Introduction to Auto Body and Estimating - Current Standards

	Indicator # IAB 1 - Students will demonstrate understanding of auto body safety practices and careers.
Level 2: Skill/Concept	IAB 1.1 Demonstrate auto body safety practices Examples: Select and use proper personal safety equipment; take the necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. HP-I Locate procedures and precautions that may apply to the vehicle being repaired. HP-I Identify vehicle system hazard types, locations and recommended procedures (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles) before inspecting or replacing components. HP-I
Level 2: Skill/Concept	IAB 1.2 Analyze career opportunities in the Transportation, Distribution, & Logistics career cluster Examples: Create resume Contact industry leaders Identify related careers of auto body

	Indicator # IAB 2 - Demonstrate uses of auto body tools and equipment.
Level 2: Skill/Concept	IAB 2.1 Demonstrate hand and power tools and their uses Examples: Names of tools and their uses Difference between pneumatic and electric Safety procedures when using tools Show how to maintain tools
Level 2: Skill/Concept	IAB 2.2 Analyze uses of a compressed air system Examples: Components of a compressed air system Compressed air system maintenance Uses of compressed air Safety issues when using compressed air Operations of a compressed air system Demonstrate use of compressed air in different operations.

Introduction to Auto Body and Estimating - Proposed Standards

	Indicator # IAB 1 - Students will demonstrate understanding of auto body safety practices and careers.
Level 2: Skill/Concept	IAB 1.1 Demonstrate auto body safety practices. Select and use proper personal safety equipment; take the necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations Locate procedures and precautions that may apply to the vehicle being repaired Identify vehicle system hazard types, locations and recommended procedures (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles) before inspecting or replacing components
Level 2: Skill/Concept	IAB 1.2 Analyze career opportunities in the Transportation, Distribution, & Logistics career cluster. Create a resume Contact industry leaders Identify related careers of auto body

	Indicator # IAB 2 - Demonstrate uses of auto body tools and equipment.
Level 2: Skill/Concept	IAB 2.1 Demonstrate hand and power tools and their uses. Name tools and their uses Differentiate between pneumatic and electric Demonstrate appropriate safety procedures when using tools Show how to maintain tools
Level 3: Strategic Thinking	IAB 2.2 Analyze uses of a compressed air system. Components of a compressed air system Compressed air system maintenance Uses of compressed air Safety issues when using compressed air Operations of a compressed air system Demonstrate use of compressed air in different operations

Introduction to Auto Body and Estimating - Current Standards

	Indicator # IAB 3 - Employ collision repair estimating processes.
Level 3: Strategic Thinking	IAB 3.1 Demonstrate the process involved in obtaining important information Examples: Determine and record customer/vehicle owner information. HP-I Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, productions date, engine type and assembly plant. HP-I Identify and record vehicle mileage and options, including trim level, paint code, transmission, accessories and modifications HP-I

Introduction to Auto Body and Estimating - Proposed Standards

	Indicator # IAB 3 - Employ collision repair estimating processes.
Level 3: Strategic Thinking	IAB 3.1 Demonstrate the process involved in obtaining important information. Determine and record customer/vehicle owner information Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, productions date, engine type and assembly plant Identify and record vehicle mileage and options, including trim level, paint code, transmission, accessories and modifications

Introduction to Auto Body and Estimating - Current Standards

Level 2: Skill/Concept	IAB 3.2 Demonstrate the process of writing a repair estimate Examples: Position the vehicle for inspection. HP-G Prepare vehicle for inspection by providing access to damaged areas. HP-G Analyze damage to determine appropriate methods for overall repairs. HP-I Identify and record pre-existing damage. HP-I Apply appropriate estimating and parts nomenclature (terminology). HP-I Determine and apply appropriate estimating sequence. HP-I Utilize estimating guide procedure pages. HP-I Identify operations requiring labor value judgment. HP-G Select appropriate labor value for each operation (structural, non-structural, mechanical, and refinish). HP-I Apply math skills to establish charges and totals. HP-I Identify procedural differences between computer generated and manually written estimates. HP-G Recognize the differences in estimation procedures when using different information provider systems. HP-G

Introduction to Auto Body and Estimating - Proposed Standards

Level 2: Skill/Concept	IAB 3.2 Demonstrate the process of writing a repair estimate. Position the vehicle for inspection Prepare vehicle for inspection by providing access to damaged areas Analyze damage to determine appropriate methods for overall repairs Identify and record pre-existing damage Apply appropriate estimating and parts nomenclature (terminology) Determine and apply appropriate estimating sequence Utilize estimating guide procedure pages Identify operations requiring labor value judgment Select appropriate labor value for each operation (structural, non-structural, mechanical, and refinish) Apply math skills to establish charges and totals Identify procedural differences between computer generated and manually written estimates Recognize the differences in estimation procedures when using different information provider systems

Introduction to Auto Body and Estimating - Current Standards

	Indicator # IAB 4 - Apply auto body repair and finishing techniques.
Level 2: Skill/Concept	IAB 4.1 Demonstrate basic auto body repair techniques Examples: Know proper corrosion protection methods and why you apply them. Welding processes Metal straightening techniques Filler options Plastic repair techniques Purpose of block sanding Hammer and Dolly procedures Block sanding techniques Uses of different body fillers Proper uses of sandpaper grits
Level 2: Skill/Concept	IAB 4.2 Demonstrate processes in automotive finishing Examples: Know and understand proper overspray protection Proper refinishing procedures & equipment use Proper surface preparation Apply overspray protection Prepare different surfaces properly Demonstrate how to use refinishing equipment (including maintenance) Perform a spray gun test

Introduction to Auto Body and Estimating - Proposed Standards

	Indicator # IAB 4 - Apply auto body repair and finishing techniques.
Level 2: Skill/Concept	IAB 4.1 Demonstrate basic auto body repair techniques. Explain proper corrosion protection methods and why you apply them Demonstrate welding processes Apply metal straightening techniques Explain the uses of different body filler options Demonstrate plastic repair techniques Explain the purpose of block sanding Demonstrate block sanding techniques Demonstrate Hammer and Dolly procedures Demonstrate proper uses of sandpaper grits
Level 2: Skill/Concept	IAB 4.2 Demonstrate processes in automotive finishing. Know and understand proper overspray protection Demonstrate proper refinishing procedures Explain proper surface preparation Apply overspray protection Prepare different surfaces properly Demonstrate how to use refinishing equipment (including maintenance) Perform a spray gun test

	Indicator # IAB 5 - Students will understand and apply appropriate business practices.
Level 3: Strategic Thinking	IAB 5.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic Thinking	IAB 5.2 Understand the concept and application of ethical business practices.
Level 3: Strategic Thinking	IAB 5.3 Understand the concept and application of excellent customer relations practices.

Structural Analysis and Damage Repair
Current Standards

	Indicator # SA 1 - Students will demonstrate auto body technology safety practices.
Level 2: Skill/Concept	SA 1.1 Demonstrate auto body technology safety practices Examples: Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. HP-I Locate procedures and precautions that may apply to the vehicle being repaired. HP-I Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures. HP-I Inspect or replace components. HP-I Select and use a National Institute of Occupational Safety and Health (NIOSH) approved air purifying respirator. Inspect condition and hazardous operations and materials in accordance with federal, state, and local regulation (e.g. OSHA Regulation 1910.134) and applicable state and local regulation. HP-I

	Indicator # SA 2 - Students will inspect and repair frames.
Level 2: Skill/Concept	SA 2.1 Measure and analyze structural damage Examples: Measure and diagnose structural damage using a tram gauge. HP-I Analyze mash, sag, side sway, twist, and diamond damage. HP-G Identify heat limitations and monitoring procedures for structural components. HP-G Measure and diagnose structural damage using a three-dimensional measuring system (mechanical, electronic, laser) etc. HP-G Determine the extent of direct and indirect damage and the direction of impact; document the methods and sequence of repair. HP-I Analyze and identify crush/collapse zones. HP-I
Level 2: Skill/Concept	SA 2.2 Make necessary repairs to the frame Examples: Attach vehicle to anchoring devices. HP-G Demonstrate an understanding of structural foam applications. HP-G

Structural Analysis and Damage Repair
Proposed Standards

	Indicator # SA 1 - Students will demonstrate auto body technology safety practices.
Level 2: Skill/Concept	SA 1.1 Demonstrate auto body technology safety practices: Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations Locate procedures and precautions that may apply to the vehicle being repaired Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures Inspect or replace components Select and use a National Institute of Occupational Safety and Health (NIOSH) approved air purifying respirator Inspect condition and hazardous operations and materials in accordance with federal, state, and local regulation (e.g. OSHA Regulation 1910.134) and applicable state and local regulation

	Indicator # SA 2 - Students will inspect and repair frames.
Level 2: Skill/Concept	SA 2.1 Measure and analyze structural damage. Measure and diagnose structural damage using a tram gauge Analyze mash, sag, side sway, twist, and diamond damage Identify heat limitations and monitoring procedures for structural components Measure and diagnose structural damage using a three-dimensional measuring system (mechanical, electronic, and laser) Determine the extent of direct and indirect damage and the direction of impact; document the methods and sequence of repair Analyze and identify crush and collapse zones
Level 2: Skill/Concept	SA 2.2 Make necessary repairs to the frame. Attach vehicle to anchoring devices Demonstrate an understanding of structural foam applications

Structural Analysis and Damage Repair
Current Standards

	Indicator # SA 3 - Students will inspect, measure and repair unibody and unitized structures.
Level 2: Skill/ Concept	SA 3.1 Analyze and determine unibody and unitized structural damage
Level 2: Skill/ Concept	SA 3.2 Repair unibody and unitized structures Examples: Attach anchoring devices to vehicle; remove or reposition components as necessary. HP-I Identify proper cold stress relief methods. HP-I Determine sectioning procedures of a steel body structure. HP-I Remove and replace damaged structural components. HP-G Restore corrosion protection to repaired or replaced structural areas and anchoring locations. HP-I

	Indicator # SA 4 - Students will inspect and repair or replace stationary glass.
Level 2: Skill/Concept	SA 4.1 Inspect vehicles for glass damage and determine manufacturer's specifications for glass window replacement Examples: Identify considerations for removal, handling, and installation of advanced glass systems (rain sensors, navigation, cameras, and collision avoidance systems). HP-G Remove and reinstall or replace modular glass using recommended materials. HP-G Check for water leaks, dust leaks, and wind noise. HP-G

Structural Analysis and Damage Repair
Proposed Standards

	Indicator # SA 3 - Students will inspect, measure and repair unibody and unitized structures.
Level 2: Skill/Concept	SA 3.1 Analyze and determine unibody and unitized structural damage. Measure and diagnose unibody damage using a tram gauge Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, and laser) Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair Analyze and identify crush/collapse zones
Level 2: Skill/Concept	SA 3.2 Repair unibody and unitized structures. Attach anchoring devices to vehicle; remove or reposition components as necessary Identify proper cold stress relief methods Determine sectioning procedures of a steel body structure Remove and replace damaged structural components Restore corrosion protection to repaired or replaced structural areas and anchoring locations

	Indicator # SA 4 - Students will inspect and repair or replace stationary glass.
Level 2: Skill/Concept	SA 4.1 Inspect vehicles for glass damage and determine manufacturer's specifications for glass window replacement. Identify considerations for removal, handling, and installation of advanced glass systems (rain sensors, navigation, cameras, and collision avoidance systems) Remove and reinstall or replace modular glass using recommended materials Check for water leaks, dust leaks, and wind noise

Structural Analysis and Damage Repair
Current Standards

	Indicator # SA 5 - Students will demonstrate proficiency in welding, cutting and joining.
Level 1: Recall	SA 5.1 Analyze and identify correct welding procedures to be used in auto body repair work Examples: Identify the considerations for cutting, removing, and welding various types of steel, aluminum, and other metals. HP-G Determine the correct Gas Metal Arc Welding (GMAW) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation. HP-I Identify hazards, foam coatings and flammable materials prior to welding/cutting procedures. HP-G Determine the joint type (butt weld with backing, lap, etc.) for weld being made. HP-I Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation. HP-I Identify different methods of attaching structural components (squeeze type resistance spot welding, riveting, structural adhesive, Metal Inert Gas (MIG) bronze, etc.)

