Knowledge	0 1 2 3 4
Equipment and materials	0 1 2 3 4

Rating Key: 0 = 4 =

Criteria

Work Habits
- is self-starting
- is organized
- follows directions
- uses time effectively
- practises safe work habits
- meets deadlines

Teamwork
- cooperates with workmates
- shares group work
- helps negotiate consensus
- respects differing opinions

Knowledge
- interprets directions correctly
- plans a sequence of repair
- uses equipment and materials properly
- recognizes problems as they arise and suggests solutions
- uses technical language to communicate ideas
- demonstrates a knowledge of the hazardous properties of materials and equipment

Equipment and Materials
- keeps work area orderly
- does not waste materials
- maintains equipment
- diposes of waste in an environmentally appropriate manner
- uses the right material

Teacher's Comments

_____
_____
_____
_____
_____

Appendix E: Task Assessment(s) for Selected Modules

Task Assessment: Module 13: Automotive Refinishing and Repainting

Name: _____

Rating Scale

1	2	3	4	**Safety**
				uses safety appliances
				works in a safe manner
				reads WHIMS data sheets; uses and disposes of materials appropriately

Technical Knowledge

				knowledgeable about steps required to refinish a vehicle
				identifies and explains function of spray equipment
				describes the use of reducers and thinners
				describes spray techniques
				describes spray problems and correction thereof

Technical Skill

				selects proper paint product for application
				performs paint application
				cleans spray equipment satisfactorily
				corrects spray problems

Rating Scale

1 Limited range of tools used; frequent supervision; minimum standard of work.
2 Plans progression of work and selects tools and materials with some supervision.
3 Limited supervision; high personal standard of work; helps others; self-starter.
4 Outstanding; positive leadership; knowledge and work respected by peers.

Comments

Adapted from Alberta Education. (1994). *Mechanics. Career and Technology Studies.* MEC/G.48.

Task Assessment: Module 16: Advanced Metal Repair

Name: _____

Rating Scale

1	2	3	4	**Safety**
				follows shop procedures
				selects and uses proper tools and materials
				is knowledgeable about hazards involved in metal repair

Technical Knowledge

				identifies direct and indirect collision damage
				identifies effects of distortion and corrosion on ferrous metal
				describes sequence in which damage occurred

Technical Skill

				evaluates damage and determines sequence of repair
				performs collision repair
				performs corrosion repair

Rating Scale

1 Limited range of tools used; frequent supervision; minimum standard of work.
2 Plans progression of work and selects tools and materials with some supervision.
3 Limited supervision; high personal standard of work; helps others; self-starter.
4 Outstanding; positive leadership; knowledge and work respected by peers.

Comments

Adapted from Alberta Education. (1994). *Mechanics*. *Career and Technology Studies.* MEC/G.45 and G.27.

Task Assessment: Module 20: Automobile Detailing

Name: _____

Rating Scale

1	2	3	4	**Safety**
				uses safety appliances
				uses appropriate processes when using hazardous chemical products

Technical Knowledge

				identifies products used to enhance the appearance of a vehicle
				describes the process of detailing a vehicle
				is knowledgeable about after-market accessories

Technical Skill

				selects proper products for vehicle enhancement
				performs a thorough detailing of a vehicle
				installs a trim or accessory

Rating Scale

1 Limited range of tools used; frequent supervision; minimum standard of work.
2 Plans progression of work and selects tools and materials with some supervision.
3 Limited supervision; high personal standard of work; helps others; self-starter.
4 Outstanding; positive leadership; knowledge and work respected by peers.

Comments

Adapted from Alberta Education. (1994). *Mechanics*. *Career and Technology Studies.* MEC/G.29.

Task Assessment: Module 21: Trim Removal and Installation

Name: _____

Rating Scale

1	2	3	4	**Safety**
				uses safety appliances
				works in a safe manner

				Technical Knowledge
				identifies interior and exterior trim materials
				identifies fastening systems
				describes trim removal

				Technical Skill
				selects proper tools for trim removal
				removes and installs interior door trim
				removes and installs exterior trim
				suggests and installs after-market trim enhancement

Rating Scale

1 Limited range of tools used; frequent supervision; minimum standard of work.
2 Plans progression of work and selects tools and materials with some supervision.
3 Limited supervision; high personal standard of work; helps others; self-starter.
4 Outstanding; positive leadership; knowledge and work respected by peers.