Structural Analysis and Damage Repair
Proposed Standards

	Indicator # SA 4 - Students will inspect and repair or replace stationary glass.
Level 1: Recall	SA 5.1 Analyze and identify correct welding procedures to be used in auto body repair work. Identify the considerations for cutting, removing, and welding various types of steel, aluminum, and other metals Determine the correct Gas Metal Arc Welding (GMAW) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation Identify hazards, foam coatings and flammable materials prior to welding/cutting procedures Determine the joint type (butt weld with backing, lap, etc.) for weld being made Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation Identify different methods of attaching structural components (squeeze type resistance spot welding, riveting, structural adhesive, Metal Inert Gas (MIG) bronze, TIG welding, other future equipment/new techniques aligned to current industry practices, etc.)

Structural Analysis and Damage Repair
Current Standards

Level 2: Skill/Concept	SA 5.2 Perform proper welding operations to specific auto body repairs Examples: Set up attach work clamp (ground) and adjust the GMAW welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded. HP-I Store, handle, and install high-pressure gas cylinders; test for leaks. HP-1 Determine the proper angle of the gun to the joint and direction of gun travel for the type of weld being made. HP-I Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. HP-I Clean and prepare the metal to be welded, assure good metal fit-up, apply weld through primer if necessary, clamp or tack as required. HP-I Perform the following welds: plug, butt weld with and without backing, and fillet, in the flat, horizontal, vertical and overhead positions. HP-I Perform visual evaluation and destructive test on each weld type. HP-I Identify the causes of various welding defects; make necessary adjustments. HP-I Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-I Identify cutting process for different substrates and locations; perform cutting operation. HP-I

Structural Analysis and Damage Repair
Proposed Standards

Level 2: Skill/Concept	A 5.2 Perform proper welding operations to specific auto body repairs. Set up attach work clamp (ground) and adjust the GMAW welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded Store, handle, and install high-pressure gas cylinders; test for leaks Determine the proper angle of the gun to the joint and direction of gun travel for the type of weld being made Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations Clean and prepare the metal to be welded, assure good metal fit-up, apply weld through primer if necessary, clamp or tack as required Perform the following welds: plug, butt weld with and without backing, and fillet, in the flat, horizontal, vertical and overhead positions Perform visual evaluation and destructive test on each weld type Identify the causes of various welding defects; make necessary adjustments Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments Identify cutting process for different substrates and locations; perform cutting operation

	Indicator # SA 6 - Students will demonstrate appropriate business practices.
Level 3: Strategic Thinking	SA 6.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic Thinking	SA 6.2 Understand the concept and application of ethical business practices.
Level 3: Strategic Thinking	SA 6.3 Understand the concept and application of excellent customer relations practices.

Nonstructural Analysis and Damage Repair - Current Standards

	Indicator # NA 1 Students will demonstrate understanding of auto body safety precautions.
Level 2: Skill/Concept	NA 1.1 Demonstrate auto body technology safety practices Examples: Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. HP-I Locate procedures and precautions that may apply to the vehicle being repaired. HP-I Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures before inspecting or replacing components. HP-I Select and use a National Institute of Occupational Safety and Health (NIOSH) approved air purifying respirator, Inspect condition and hazardous operations and materials in accordance with federal, state, and local regulation (e.g. OSHA Standard 1910.134) and applicable state and local regulation. HP-I

Nonstructural Analysis and Damage Repair - Proposed Standards

	Indicator # INA 1 - Students will demonstrate understanding of auto body safety precautions.
Level 2: Skill/Concept	NA 1.1 Demonstrate auto body technology safety practices. Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations Locate procedures and precautions that may apply to the vehicle being repaired Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures before inspecting or replacing components Select and use a National Institute of Occupational Safety and Health (NIOSH) approved air purifying respirator, inspect condition and hazardous operations and materials in accordance with federal, state, and local regulation (e.g. OSHA Standard 1910.134) and applicable state and local regulation

Nonstructural Analysis and Damage Repair - Current Standards

	Indicator # NA 2 - Students will learn and demonstrate preparation for nonstructural repair.
Level 2: Skill/Concept	NA 2.1 Analyze and demonstrate processes involved in preparation for nonstructural inspection and repair Examples: Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan. HP-I Inspect, remove, label, store, and reinstall exterior trim and moldings. HP-I Inspect, remove, label, store, and reinstall interior trim and components. HP-I Inspect, remove, label, store, and reinstall body panels and components that may interfere with, or be damaged during, repair. HP-I Inspect, remove, protect label, store, and reinstall vehicle mechanical and electrical components that may interfere with, or be damaged during, repair. HP-G Protect panels, glass, interior parts, and other vehicles adjacent to the repair area. HP-I Soap and water wash entire vehicle; complete pre-repair inspection checklist. HP-I Prepare damaged area using water-based and solvent-based cleaners. HP-I Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs. HP-I Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair. HP-I

Nonstructural Analysis and Damage Repair - Proposed Standards

	Indicator # NA 2 - Students will learn and demonstrate preparation for nonstructural repair.
Level 2: Skill/Concept	NA 2.1 Analyze and demonstrate processes involved in preparation for nonstructural inspection and repair. Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan Inspect, remove, label, store, and reinstall exterior trim and moldings Inspect, remove, label, store, and reinstall interior trim and components Inspect, remove, label, store, and reinstall body panels and components that may interfere with, or be damaged during, repair Inspect, remove, protect label, store, and reinstall vehicle mechanical and electrical components that may interfere with, or be damaged during, repair Protect panels, glass, interior parts, and other vehicles adjacent to the repair area Soap and water wash entire vehicle; complete pre-repair inspection checklist Prepare damaged area using water-based and solvent-based cleaners Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair

Nonstructural Analysis and Damage Repair - Current Standards

	Indicator # NA 3 - Students will learn and demonstrate procedures for outer body panel repairs, replacements and adjustments.
Level 2: Skill/ Concept	NA 3.1 Demonstrate the processes involved in outer body panel repairs, replacements, and adjustments Examples: Inspect/locate direct, indirect, or hidden damage and direction of impact. HP-I Inspect, remove, replace, and align hood, hood hinges, and hood latch. HP-I Inspect, remove, replace, and align deck lid, lid hinges, and lid latch. HP-I Inspect, remove, replace, and align doors, latches, hinges, and related hardware. HP-I Inspect, remove, replace and align tailgates, hatches, liftgates and sliding doors. HP-G Inspect, remove, replace, and align bumpers, covers, reinforcements, guards, impact absorbers, and mounting hardware. HP-I Inspect, remove, replace and align fenders, and related panels. HP-I Restore corrosion protection during and after the repair. HP-I Restore sound deadeners and foam materials. HP-G

Nonstructural Analysis and Damage Repair - Proposed Standards

	Indicator # NA 3 - Students will learn and demonstrate procedures for outer body panel repairs, replacements and adjustments.
Level 2: Skill/Concept	NA 3.1 Demonstrate the processes involved in outer body panel repairs, replacements, and adjustments. Inspect/locate direct, indirect, or hidden damage and direction of impact Inspect, remove, replace, and align hood, hood hinges, and hood latch Inspect, remove, replace, and align deck lid, lid hinges, and lid latch Inspect, remove, replace, and align doors, latches, hinges, and related hardware Inspect, remove, replace and align tailgates, hatches, liftgates and sliding doors Inspect, remove, replace, and align bumpers, covers, reinforcements, guards, impact absorbers, and mounting hardware Inspect, remove, replace and align fenders, and related panels Discuss effects of inspection, removal and replacement of cameras, sensors, other electrical components Restore corrosion protection during and after the repair Restore sound deadeners and foam materials Diagnose and repair water leaks, dust leaks, and wind noise

Nonstructural Analysis and Damage Repair - Current Standards

	Indicator # NA 4 - Students will perform metal finishing and body filling.
Level 2: Skill/Concept	NA 4.1 Understand and demonstrate the processes involved in metal finishing and body filling Examples: Prepare a panel for body filler by abrading or removing the coatings; featheredge and refine scratches before the application of body filler.HP-I Locate and repair surface irregularities on a damaged body panel using power tools, hand tools, and weld-on pulling attachments. HP-I Demonstrate hammer and dolly techniques. HP-I Heat shrink stretched panel areas to proper contour. HP-G Cold shrink stretched panel areas to proper contour. HP-I Identify body filler defects; correct the cause and condition (pinholing, ghosting, staining, over catalyzing, etc.). HP-I Identify different types of body fillers. HP-G Shape body filler to contour; finish sand. HP-I Straighten contours of damaged panels to a suitable condition for body fillings or metal finishing using power tools, hand tools, and weld-on pulling attachments. HP-I

	Indicator # NA 5 - Students will demonstrate service procedures for moveable glass and hardware.
Level 2: Skill/Concept	NA 5.1 Understand and demonstrate proper repair procedures for moveable glass and hardware Examples: Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls. HP-I Inspect, adjust, repair, remove, reinstall or replace weather-stripping. HP-G Inspect, repair or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. HP-G Initialize electrical components as needed. HP-G

Nonstructural Analysis and Damage Repair - Proposed Standards

	Indicator # NA 4 - Students will perform metal finishing and body filling.
Level 2: Skill/Concept	NA 4.1 Understand and demonstrate the processes involved in metal finishing and body filling. Prepare a panel for body filler by abrading or removing the coatings, featheredge, and refine scratches before the application of body filler Locate and repair surface irregularities on a damaged body panel using power tools, hand tools, and weld-on pulling attachments Demonstrate hammer and dolly techniques Heat shrink stretched panel areas to proper contour Cold shrink stretched panel areas to proper contour Identify body filler defects; correct the cause and condition (pinholing, ghosting, staining, over catalyzing, etc.) Identify different types of body fillers Shape body filler to contour; finish sand Straighten contours of damaged panels to a suitable condition for body fillings or metal finishing using power tools, hand tools, and weld-on pulling attachments

	Indicator # NA 5 - Students will demonstrate service procedures for moveable glass and hardware.
Level 2: Skill/Concept	NA 5.1 Understand and demonstrate proper repair procedures for moveable glass and hardware. Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls Inspect, adjust, repair, remove, reinstall or replace weather-stripping Inspect, repair or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs Initialize electrical components as needed

Nonstructural Analysis and Damage Repair - Current Standards

	Indicator # NA 6 - Students will demonstrate plastic repair.
Level 2: Skill/Concept	NA 6.1 Understand and demonstrate repair processes and use of adhesives involved in plastic repair Examples: Identify the types of plastic; determine reparability. HP-I Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures. HP-I Repair rigid, semi-rigid, and flexible plastic panels. HP-I Remove or repair damaged areas from rigid exterior composite panels. HP-G Replace bonded rigid exterior composite body panels; straighten or align panel supports. HP-G

Nonstructural Analysis and Damage Repair - Proposed Standards

	Indicator # NA 6 - Students will demonstrate plastic repair.
Level 2: Skill/Concept	NA 6.1 Understand and demonstrate repair processes and use of adhesives involved in plastic repair. Identify the types of plastic; determine reparability Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures Repair rigid, semi-rigid, and flexible plastic panels Remove or repair damaged areas from rigid exterior composite panels Replace bonded rigid exterior composite body panels; straighten or align panel supports

	Indicator # NA 7 - Students will demonstrate appropriate business practices.
Level 3: Strategic Thinking	NA 7.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic Thinking	NA 7.2 Apply ethical business practices.
Level 3: Strategic Thinking	NA 7.3 Apply excellent customer relations practices.

Auto Body Painting and Refinishing - Current Standards

	Indicator # PFR 1 - Auto body students understand painting and refinishing safety precautions.
Level 2: Skill/Concept	PFR 1.1 Demonstrate auto body painting and refinishing safety practices Examples: Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. HP-I Identify safety and personal health hazards according to Occupational Safety and Health Administration (OSHA) guidelines and the "Right to Know Law." HP-I Inspect spray environment and equipment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards. HP-I Select and use a National Institute of Occupational Safety and Health (NIOSH) approved air purifying respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation. HP-I Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.). HP-I

	Indicator # PFR 2 - Students will understand surface preparation procedures.
Level 2: Skill/Concept	PFR 2.1 Analyze areas for surface preparation Examples: Inspect and identify type of finish, surface condition and film thickness; develop and document a plan for refinishing using a total product system. HP-G Identify a complimentary color or shade of undercoat to improve coverage. HP-G Identify types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials needed, preparation and refinishing procedures. HP-I Identify metal parts to be refinished; determine material needed, preparation, and refinishing procedures. HP-I

Auto Body Painting and Refinishing - Proposed Standards

	Indicator # PFR 1 - Students will understand painting and refinishing safety precautions.
Level 2: Skill/Concept	PFR 1.1 Demonstrate auto body painting and refinishing safety practices Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials according to federal, state, and local regulations Identify safety and personal health hazards according to Occupational Safety and Health Administration (OSHA) guidelines and the "Right to Know Law" Inspect spray environment and equipment to ensure compliance with federal, state, and local regulations, and for safety and cleanliness hazards Select and use a National Institute of Occupational Safety and Health (NIOSH) approved air purifying respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.)

	Indicator # PFR 2 - Students will understand surface preparation procedures.
Level 2: Skill/Concept	PFR 2.1 Analyze areas for surface preparation. Inspect and identify type of finish, surface condition and film thickness; develop and document a plan for refinishing using a total product system Identify a complimentary color or shade of undercoat to improve coverage Identify types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials needed, preparation and refinishing procedures Identify metal parts to be refinished; determine material needed, preparation, and refinishing procedures

Auto Body Painting and Refinishing - Current Standards

Level 2: Skill/Concept	PFR 2.2 Prepare automotive surface to be refinished Examples: Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants. HP-I Inspect and identify type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system. HP-G Remove paint finish as needed. HP-I Dry- or wet-sand areas to be refinished. HP-I Featheredge areas to be refinished. HP-I Apply suitable metal treatment or primer in accordance with total paint product systems. HP-I Mask and protect areas that will not be refinished. HP-I Demonstrate different masking techniques (recess/back masking, foam door type, etc.). HP-G Mix primer, primer-surfacer and primer-sealer. HP-I Identify a complimentary color or shade of undercoat to improve coverage. HP-G Apply primer onto surface of repaired area. HP-I Apply two-component finishing filler to minor surface imperfections. HP-I Block sand area to which primer-surfacer has been applied. HP-I Dry-sand area to which finishing filler has been applied. HP-I Remove dust from area to be refinished, including cracks or moldings on adjacent areas. HP-I Clean area to be refinished using a final cleaning solution. HP-I Remove, with a tack rag, any dust or lint particles from the area to be refinished. HP-I Apply suitable primer sealer to the area being refinished. HP-I Scuff sand to remove nibs or imperfections from a sealer. HP-I Apply stone chip resistant coating. HP-G Restore caulking and seam sealers to repaired areas. HP-G Prepare adjacent panels for blending. HP-I

	Indicator # PFR 3 - Students will understand spray gun and related equipment operation.
Level 2: Skill/Concept	PFR 3.1 Inspect, prepare and demonstrate usage of spray gun and related equipment Examples: Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment). HP-I Select spray gun setup (fluid needle, nozzle, and cap) for product being applied. HP-I Test and adjust spray gun using fluid, air and pattern control valves. HP-I Demonstrate an understanding of the operation of pressure spray equipment. HP-G

	Indicator # PFR 4 - Students will understand and perform paint mixing, matching, and applying automotive refinishing materials.

Auto Body Painting and Refinishing - Proposed Standards

Level 2: Skill/Concept	PFR 2.2 Prepare automotive surface to be refinished. Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants Inspect and identify type of finish, surface condition, and film thickness Develop and document a plan for refinishing using a total product system Remove paint finish as needed Dry- or wet-sand areas to be refinished Featheredge areas to be refinished Apply suitable metal treatment or primer in accordance with total paint product systems Mask and protect areas that will not be refinished Demonstrate different masking techniques (recess/back masking, foam door type, etc.) Mix primer, primer-surfacer and primer-sealer Identify a complimentary color or shade of undercoat to improve coverage Apply primer onto surface of repaired area Apply two-component finishing filler to minor surface imperfections Block sand area to which primer-surfacer has been applied Dry-sand area to which finishing filler has been applied Remove dust from area to be refinished, including cracks or moldings on adjacent areas Clean area to be refinished using a final cleaning solution Remove, with a tack rag, any dust or lint particles from the area to be refinished Apply suitable primer sealer to the area being refinished Scuff sand to remove nibs or imperfections from a sealer Apply stone chip resistant coating Restore caulking and seam sealers to repaired areas Prepare adjacent panels for blending

	Indicator # PFR 3 - Students will understand spray gun and related equipment operation.
Level 2: Skill/Concept	PFR 3.1 Inspect, prepare and demonstrate usage of spray gun and related equipment. Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment) Select spray gun setup (fluid needle, nozzle, and cap) for product being applied Test and adjust spray gun using fluid, air and pattern control valves Demonstrate an understanding of the operation of pressure spray equipment

	Indicator # PFR 4 - Students will understand and perform paint mixing, matching, and applying automotive refinishing materials to achieve invisible repair.

Auto Body Painting and Refinishing - Current Standards

Level 1: Recall	PFR 4.1 Understand the process for mixing and matching automotive paint Examples: Identify color code by manufacturer's vehicle information label. HP-I Shake, stir, reduce, catalyze/activate, and strain refinish materials. HP-I Identify product expiration dates as applicable. HP-G Identify and mix paint using a formula. HP-I Identify poor hiding colors; determine necessary action. HP-G Identify alternative color formula to achieve a blendable match. HP-I Identify the material's equipment and preparation differences between solvent and waterborne technologies. HP-G
Level 2: Skill/Concept	PFR 4.2 Correctly apply automotive paint to prepared surfaces Examples: Apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied. HP-I Apply selected product on test or let-down panel; check for color match. HP-I Apply single stage topcoat. HP-G Apply basecoat/clearcoat for panel blending and panel refinishing. HP-I Apply basecoat/clearcoat for overall refinishing. HP-G Remove nibs or imperfections from basecoat. HP-I Refinish plastic parts. HP-I Apply multi-stage coats for panel blending and overall refinishing. HP-G Tint color using formula to achieve a blendable match. HP-I

	Indicator # PFR 5 - Students will identify causes and correction procedures for paint defects.
Level 2: Skill/Concept	PFR 5.1 Identify paint defects, understand the causes, and correct paint defects Examples: Identify blistering (raising of the paint surface, air entrapment); correct the cause(s) and the condition. HP-G Identify a dry spray appearance in the paint surface; correct the cause(s) and the condition. HP-I Identify the presence of fish-eyes (crater-like openings) in the finish; correct the cause(s) and the condition. HP-I dentify lifting; correct the cause(s) and the condition Identify clouding (mottling and streaking in metallic finishes); correct the cause(s) and the condition Identify orange peel; correct the cause(s) and the condition

Auto Body Painting and Refinishing - Proposed Standards

Level 1: Recall	PFR 4.1 Understand the process for mixing and matching automotive paint. Identify color code by manufacturer's vehicle information label Shake, stir, reduce, catalyze/activate, and strain refinish materials Identify product expiration dates as applicable Identify and mix paint using a formula Identify poor hiding colors; determine necessary action Identify alternative color formula to achieve a blendable match Identify the material's equipment and preparation differences between solvent and waterborne technologies
Level 2: Skill/Concept	PFR 4.2 Correctly apply automotive paint to prepared surfaces. Apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied Apply selected product on test or let-down panel; check for color match Apply single stage topcoat Apply basecoat/clearcoat for panel blending and panel refinishing Apply basecoat/clearcoat for overall refinishing Remove nibs or imperfections from basecoat Refinish plastic parts Apply multi-stage coats for panel blending and overall refinishing Tint color using formula to achieve a blendable match

	Indicator # PFR 5 - Students will identify causes and correction procedures for paint defects.
Level 2: Skill/Concept	PFR 5.1 Identify paint defects, understand the causes, and correct paint defects such as: Identify blistering (raising of the paint surface, air entrapment); correct the cause(s) and the condition Identify a dry spray appearance in the paint surface; correct the cause(s) and the condition Identify the presence of fish-eyes (crater-like openings) in the finish; correct the cause(s) and the condition Identify lifting; correct the cause(s) and the condition Identify clouding (mottling and streaking in metallic finishes); correct the cause(s) and the condition Identify orange peel; correct the cause(s) and the condition