Comments

Adapted from Alberta Education. (1994). *Mechanics. Career and Technology Studies.* MEC/G.46.

Task Assessment: Module 23: Plastic Repair

Name: _____

Rating Scale

1	2	3	4	**Safety**
				uses safety appliances
				works in a safe manner
				reads WHMIS data sheets and uses and disposes of materials appropriately

				Technical Knowledge
				is knowledgeable about plastic types and identification
				describes repair process

				Technical Skill
				performs a plastic weld
				performs a plastic bond

Rating Scale

1 Limited range of tools used; frequent supervision; minimum standard of work.
2 Plans progression of work and selects tools and materials with some supervision.
3 Limited supervision; high personal standard of work; helps others; self-starter.
4 Outstanding; positive leadership; knowledge and work respected by peers.

Comments

Adapted from Alberta Education. (1994). *Mechanics*. *Career and Technology Studies.* MEC/G.78.

Task Assessment: Module 25: Automotive Refinishing and Painting

Name: _____

Rating Scale

1	2	3	4	**Safety**
				uses safety appliances and works in a safe manner
				selects and uses proper tools and materials
				reads WHMIS data sheets; uses and disposes of materials appropriately

				Technical Knowledge
				selects and uses refinishing products as needed
				is knowledgeable about base and clear coat systems
				uses colour code references to match colours

				Technical Skill
				prepares vehicle and booth for refinishing
				mixes paint to correct viscosity
				applies paint in an acceptable manner
				cleans spray equipment and area

Rating Scale

1 Limited range of tools; frequent supervision; minimum standard of work.
2 Plans progression of work and selects tools and materials with some supervision.
3 Limited supervision; high personal standard of work; helps others; self-starter.
4 Outstanding; positive leadership; knowledge and work respected by peers.

Comment:

Adapted from Alberta Education. (1994). *Mechanics*. *Career and Technology Studies.* MEC/G.45 and G.27.

Appendix F: Painting an Automobile – Task Assessment

Student: _____

Date(s): _____

Criteria	Rating Scale (Rubric)			
	1	2	3	4
Wash and clean the vehicle and evaluate the surfaces (watch for peeling, blistering, checking, stone chips, etc.)				
Clean the interior of the vehicle to remove any dust, etc. that could contaminate the paint finish.				
Clean the surfaces with wax and grease remover. (Primers and paint will not adhere to wax or grease.)				
Feather edge all broken edges (stone chips, body work areas, scratches, etc.) in the paint surface. Do one panel at a time and inspect carefully.				
Sand all edges (hood opening, trunk opening, hood, trunk lid, around glass, etc.). It is important to be meticulous as the edge is the most vulnerable part of paint. Peeling or lifting occurs first at the edge.				
Sand the entire automobile, one panel at a time and always in a front to back or horizontal manner.				
Rough mask the automobile where it is to be primed. (Protects windows, tires, etc.) **Primer is extremely difficult to remove from rubber once it has dried**.				
Metal prep all bare metal areas with metal conditioner. (Removes corrosion.)				
Apply vinyl wash to all bare metal areas. This provides an excellent bonding agent for the primer.				
Apply etch primer to bare metal areas and feather edged areas. This provides maximum adherence for the primer.				
Apply high solid primer to all body panels. Where there is bodywork or feather edging apply two coats. It is a very expensive product. **Do not apply two coats to the entire vehicle.**				
Body putty any scratches or marks that the primer did not fill. **Failure to do this will result in the scratch showing in the final coat of paint**.				
Block sand all body work areas to remove waves. (A tracer coat can be applied over the primer to show up scratches, waves, etc.) Pay particular attention to areas of body filler. Sand all primed areas.				
Reprime as necessary. **All bare metal must be vinyl washed, etch primed and then primed with high solid primer.**				
Sand whole vehicle again. **Over spray that is not sanded out will show up as dry rough spots in the new paint**.				
Remove all rough masking and use an air gun to remove dust from the exterior and the interior.				
Remask the automobile taking great care not to overmask or undermask.				
Wet down the paint booth. This settles the dust so it does not become air borne during the painting process. **Do not wet the roof of the booth as drips of water will fall on the new paint**.				
Move the vehicle into the paint booth. Blow and remove any dust or lint from the vehicle surfaces.				
Wipe down with a quality wash to remove any oil, grease, finger prints, etc.				
Wipe the entire vehicle with a tack cloth.				
Apply colour coat.				