Auto Body Painting and Refinishing - Current Standards

	Identify overspray; correct the cause(s) and the condition Identify solvent popping in freshly painted surface; correct the cause(s) and the condition Identify sags and runs in paint surface; correct the cause(s) and the condition Identify sanding marks or sand scratch swelling; correct the cause(s) and the condition Identify contour mapping/edge mapping; correct the cause(s) and the condition Identify color difference (off-shade); correct the cause(s) and the condition Identify tape tracking; correct the cause(s) and the condition Identify low gloss condition; correct the cause(s) and the condition Identify poor adhesion; correct the cause(s) and the condition Identify paint cracking (shrinking, splitting, crowsfeet or line-checking, micro-checking, etc.); correct the cause(s) and the condition Identify corrosion; correct the cause(s) and the condition Identify dirt or dust in the paint surface; correct the cause(s) and the condition Identify water spotting; correct the cause(s) and the condition Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition Identify die-back conditions (dulling of the paint film showing haziness); correct the cause(s) and the condition
	Indicator # PRF 6 - Students will understand and perform detailing of paint refinishing.
Level 2: Skill/Concept	PRF 6.1 Perform final vehicle inspection Examples: Perform vehicle clean-up; complete quality control using a checklist. HP-I Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc. HP-G Sand, buff and polish fresh or existing finish to remove defects as required. HP-I Clean interior, exterior, and glass. HP-I Clean body openings (door jambs and edges, etc.). HP-I Remove overspray. HP-I

Auto Body Painting and Refinishing - Proposed Standards

	Identify overspray; correct the cause(s) and the condition Identify solvent popping in freshly painted surface; correct the cause(s) and the condition Identify sags and runs in paint surface; correct the cause(s) and the condition Identify sanding marks or sand scratch swelling; correct the cause(s) and the condition Identify contour mapping/edge mapping; correct the cause(s) and the condition Identify color difference (off-shade); correct the cause(s) and the condition Identify tape tracking; correct the cause(s) and the condition Identify low gloss condition; correct the cause(s) and the condition Identify poor adhesion; correct the cause(s) and the condition Identify paint cracking (shrinking, splitting, crowsfeet or line-checking, micro-checking, etc.); correct the cause(s) and the condition Identify corrosion; correct the cause(s) and the condition Identify dirt or dust in the paint surface; correct the cause(s) and the condition Identify water spotting; correct the cause(s) and the condition Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition Identify die-back conditions (dulling of the paint film showing haziness); correct the cause(s) and the condition
	Indicator # PRF 6 - Students will understand and perform detailing of paint refinishing.
Level 2: Skill/Concept	PRF 6.1 Perform final vehicle inspection. Perform vehicle clean-up; complete quality control using a checklist Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc. Sand, buff and polish fresh or existing finish to remove defects as required Clean interior, exterior, and glass Clean body openings (door jambs and edges, etc.) Remove overspray
	Indicator # PRF 7 - Students will demonstrate appropriate business practices.
Level 3: Strategic Thinking	PRF 7.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic Thinking	PRF 7.2 Apply ethical business practices.
Level 3: Strategic Thinking	PRF 7.3 Apply excellent customer relations practices.

Intro to Vehicle Systems & Maintenance Current Standards

	Indicator # IVSM 1 -Students will demonstrate automotive technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements, for an automotive repair facility.
Level 2: Skill/Concept	IVSM 1.1 Demonstrate automotive technician safety practices Examples: Use protective clothing and safety equipment according to OSHA and EPA requirements. Summarize the proper use of safety data sheet (SDS) Demonstrate the proper use of hand and power tools Examine basic shop safety using OSHA standards Maintain a portfolio of successfully completed safety and equipment exams
Level 2: Skill/Concept	IVSM 1.2 Understand the way in which waste gasses, emissions, and other environmentally destructive substances are generated and their effects on the environment Examples: Understand the formation of carbon monoxide in internal combustion engines and the effects on the environment Study the effects of vehicle emissions on the eco-system Compare the emissions of hydro-fuel cell, electric, and gasoline powered vehicles

	Indicator # IVSM2 - Students explore career opportunities in the transportation, distribution and logistics career cluster and develop leadership skills.
Level 2: Skill/Concept	IVSM 2.1 Demonstrate independent and teamwork skills Examples: Participate in Career and Technical Student Organizations (CTSO's) Develop a teamwork project (change oil, tire rotation)

Intro to Vehicle Systems & Maintenance Proposed Standards

	Indicator # IVSM 1 - Students will demonstrate automotive technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements, for an automotive repair facility.
Level 2: Skill/Concept	IVSM 1.1 Demonstrate automotive technician safety practices. Use protective clothing and safety equipment according to OSHA and EPA requirements Summarize the proper use of safety data sheet (SDS) Demonstrate the proper use of hand and power tools Examine basic shop safety using OSHA standards Maintain a portfolio of successfully completed safety and equipment exams
Level 2: Skill/Concept	IVSM 1.2 Understand the way in which waste gasses, emissions, and other environmentally destructive substances are generated and their effects on the environment. Understand the formation of carbon monoxide in internal combustion engines and the effects on the environment Study the effects of vehicle emissions on the ecosystem Compare the emissions of hydro-fuel cell, electric, and gasoline powered vehicles

	Indicator # IVSM 2 - Students explore career opportunities in the Transportation, Distribution and Logistics career cluster and develop leadership skills.
Level 2: Skill/Concept	IVSM 2.1 Demonstrate independent and teamwork skills. Develop a teamwork project (change oil, tire rotation)

Intro to Vehicle Systems & Maintenance Current Standards

Level 2: Skill/Concept	IVSM 2.2 Explore career opportunities within the industry Examples: Utilize guidance software to research and report on career opportunities Update student portfolios and personal learning plans
	Indicator # IVSM3 - Students will demonstrate an understanding of the safe and appropriate use of tools, equipment and work processes.
Level 2: Skill/Concept	ITVSM 3.1. Understand and use the appropriate tools and equipment Examples: Demonstrate proper usage of tools and equipment Inspect and perform preventative and required maintenance of tools and equipment
Level 2: Skill/Concept	IVSM 3.2. Diagnose and analyze components and systems Examples: Use DMM (digital multi-meter) to measure electrical voltage, amps and resistance Demonstrate use of a load tester on a battery, charging, and starting systems
Level 2: Skill/Concept	IVSM 3.3. Select and demonstrate proper use of measuring devices and mathematical formulas Examples: Identify the measuring instruments needed to assure proper tolerance ranges can be achieved (micrometer, caliper) Identify, apply, and calculate mathematical formulas that apply to the automotive industry (Ohm's Law, cubic displacement, horse power)

Intro to Vehicle Systems & Maintenance Proposed Standards

Level 2: Skill/Concept	IVSM 2.2 Explore career opportunities within the industry. Utilize guidance software to research and report on career opportunities Update student portfolios and personal learning plans
	Indicator # IVSM 3 - Students will demonstrate an understanding of the safe and appropriate use of tools, equipment and work processes.
Level 2: Skill/Concept	ITVSM 3.1. Understand and use the appropriate tools and equipment. Demonstrate proper usage of tools and equipment Inspect and perform preventative and required maintenance of tools and equipment
Level 2: Skill/Concept	IVSM 3.2. Diagnose and analyze components and systems. Use DMM (digital multi-meter) to measure electrical voltage, amps and resistance Demonstrate use of a load tester on a battery, charging, and starting systems
Level 2: Skill/Concept	IVSM 3.3. Select and demonstrate proper use of measuring devices and mathematical formulas. Identify the measuring instruments needed to assure proper tolerance ranges can be achieved (micrometer, caliper) Identify, apply, and calculate mathematical formulas that apply to the automotive industry (Ohm's Law, cubic displacement, horse power)

Intro to Vehicle Systems & Maintenance Current Standards

Level 2: Skill/Concept	IVSM 3.4. Use and understand standard and metric units of measurements Examples: Measure brake rotor with caliper and compare to specifications Measure tread width and mathematically calculate the sidewall height of the tire using the aspect ratio of the tire Convert standard units and metric units
Level 2: Skill/Concept	IVSM 3.5. Use measurement devices to diagnose and repair vehicles and components following industry standards Examples: Identify tools and equipment used to measure caster, camber and toe Measure resistance in spark plug high-tension leads to assure proper operation of ignition system
Level 2: Skill/Concept	IVSM 3.6. Demonstrate access and proper usage of Technical Service Bulletins (TSB) and service manuals Examples: Utilize service information to find vehicle specifications Use vehicle owner's manual to find proper quantity and quality of oil to use to perform an engine oil and filter change Use scan tool to pull trouble codes from vehicle's computer diagnostic system
Level 3: Strategic Thinking	IVSM. 3.7. Comprehend the importance of calibration processes, systems, techniques using various measuring and testing devices Examples: Calibrate of a dial indicator Check the accuracy of an outside/inside micrometer Calibrate an Ohm meter

Intro to Vehicle Systems & Maintenance Proposed Standards

Level 2: Skill/Concept	IVSM 3.4. Use and understand standard and metric units of measurements. Measure brake rotor with caliper and compare to specifications Measure tread width and mathematically calculate the sidewall height of the tire using the aspect ratio of the tire Convert standard units and metric units
Level 2: Skill/Concept	IVSM 3.5. Use measurement devices to diagnose and repair vehicles and components following industry standards. Identify tools and equipment used to measure caster, camber and toe Measure resistance in spark plug high-tension leads to assure proper operation of ignition system
Level 2: Skill/Concept	IVSM 3.6. Demonstrate access and proper usage of Technical Service Bulletins (TSB) and service manuals. Utilize service information to find vehicle specifications Use vehicle owner's manual to find proper quantity and quality of oil to use to perform an engine oil and filter change Use scan tool to pull trouble codes from vehicle's computer diagnostic system
Level 3: Strategic Thinking	IVSM. 3.7. Comprehend the importance of calibration processes, systems, and techniques using various measuring and testing devices. Calibrate a dial indicator Check the accuracy of an outside/inside micrometer Calibrate an Ohm meter

Intro to Vehicle Systems & Maintenance Current Standards

	Indicator # IVSM 4 - Students understand scientific principles in relation to chemical, mechanical, and physical functions of various power plants and vehicle systems.
Level 2: Skill/Concept	IVSM 4.1. Demonstrate knowledge of the operation of the internal combustion engine Examples: Identify different types of gasoline and diesel engines and 2 & 4 stroke engines
Level 2: Skill/Concept	IVSM 4.2. Demonstrate a basic understanding of the operating principles of heating and air conditioning systems Examples: Identify the components of heating and air conditioning systems Describe the air flow and refrigerant flow in heating and air conditioning systems
Level 2: Skill/Concept	IVSM 4.3. Compare alternate fuel and power sources Examples: Identify and research hybrid, fuel cell, and electric vehicles for a written report or presentation

	Indicator # IVSM 5 - Students perform and document maintenance procedures according to manufacturers' specifications.
Level 3: Strategic Thinking	IVSM 5.1. Demonstrate the procedures and practices for manufacturer's repair and maintenance schedules Examples: Change oil and filter according to manufacturer's specs Check proper inflation and condition of vehicle tires Check and refill critical fluids Inspect belts and hoses

Intro to Vehicle Systems & Maintenance Proposed Standards

	Indicator # IVSM 4 - Students understand scientific principles in relation to chemical, mechanical, and physical functions of various power plants and vehicle systems.
Level 2: Skill/Concept	IVSM 4.1. Demonstrate knowledge of the operation of the internal combustion engine. Identify different types of gasoline and diesel engines and 2 and 4 stroke engines Compare the similarities and differences in a 2 and 4 stroke cycle
Level 2: Skill/Concept	IVSM 4.2. Demonstrate a basic understanding of the operating principles of heating and air conditioning systems. Identify the components of heating and air conditioning systems Describe the air flow and refrigerant flow in heating and air conditioning systems
Level 2: Skill/Concept	IVSM 4.3. Compare alternate fuel and power sources. Identify and research hybrid, fuel cell, and electric vehicles and explain how these vehicles work for a written report or presentation Understand fundamental hazards of dealing with hybrid, fuel cell, and electric vehicles

	Indicator # IVSM 5 - Students perform and document maintenance procedures according to manufacturers' specifications.
Level 3: Strategic Thinking	IVSM 5.1. Demonstrate the procedures and practices for manufacturers' repair and maintenance schedules. Change oil and filter according to manufacturer's specs Check proper inflation and condition of vehicle tires Check and refill critical fluids Inspect belts and hoses

Intro to Vehicle Systems & Maintenance Current Standards

Level 3: Strategic Thinking	IVSM 5.2. Demonstrate the use of service information to repair a vehicle Examples: Utilize service information to find vehicle specifications Use vehicle owner manual to find proper quantity and quality of oil to use to perform an engine oil and filter change
Level 3: Strategic Thinking	IVSM 5.3. Demonstrate proper procedures for work order, customer information, and billing information completion Examples: Demonstrate the proper use of a repair order that contains critical information Complete work orders with customer, labor, and parts information
	Indicator # IVSM 6 - Students will understand and apply appropriate business practices.
Level 3: Strategic Thinking	IVSM 6.1 Demonstrate the importance of, and the procedures for, maintaining accurate records Examples: Recording the mileage of a vehicle on the work order for warranty purposes Billing of customers and collection of funds Taxes and required taxable income

Intro to Vehicle Systems & Maintenance Proposed Standards

Level 3: Strategic Thinking	IVSM 5.2. Demonstrate the use of service information to repair a vehicle. Utilize service information to find vehicle specifications Use vehicle owner manual to find proper quantity and quality of oil to use to perform an engine oil and filter change
Level 3: Strategic Thinking	IVSM 5.3 Demonstrate tire maintenance/tire care (tire rotation, tread depth, air pressure, and tire wear types).
	Indicator # IVSM 6 - Students explore considerations when purchasing, owning, maintaining, and selling a vehicle.
Level 2: Skill/Concept	IVSM 6.1 Understand and demonstrate skills for purchasing, owning, maintaining and selling a vehicle. Demonstrate knowledge of purchasing a vehicle, including how to select a vehicle Explore various vehicle types Compare and contrast buying from a dealer versus purchasing from a private party, and buying versus leasing a vehicle Understand the costs associated with owning a vehicle including licensing, registration, insurance, loans, interest rates, credit scores, depreciation and other factors

Intro to Vehicle Systems & Maintenance Current Standards

Level 3: Strategic Thinking	IVSM 6.2 Understand the concept and application of ethical business practices Examples: Marking up parts for profit Installation of quality new and/or used parts Making only necessary repairs
Level 3: Strategic Thinking	IVSM 6.3 Understand the concept and application of acceptable customer relations practices Examples: Return all settings of radio, seat and steering wheel positions to customer's settings Respect customer's opinions of the vehicle's problems
	Indicator # IVSM 7 - Students will understand and apply appropriate vehicle service and repairs.
Level 2: Skill/Concept	IVSM 7.1 Perform general engine diagnosis and repair in professional manner within National Automotive Technicians Education Foundation (NATEF) standards Examples: Perform engine compression test (dry/wet) Set gap, and replace spark plugs and wires as needed
Level 2: Skill/Concept	IVSM 7.2 Demonstrate ability to maintain and service lubrication and cooling systems Examples: Analyze engine oil pressure Remove and install an oil pressure sending unit Inspect and test cooling system and pressure cap
Level 2: Skill/Concept	IVSM 7.3 Understand the basic operation of computer controlled systems, and location and identification of related parts Examples: Use a code reader and or scanner to diagnose computer system failure Locate and test computer components Clear trouble codes from computer with scanner

Intro to Vehicle Systems & Maintenance Proposed Standards

	Indicator # IVSM 7 - Students will understand and apply appropriate vehicle service and repairs.
Level 2: Skill/Concept	IVSM 7.1 Perform general automotive diagnosis and repair in professional manner within National Automotive Technicians Education Foundation (NATEF) standards. Perform engine compression test (dry/wet) Set gap and replace spark plugs and wires as needed
Level 2: Skill/Concept	IVSM 7.2 Perform basic roadside maintenance and repairs, including simple diagnostics. Replace a tire and rim, change wiper blades, and demonstrate other basic maintenance tasks. Diagnose what to do if check engine light comes on Check gauges for sufficient oil pressure, fuel, and other indications
Level 1: Recall and Recognition	IVSM 7.3 Understand what items should be in a vehicle in case of problems. Flashlights, blankets, basic food, jumper cables, tow strap, small/folding shovel, first aid kit, candle, safety triangle/flares, can of green slime, and other basic necessities.

Intro to Vehicle Systems & Maintenance Current Standards

	Indicator # IVSM 8 - Students understand the function, principles and operation of electrical systems using manufacturers' and industry standards.
Level 2: Skill/Concept	IVSM 8.1 Demonstrate an understanding of how to diagnose and repair electrical systems Examples: Clean battery terminals and electrical connections Use DVOM (digital volt ohm meter) to check voltage drop at connections Use DVOM to check resistance in electrical circuits
Level 2: Skill/Concept	IVSM8.2 Diagnose and service batteries Examples: Check battery state-of-charge with hydrometer or DVOM Check battery load capacity with load tester Remove and replace battery
Level 2: Skill/Concept	IVSM 8.3 Demonstrate knowledge needed to diagnose and repair starting and charging systems Examples: Check starting system draw with starting system tester Check charging system output with charging system tester

Intro to Vehicle Systems & Maintenance Proposed Standards

Level 2: Skill/Concept	IVSM 7.4 Demonstrate ability to maintain and service lubrication and cooling systems. Analyze engine oil pressure Remove and install an oil pressure sending unit Inspect and test cooling system and pressure cap
Level 2: Skill/Concept	IVSM 7.5 Understand the basic operation of computer-controlled systems, and location and identification of related parts. Use a code reader and or scanner to diagnose computer system failure Locate and test computer components Clear trouble codes from computer with scanner

	Indicator # IVSM 8 - Students understand the function, principles and operation of electrical systems using manufacturers' and industry standards.
Level 2: Skill/Concept	IVSM 8.1 Demonstrate an understanding of how to diagnose and repair electrical systems. Clean battery terminals and electrical connections Use DVOM (digital volt ohm meter) to check voltage drop at connections Use DVOM to check resistance in electrical circuits
Level 2: Skill/Concept	IVSM8.2 Diagnose and service batteries. Check battery state-of-charge with hydrometer or DVOM Check battery load capacity with load tester Remove and replace battery
Level 2: Skill/Concept	IVSM 8.3 Demonstrate knowledge needed to diagnose and repair starting and charging systems. Check starting system draw with starting system tester Check charging system output with charging system tester

Intro to Vehicle Systems & Maintenance Current Standards

Level 2: Skill/Concept	IVSM 8.4 Demonstrate ability to properly diagnose and repair lighting systems Examples: Adjust headlights Replace bulbs Test electrical system circuits and components
Level 2: Skill/Concept	IVSM 8.5 Demonstrate ability to properly diagnose and repair heating and air conditioning systems Examples: Test strength and condition of coolant Remove and replace coolant and flush if needed Test output temperature of A/C system
	Indicator # IVSM 9 - Students understand the function and principles of automotive brake, steering and suspension, automatic and manual transmission systems.
Level 2: Skill/Concept	IVSM 9.1 Demonstrate how to diagnose and service hydraulic and friction systems Examples: Check brake pad dimensions and conditions Check condition of rotor and/or drum Check for leaks, cracks or bulges in brake lines Check emergency brake cable operation
Level 2: Skill/Concept	IVSM 9.2 Demonstrate how to diagnose and service steering and suspension systems Examples: Check for proper power steering fluid condition and level Check condition of front and rear struts and/or shocks
Level 2: Skill/Concept	IVSM 9.3 Demonstrate how to diagnose and service automatic and manual transmissions Examples: Check automatic and manual transmission fluid levels Replace automatic transmission fluid and filter

Intro to Vehicle Systems & Maintenance Proposed Standards

Level 2: Skill/Concept	IVSM 8.4 Demonstrate ability to properly diagnose and repair lighting systems. Adjust headlights Remove and replace headlight/taillight bulbs Replace bulbs Test electrical system circuits and components
Level 2: Skill/Concept	IVSM 8.5 Demonstrate ability to properly diagnose and repair heating and air conditioning systems. Test strength and condition of coolant Remove and replace coolant and flush if needed Test output temperature of A/C system
	Indicator # IVSM 9 - Students understand the function and principles of automotive brake, steering and suspension, automatic and manual transmission systems.
Level 2: Skill/Concept	IVSM 9.1 Demonstrate how to diagnose and service hydraulic and friction systems. Check brake pad dimensions and conditions Check condition of rotor and/or drum Check for leaks, cracks or bulges in brake lines Check emergency brake cable operation
Level 2: Skill/Concept	IVSM 9.2 Demonstrate how to diagnose and service steering and suspension systems. Check for proper power steering fluid condition and level Check condition of front and rear struts and/or shocks
Level 2: Skill/Concept	IVSM 9.3 Demonstrate how to diagnose and service automatic and manual transmissions. Check automatic and manual transmission fluid levels Replace automatic transmission fluid and filter

Maintenance and Light Repair
Current Standards

	Indicator # MLR 1 - Students will demonstrate safety practices for automotive repair.
Level 2: Skill/Concept	MLR 1.1 Identify and demonstrate general shop safety rules and procedures using Occupational Safety and Health Administration (OSHA) standards

	Indicator # MLR 2 - Students will demonstrate an understanding of the safe and appropriate use of tools and equipment.
Level 2: Skill/Concept	Sub-indicator MLR 2.1 Utilize safe procedures for handling of tools and equipment

Maintenance and Light Repair
Proposed Standards

	Indicator # MLR 1 - Students will demonstrate safety practices for automotive repair.
Level 2: Skill/Concept	MLR 1.1 Identify and demonstrate general shop safety rules and procedures using Occupational Safety and Health Administration (OSHA) standards. Examine basic shop safety using OSHA 10 standards Utilize proper ventilation procedures for working within the lab/shop area Identify marked safety areas Identify location and types of fire extinguishers and other fire safety equipment Identify location and use of eyewash stations Identify location of posted evacuation routes Demonstrate knowledge of industry requirements for personal protective clothing and equipment Identify and wear proper clothing, hairstyles and jewelry for lab/shop activities

	Indicator # MLR 2 - Students will demonstrate an understanding of the safe and appropriate use of tools and equipment.
Level 2: Skill/Concept	LR 2.1 Utilize safe procedures for handling of tools and equipment. Identify and use proper placement of floor jacks and jack stands Identify and use proper procedures for safe lift operation Demonstrate knowledge of safety aspects of supplemental restraint systems (SRS), electronic brake control systems and hybrid vehicle high voltage circuits Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge [HID] lamps, ignition systems, injection systems, etc.)

Maintenance and Light Repair
Current Standards

	Indicator # MLR 3 - Students will locate needed information.
Level 1: Recall	MLR 3.1 Identify sources of service information
Level 1: Recall	MLR 3.2 Identify proper vehicle identification information

	Indicator # LPM 4 - Students will learn regulations associated with Logistics and Management.
Level 1: Recall	MLR 4.1 Prepare vehicle for service

Maintenance and Light Repair
Proposed Standards

	Indicator # MLR 3: Students will locate needed information.
Level 1: Recall	MLR 3.1 Identify sources of service information. Locate and use paper and electronic manuals Locate and use Technical Service Bulletins (TSB) Demonstrate awareness of special service messages, service campaigns/recalls, vehicle/service warranty applications, and service interval recommendations
Level 1: Recall	MLR 3.2 Identify proper vehicle identification information. Locate vehicle identification number (VIN) and production date code Apply knowledge of VIN information Demonstrate awareness of other vehicle information labels (such as tire, emissions, etc.)

	Indicator # MLR 4 - Students will understand and apply appropriate business practices.
Level 3: Strategic Thinking	MLR 4.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic Thinking	MLR 4.2 Understand the concept and application of ethical business practices.
Level 3: Strategic Thinking	MLR 4.3 Understand the concept and application of excellent customer relations practices.

Maintenance and Light Repair
Current Standards

	Indicator # MLR 5 - Students will prepare vehicle for customer.
Level 2: Skill/Concept	MLR 5.1 Ensure vehicle is prepared to return to the customer per school/company policy Example: Inspect vehicle after repair and remove protective covers

Maintenance and Light Repair
Proposed Standards

	Indicator # MLR 5 - Students will perform basic vehicle service.
Level 2: Skill/Concept	MLR 5.1 Perform basic vehicle service. Determine fluid type requirements and identify fluid Check and adjust engine oil Check and adjust engine coolant level Check and adjust power steering fluid level Check and adjust brake fluid level Check and adjust windshield washer fluid level Check and adjust differential /transfer case fluid level Check and adjust transmission fluid level Check and replace wiper blades Inspect drive belts, tensioners, and pulleys; check pulley and belt alignment Inspect and replace air filter Check and adjust tire air pressure Inspect exhaust system

Maintenance and Light Repair
Current Standards

	Indicator # MLR 6 - Students will perform basic vehicle service.
Level 2: Skill/Concept	MLR 6.1 Perform basic vehicle service

	Indicator # MLR 7 - Students will inspect and repair engine.
Level 2: Skill/Concept	MLR 7.1 Test and perform actions necessary to repair engine

Maintenance and Light Repair
Proposed Standards

	Indicator # MLR 6 - Students will inspect and repair engine.
Level 2: Skill/Concept	MLR 6.1 Test and perform actions necessary to repair engine. Demonstrate knowledge of four-cycle engine Inspect engine assembly for fuel, oil coolant and other leaks; determine necessary action Perform cooling system pressure tests; test coolant condition; inspect and test radiator, pressure cap, coolant recovery tank and hoses; perform necessary action Test cooling system for the presence of combustion gases Drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required Perform oil and filter change; reset oil life monitoring system where applicable Remove and replace radiator; replace radiator hoses Inspect powertrain mounts; determine necessary action

	Indicator # MLR 7 - Students will service an automatic transmission.
Level 2: Skill/Concept	MLR 7.1 Service transmission system. Drain automatic transmission fluid Visually inspect the amount of debris in oil pan Remove filter and install new filter Install the proper fluid to the proper level

Maintenance and Light Repair
Current Standards

	Indicator # MLR 8 - Students will service an automatic transmission.
Level 2: Skill/Concept	MLR 8.1 Service transmission system Examples: Drain automatic transmission fluid P-1 Visually inspect the amount of debris in oil pan P-1 Remove filter and install new filter. P-1 Install the proper fluid to the proper level P-1

	Indicator # MLR 9 - Students will inspect, diagnose and repair manual drive train and axles.
Level 2: Skill/Concept	MLR 9.1 Diagnose and repair manual drive train and axles Examples: Diagnose fluid loss, level, and condition concerns; determine necessary action. P-1 Drain and fill transmission/transaxle and final drive unit P-1 Identify and inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine necessary action P-1 Identify and inspect hydraulic clutch slave and master cylinders, lines and hoses; determine necessary action. P-1 Bleed clutch hydraulic system Inspect constant velocity (CV) joint boots P-1 Remove and replace rear wheel drive shaft P-1

Maintenance and Light Repair
Proposed Standards

	Indicator # MLR 8 - Students will inspect, diagnose and repair manual drive train and axles.
Level 2: Skill/Concept	MLR 8.1 Diagnose and repair manual drive train and axles. Diagnose fluid loss, level, and condition concerns; determine necessary action Drain and fill transmission/transaxle and final drive unit Identify and inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine necessary action Identify and inspect hydraulic clutch slave and master cylinders, lines and hoses; determine necessary action Bleed clutch hydraulic system Inspect constant velocity (CV) joint boots Remove and replace rear wheel drive shaft

	Indicator # MLR 9 - Students will repair suspension and steering.
Level 2: Skill/Concept	MLR 9.1 Diagnose suspension and steering; determine necessary action. Determine proper power steering fluid types Flush, fill and bleed power steering system Diagnose power steering fluid leakage; determine necessary action Lubricate suspension and steering systems Inspect, remove and replace shock absorbers Inspect and install stabilizer bar bushings, brackets, and links Inspect and install strut cartridge or assembly, coil spring, insulators (silencers), and upper strut mount Perform pre-alignment inspection and measure vehicle ride height; determine necessary action Demonstrate knowledge of the principles of steering geometry using caster, camber and toe

Maintenance and Light Repair
Current Standards

	Indicator # MLR 10 - Students will repair suspension and steering.
Level 2: Skill/Concept	MLR 10.1 Diagnose suspension and steering; determine necessary action.
Level 2: Skill/Concept	MLR 10.2 Inspect and repair tire and wheel assembly

Maintenance and Light Repair
Proposed Standards

Level 2: Skill/Concept	MLR 9.2 Inspect and repair tire and wheel assembly. Diagnose tire wear patterns; determine necessary action Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action Identify vehicles equipped with a tire pressure monitoring system (TPMS) Demonstrate knowledge of service considerations of vehicles equipped with a TPMS Rotate tires according to manufacturer's recommendations Balance wheel and tire assembly (static and dynamic) Dismount, inspect, and remount tire on wheel Repair tire using internal patch Reinstall wheel; torque lug nuts

	Indicator # MLR 10 - Students will inspect, diagnose and repair brake assembly.
Level 2: Skill/Concept	MLR 10.1 Diagnose and repair brake fluid system. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and support; determine necessary action Select, handle, and fill brake fluids to proper level Bleed brake system Test brake fluid for contamination; determine necessary action
Level 2: Skill/Concept	MLR 10.2 Inspect and repair brake shoes and drum assemblies. Remove, clean, inspect and measure brake drums; determine necessary action Refinish brake drum; measure final drum diameter Remove, clean, inspect brake shoes, springs, pins, clips, levers, adjuster/self-adjuster, other related brake hardware, and backing support plates; lubricate and reassemble Inspect and install wheel cylinders Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings Install wheel, torque lug nuts, and make final checks and adjustments

Maintenance and Light Repair
Current Standards

Maintenance and Light Repair
Proposed Standards

Level 2: Skill/Concept	MLR 10.3 Inspect and repair caliper assembly. Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action Clean and inspect caliper mounting and slides/pins for wear, operation and damage; determine necessary action Remove, inspect and replace pads and retaining hardware; determine necessary action Reassemble, lubricate, and reinstall caliper, pads and related hardware; seat pads and inspect for leaks
Level 2: Skill/Concept	MLR 10.4 Inspect and repair rotor assembly. Clean, inspect and measure rotor thickness, lateral runout and thickness variation; determine necessary action Remove and reinstall rotor Refinish rotor on vehicle; measure final rotor thickness Refinish rotor off vehicle; measure final rotor thickness Install wheel. Torque lug nuts and make final checks and adjustments
Level 2: Skill/Concept	MLR 10.5 Inspect and repair vacuum supply. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster Inspect vacuum-type power booster unit for leaks; inspect the check valve for proper operation; verify proper booster function Demonstrate knowledge of the causes of wheel bearing noises, wheel shimmy and vibration concerns Check parking brake cables and components for wear, binding and corrosion; clean, lubricate, adjust or replace as needed
Level 2: Skill/Concept	MLR 10.6 Inspect and repair brake indicator light components. Check parking brake and indicator light system operation; determine necessary action Check operation of brake stop light system; determine necessary action Replace tapered roller wheel bearing and race Clean, inspect, lubricate, install and adjust wheel bearing Identify and inspect electronic brake control system components; determine necessary action Demonstrate knowledge of the operation of the brake hydraulic failure warning light

Maintenance and Light Repair
Current Standards

	Indicator # MLR 11 - Students will inspect, diagnose and repair brake assembly.
Level 2: Skill/Concept	MLR 11.1 Diagnose and repair brake fluid system Examples: Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and support; determine necessary action P-1 Select, handle, and fill brake fluids to proper level P-1 Bleed brake system P-1 Test brake fluid for contamination; determine necessary action P-1
Level 2: Skill/Concept	MLR 11.2 Inspect and repair brake shoes and drum assemblies

Maintenance and Light Repair
Proposed Standards

	Indicator # MLR 11 - Students will inspect, test and repair electrical/electronic systems.
Level 1: Recall	MLR 11.1 Diagnose electrical circuit problems. Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law) Demonstrate use of wiring diagrams during diagnosis of electrical circuit problems Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including source voltage, voltage drop, current flow and resistance Check electrical circuits with a test light; determine necessary action Check electrical circuits using fused jumper wires; determine necessary action Demonstrate knowledge of the causes and effects of shorts, grounds, opens and resistance problems in electrical/electronic circuits Measure key-off battery drain (parasitic draw); determine necessary action Inspect and test fusible links, circuit breakers and fuses; determine necessary action Inspect and test switches, connectors, relays and wires of electrical/electronic circuits Repair connectors and terminal ends Perform solder repair of electrical wiring
Level 2: Skill/Concept	MLR 11.2 Inspect and repair battery problems. Perform battery state-of-charge test; determine necessary action Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action Maintain or restore electronic memory functions Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps and hold-downs Perform battery charge Start a vehicle using jumper cables and a battery or auxiliary power supply

Maintenance and Light Repair
Current Standards

Level 2: Skill/Concept	MLR 11.3 Inspect and repair caliper assembly
Level 2: Skill/Concept	MLR 11.4 Inspect and repair rotor assembly
Level 1: Recall	MLR 11.5 Inspect and repair vacuum supply
Level 2: Skill/Concept	MLR 11.6 Inspect and repair brake indicator light components

	Indicator # MLR 12 - Students will inspect, test and repair electrical/electronic systems.
Level 1: Recall	MLR 12.1 Diagnose electrical circuit problems
Level 2: Skill/Concept	MLR 12.2 Inspect and repair battery problems
Level 2: Skill/Concept	MLR 12.3 Diagnose and repair starter
Level 2: Skill/Concept	MLR 12.4 Diagnose and repair charging system

Maintenance and Light Repair
Proposed Standards

Level 2: Skill/Concept	MLR 11.3 Diagnose and repair starter. Perform starter current draw tests; determine necessary action Perform starter circuit voltage drop tests; determine necessary action Inspect and test starter relays and solenoids; determine necessary action Remove and replace starter
Level 2: Skill/Concept	MLR 11.4 Diagnose and repair charging system. Perform charging system output test; determine necessary action Remove and replace generator (alternator) Diagnose the cause of dim, or no light operation; determine necessary action Inspect, replace, and aim headlights and bulbs

	Indicator # MLR 12 - Students will inspect, diagnose and repair heating and air conditioning.
Level 2: Skill/Concept	MLR 12.1 Identify and visually inspect A/C system components. Locate refrigerant label and identify specified refrigerant type (e.g., R-12, R-134a) Conduct preliminary performance test of A/C system and determine necessary action Conduct performance test of the heater/ventilation system Inspect and replace cabin air filter

Maintenance and Light Repair
Current Standards

	Indicator # MLR 13 - Students will inspect, diagnose and repair heating and air conditioning.
Level 2: Skill/Concept	MLR 13.1 Identify and visually inspect A/C system components Examples: Locate refrigerant label and identify specified refrigerant type (e.g., R-12, R-134a) P-1 Conduct preliminary performance test of A/C system and determine necessary action P-1 Conduct performance test of the heater/ventilation system P-1 Inspect and replace cabin air filter P-1

Maintenance and Light Repair
Proposed Standards

	Indicator # MLR 13 - Students will inspect, diagnose and improve engine performance.
Level 2: Skill/Concept	MLR 13.1 Perform the necessary tests and repairs to improve engine performance. Perform engine cranking and running vacuum tests; determine necessary action Perform cylinder power balance test; determine necessary action Perform cylinder cranking compression test; determine necessary action Perform cylinder leakage test; determine necessary action Verify engine operating temperature; determine necessary action Retrieve and record stored diagnostic trouble codes, On-Board Diagnostics (OBD) monitor status and freeze frame data; clear codes when applicable Obtain and interpret scan tool data Perform fuel pressure test Replace fuel filters Remove and replace secondary ignition components Remove and replace thermostat and gasket/seal Perform common fastener and thread repair, to include: removing broken bolt, restoring internal and external threads, and repairing internal threads with a threaded insert

Maintenance and Light Repair
Current Standards

	Indicator # MLR 13 - Students will inspect, diagnose and repair heating and air conditioning.
Level 2: Skill/Concept	MLR 14.1 Perform the necessary tests and repairs to improve engine performance

	Indicator # MLR 15 - Students explore career opportunities in the transportation, distribution and logistics career cluster and develop leadership skills.
Level 1: Recall	MLR 15.1 Research career opportunities in the transportation, distribution and logistics (TD&L) fields

Maintenance and Light Repair
Proposed Standards

	Indicator # MLR 14 - Students explore career opportunities in the transportation, distribution and logistics career cluster and develop leadership skills.
Level 1: Recall	MLR 14.1 Research career opportunities in the transportation, distribution and logistics fields. Utilizing career exploration software, research and write a report on career opportunities in the field Utilizing career exploration software, research educational requirements for a chosen career path Utilizing career exploration software, update student portfolio

MLR Automotive Engine Repair and Performance - Current Standards

	Indicator # EPER 1 - Students will demonstrate automotive technology safety practices, as identified in Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.
Level 1: Recall and Recognition	EPER 1.1 Demonstrate automotive technology safety practices. Examples: Identify general shop safety rules and procedures. Identify and use proper procedures for safe jack and lift operations. Utilize proper ventilation procedures for working within the lab/shop area. Identify the location and the types of fire extinguishers and other fire safety equipment. Identify the location and use of eye wash stations. Identify the location of posted evacuation routes. Locate and demonstrate knowledge of Safety Data Sheets (SDS).

	Indicator # EPER 2 - Students will demonstrate proper tool selection and usage.
Level 1: Recall and Recognition	EPER 2.1. Demonstrate proper tool selection and usage. Examples: Identify tools and their usage in automotive applications. Identify standard and metric designation. Demonstrate safe handling and use of appropriate tools. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. Demonstrate proper use of precision measuring tools (e.g. micrometer, dial-indicator, dial-caliper).

Automotive Engine Repair and Performance - Proposed Standards

	Indicator # EPER 1 - Students will demonstrate automotive technology safety practices, as identified in Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.
Level 1: Recall & Recognition	EPER 1.1 Demonstrate automotive technology safety practices. Identify general shop safety rules and procedures Identify and use proper procedures for safe jack and lift operations Utilize proper ventilation procedures for working within the lab/shop area Identify the location and the types of fire extinguishers and other fire safety equipment Identify the location and use of eye wash stations Identify the location of posted evacuation routes Locate and demonstrate knowledge of Safety Data Sheets (SDS)

	Indicator # EPER 2 - Students will demonstrate proper tool selection and usage.
Level 1: Recall & Recognition	EPER 2.1. Demonstrate proper tool selection and usage: Identify tools and their usage in automotive applications Identify standard and metric designation Demonstrate safe handling and use of appropriate tools Demonstrate proper cleaning, storage, and maintenance of tools and equipment Demonstrate proper use of precision measuring tools (e.g. micrometer, dial-indicator, dial-caliper)

MLR Automotive Engine Repair and Performance - Current Standards

	Indicator # EPER 3 - Students will prepare the vehicle for service.
Level 2: Skill/ Concept	EPER 3.1 Perform preparatory procedures for vehicle service. Examples: Identify information needed and the service requested on a repair order. P-1 Identify purpose and demonstrate proper use of fender covers, mats. Demonstrate use of the three C's: concern, cause, and correction. Review vehicle service history. P-1 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1

	Indicator # EPER 4 - Students will perform engine repair.
Level 2 Skill/Concept	EPER 4.1 Perform engine maintenance operations. Examples: Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 Verify operation of the instrument panel engine warning indicators. P-1 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-1 Install engine covers using gaskets, seals, and sealers as required. P-1 Verify engine mechanical timing. P-2 Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. P-1 Identify service precautions related to service of the internal combustion engine of a hybrid vehicle. P-1
Level 2: Skill/Concept	EPER 4.2 Understand component operation and perform maintenance on cylinder head and valve train. Examples: Adjust valves (mechanical or hydraulic lifters). P-2 Identify components of the cylinder head and valve train. P-1

Automotive Engine Repair and Performance - Proposed Standards

	Indicator # EPER 3 - Students will prepare the vehicle for service.
Level 2: Skill/Concept	EPER 3.1 Perform preparatory procedures for vehicle service. Identify information needed and the service requested on a repair order Identify purpose and demonstrate proper use of fender covers, mats Demonstrate use of the three C's: concern, cause, and correction Review vehicle service history Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction

	Indicator # EPER 4 - Students will perform engine repair.
Level 2: Skill/Concept	EPER 4.1 Perform engine maintenance operations. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins Verify operation of the instrument panel engine warning indicators Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action Install engine covers using gaskets, seals, and sealers as required. Verify engine mechanical timing Perform common fastener and thread repair, to include: removing broken bolt, restoring internal and external threads, and repairing internal threads with thread insert Identify service precautions related to service of the internal combustion engine of a hybrid vehicle
Level 2: Skill/Concept	EPER 4.2 Understand component operation and perform maintenance on cylinder head and valve train. Adjust valves (mechanical or hydraulic lifters) Identify components of the cylinder head and valve train

MLR Automotive Engine Repair and Performance - Current Standards	
Level 2: Skill/Concept	EPER 4.3 Test, inspect and perform maintenance on the lubrication and cooling system. Examples: Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action. P-1 Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. P-1 Remove, inspect, and replace thermostat and gasket/seal. P-1 Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. P-1 Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required. P-1 Identify components of the lubrication and cooling systems. P-1
	Indicator # EPER 5 - Students will test, diagnose, and repair engine performance issues.
Level 3: Strategic Thinking	EPER 5.1. Perform engine diagnostics and analyze retrieved data. Examples: Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 Perform engine absolute manifold pressure tests (vacuum/boost); document results. P-2 Perform cylinder power balance test; document results. P-2 Perform cylinder cranking and running compression tests; document results. P-2 Perform cylinder leakage test; document results. P-2 Verify engine operating temperature. P-1 Remove and replace spark plugs; inspect secondary ignition components for wear and damage. P-1
Level 3: Strategic Thinking	EPER 5.2. Test the computerized controls and analyze retrieved data. Examples: Retrieve and record diagnostic trouble codes (DTC), On-board Diagnostic (OBD) monitor status, and freeze frame data; clear codes when applicable. P-1 Describe the use of the OBD monitors for repair verification. P-1

Automotive Engine Repair and Performance - Proposed Standards	
Level 2: Skill/Concept	EPER 4.3 Test, inspect and perform maintenance on the lubrication and cooling system. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment Remove, inspect, and replace thermostat and gasket/seal Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required Identify components of the lubrication and cooling systems
	Indicator # EPER 5 - Students will test, diagnose, and repair engine performance issues.
Level 3: Strategic Thinking	EPER 5.1. Perform engine diagnostics and analyze retrieved data. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins Perform engine absolute manifold pressure tests (vacuum/boost); document results Perform cylinder power balance test; document results Perform cylinder cranking and running compression tests; document results Perform cylinder leakage test; document results Verify engine operating temperature Remove and replace spark plugs; inspect secondary ignition components for wear and damage
Level 3: Strategic Thinking	EPER 5.2. Test the computerized controls and analyze retrieved data. Retrieve and record diagnostic trouble codes (DTC), On-board Diagnostic (OBD) monitor status, and freeze frame data; clear codes when applicable Describe the use of the OBD monitors for repair verification

MLR Automotive Engine Repair and Performance - Current Standards

Level 2: Skill/Concept	EPER 5.3. Perform maintenance on the fuel, air Induction, and exhaust systems Examples: Replace fuel filter(s) where applicable. P-2 Inspect, service, or replace air filters, filter housings, and intake duct work. P-1 Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action. P-1 Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action. P-1 Check and refill diesel exhaust fluid (DEF). P-2
Level 2: Skill/Concept	EPER 5.4. Perform maintenance operations on emissions control system. Examples: Inspect, test, and service Positive Crankcase Ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action. P-2

Automotive Engine Repair and Performance - Proposed Standards

Level 2: Skill/Concept	EPER 5.3. Perform maintenance on the fuel, air Induction, and exhaust systems Replace fuel filter(s) where applicable Inspect, service, or replace air filters, filter housings, and intake duct work Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action Check and refill diesel exhaust fluid (DEF)
Level 2: Skill/Concept	EPER 5.4. Perform maintenance operations on emissions control system. Inspect, test, and service Positive Crankcase Ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action

	Indicator # EPER 6 - Students will understand and apply appropriate business practices.
Level 3: Strategic Thinking	EPER 6.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic Thinking	EPER 6.2 Understand the concept and application of ethical business practices.
Level 3: Strategic Thinking	EPER 6.3 Understand the concept and application of excellent customer relations practices.

Brakes/Manual Drivetrain & Axles
Current Standards

	Indicator # AB 1 - Students will demonstrate automotive technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements, for an automotive repair facility.
Level 2: Skill/Concept	AB 1.1 Demonstrate automotive technician safety practices. Use protective clothing and safety equipment according to OSHA and EPA requirements. Summarize the proper use of Safety Data Sheet (SDS) Demonstrate the proper use of hand and power tools Examine basic shop safety using OSHA standards. Maintain a portfolio of successfully completed safety and equipment exams

	Indicator # AB 2 - Students will demonstrate knowledge of brake system theory and procedure.
Level 2: Skill/Concept	AB 2.1 Analyze and diagnose automotive brake hydraulic and friction systems. Examples: Identify and interpret brake system concerns; determine needed action. P-1 Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS). P-1 Identify brake system components and configuration. P-1

Brakes/Manual Drivetrain & Axles
Proposed Standards

Webb Level	**AB 1: Students will demonstrate automotive technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements, for an automotive repair facility.**
Level 2: Skills/Concepts	AB 1.1 Demonstrate automotive technician safety practices. ●Use protective clothing and safety equipment according to OSHA and EPA requirements ●Summarize the proper use of Safety Data Sheet (SDS) ●Demonstrate the proper use of hand and power tools ●Examine basic shop safety using OSHA standards. ●Maintain a portfolio of successfully completed safety and equipment exams

Webb Level	**AB 2: Students will demonstrate knowledge of brake system theory and procedure.**
Level 2: Skills/Concepts	AB 2.1 Analyze and diagnose automotive brake hydraulic and friction systems. ●Identify and interpret brake system concerns; determine needed action ●Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins ●Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS) ●Identify brake system components and configuration

Brakes/Manual Drivetrain & Axles
Current Standards

	Indicator # AB 3 - Students will demonstrate knowledge and procedure of the hydraulic brake system.
Level 3: Strategic Thinking	AB 3.1 Analyze and draw conclusions concerning malfunctions of brake hydraulic systems. Examples: Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law). P-1 Check master cylinder for internal/external leaks and proper operation; determine needed action. P-1 Identify components of hydraulic brake warning light system. P-2 Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine needed action. P-3
Level 2: Skills/ Concepts	AB 3.2 Apply repair skills to correct malfunctions of brake hydraulic systems. Examples: Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports; determine needed action. P-1 Remove, bench bleed, and reinstall master cylinder. P-1 Replace brake lines, hoses, fittings, and supports. P-2 Fabricate brake lines using proper material and flaring procedures (double flare and ISO types). P-2 Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification. P-1 Inspect, test, and/or replace components of brake warning light system. P-3 Bleed and/or flush brake system. P-1 Test brake fluid for contamination. P-1 Measure brake pedal height, travel, and free play (as applicable); determine needed action. P-1

Brakes/Manual Drivetrain & Axles
Proposed Standards

Webb Level	**AB 3: Students will demonstrate knowledge and procedure of the hydraulic brake system.**
Level 3: Strategic Thinking	AB 3.1 Analyze and draw conclusions concerning malfunctions of brake hydraulic systems. ●Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law) ●Check master cylinder for internal/external leaks and proper operation; determine needed action ●Identify components of hydraulic brake warning light system ●Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine needed action
Level 2: Skills/Concepts	AB 3.2 Apply repair skills to correct malfunctions of brake hydraulic systems. ●Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports; determine needed action ●Remove, bench bleed, and reinstall master cylinder ●Replace brake lines, hoses, fittings, and supports ●Fabricate brake lines using proper material and flaring procedures (double flare and ISO types) ●Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification ●Inspect, test, and/or replace components of brake warning light system ●Bleed and/or flush brake system ●Test brake fluid for contamination ●Measure brake pedal height, travel, and free play (as applicable); determine needed action

Brakes/Manual Drivetrain & Axles
Current Standards

	Indicator # AB 4 - Students will demonstrate knowledge of theory and repair procedures for drum brake systems.
Level 3: Strategic Thinking	AB 4.1 Assess and evaluate operation of drum brake systems. Examples: Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine needed action. P-1
Level 2: Skills/ Concepts	AB 4.2 Repair drum brake systems. Examples: Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability. P-1 Refinish brake drum and measure final drum diameter; compare with manufacturer's specification. P-1 Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. P-1 Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. P-2 Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments. P-1

	Indicator # AB 5 - Students will demonstrate knowledge of theory and repair procedures for disc brake systems.
Level 3: Strategic Thinking	AB 5.1 Assess and evaluate operation of disc brake systems. Examples: Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine needed action. P-1 Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine needed action. P-1 Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. P-1

Brakes/Manual Drivetrain & Axles
Proposed Standards

Webb Level	**AB 4: Students will demonstrate knowledge of theory and repair procedures for drum brake systems.**
Level 3: Strategic Thinking	AB 4.1 Assess and evaluate operation of drum brake systems. ●Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine needed action
Level 2: Skill/Concept	AB 4.2 Repair drum brake systems. ●Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability ●Refinish brake drum and measure final drum diameter; compare with manufacturer's specification ●Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble ●Inspect wheel cylinders for leaks and proper operation; remove and replace as needed ●Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments

Webb Level	**AB 5: Students will demonstrate knowledge of theory and repair procedures for disc brake systems.**
Level 3: Strategic Thinking	AB 5.1 Assess and evaluate operation of disc brake systems. ●Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine needed action ●Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine needed action ●Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations

Brakes/Manual Drivetrain & Axles
Current Standards

Level 2: Skills/ Concepts	AB 5.2 Repair disc brake systems. Remove, inspect, and/or replace brake pads and retaining hardware; determine needed action. P-1 Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads; inspect for leaks. P-1 Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action. P-1 Remove and reinstall/replace rotor. P-1 Refinish rotor on vehicle; measure final rotor thickness and compare with specification. P-1 Refinish rotor off vehicle; measure final rotor thickness and compare with specification. P-1 Retract and re-adjust caliper piston on an integrated parking brake system. P-2 Check brake pad wear indicator; determine needed action. P-1 Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action. P-1

	Indicator # AB 6 - Students will demonstrate knowledge of theory and repair procedures for power assist units.
Level 2: Skill/Concept	AB 6.1 Analyze power-assist units. Examples: Check brake pedal travel with and without engine running to verify proper power booster operation. P-2 Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. P-1

Brakes/Manual Drivetrain & Axles
Proposed Standards

Level 2: Skill/Concept	AB 5.2 Repair disc brake systems. ●Remove, inspect, and/or replace brake pads and retaining hardware; determine needed action ●Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads; inspect for leaks ●Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action ●Remove and reinstall/replace rotor ●Refinish rotor on vehicle; measure final rotor thickness and compare with specification ●Refinish rotor off vehicle; measure final rotor thickness and compare with specification ●Retract and re-adjust caliper piston on an integrated parking brake system. ●Check brake pad wear indicator; determine needed action ●Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action

Webb Level	**AB 6: Students will demonstrate knowledge of theory and repair procedures for power assist units.**
Level 2: Skill/Cor	AB 6.1 Analyze power-assist units. ●Check brake pedal travel with and without engine running to verify proper power booster operation ●Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster

Brakes/Manual Drivetrain & Axles Current Standards

	Indicator # AB 7 - Students will demonstrate knowledge of theory and repair procedures for related systems – Wheel Bearings, Parking Brakes, Electrical
Level 2: Skills/ Concepts	AB 7.1 Diagnose related systems (i.e., wheel bearings, parking brakes, electrical). Examples: Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine needed action. P-2 Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed. P-1 Check parking brake operation and parking brake indicator light system operation; determine needed action. P-1 Check operation of brake stop light system. P-1
Level 2: Skills/ Concepts	AB 7.2 Repair related systems Examples: Replace wheel bearing and race. P-3 Inspect and replace wheel studs. P-1 Remove, reinstall, and/or replace sealed wheel bearing assembly. P-1 Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. P-2

	Indicator # AB 8 - Students will demonstrate knowledge of theory and repair procedures for related systems – Antilock Brake Systems (ABS), Traction Control Systems (TCS), Electronic Stability Control (ESC).
Level 2: Skills/ Concepts	AB 8.1 Diagnose Electronic Brake Control Systems: ABS, TCS and ESC Systems Examples: Identify and inspect electronic brake control system components (ABS, TCS, ESC); determine needed action. P-1 2. Describe the operation of a regenerative braking system. P-3

Brakes/Manual Drivetrain & Axles Proposed Standards

Webb Level	**AB 7: Students will demonstrate knowledge of theory and repair procedures for related systems – Wheel Bearings, Parking Brakes and Electrical.**
Level 2: Skill/Concept	AB 7.1 Diagnose related systems (i.e., wheel bearings, parking brakes, electrical). ●Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine needed action ●Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed ●Check parking brake operation and parking brake indicator light system operation; determine needed action ●Check operation of brake stop light system
Level 2: Skill/Concept	AB 7.2 Repair related systems. ●Replace wheel bearing and race ●Inspect and replace wheel studs ●Remove, reinstall, and/or replace sealed wheel bearing assembly ●Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings

Webb Level	**AB 8: Students will demonstrate knowledge of theory and repair procedures for related systems – Antilock Brake Systems (ABS), Traction Control Systems (TCS), Electronic Stability Control (ESC).**
Level 2: Skill/Concept	AB 8.1 Diagnose Electronic Brake Control Systems: ABS, TCS and ESC Systems ●Identify and inspect electronic brake control system components (ABS, TCS, ESC); determine needed action. ●2. Describe the operation of a regenerative braking system

Brakes/Manual Drivetrain & Axles
Current Standards

	Indicator # AB 9 - Students will demonstrate knowledge of theory and repair procedures for manual drive train and axles.
Level 1: Recall	AB 9.1 Identify manual transmission information Examples: Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 Identify manual drive train and axle components and configuration. P-1
Level 2: Skills/ Concepts	AB 9.2 Perform general maintenance procedures Examples: Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer's specification. P-1 Check fluid condition; check for leaks. P-2

	Indicator # AB 10 - Students will perform maintenance procedures for hydraulic clutches.
Level 2: Skills/ Concepts	AB 10.1 Check clutch hydraulic system. Examples: Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification. P-1 Check for hydraulic system leaks. P-1

	Indicator # AB 11 - Students will define the operation of electronic manual transmission/transaxle.
Level 1: Recall	AB 11.1 Research Manual Transmission/Transaxle. Example: Describe the operational characteristics of an electronically-controlled manual transmission/transaxle. P-2

Brakes/Manual Drivetrain & Axles
Proposed Standards

Webb Level	**AB 9: Students will demonstrate knowledge of theory and repair procedures for manual drivetrain and axles.**
Level 1: Recall	AB 9.1 Identify manual transmission information. ●Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins ●Identify manual drivetrain and axle components and configuration
Level 2: Skill/Concept	AB 9.2 Perform general maintenance procedures. ●Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer's specification ●Check fluid condition; check for leaks

Webb Level	**AB 10: Students will perform maintenance procedures for hydraulic clutches.**
Level 2: Skill/Concept	AB 10.1 Check clutch hydraulic system. ●Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification ●Check for hydraulic system leaks

Webb Level	**AB 11: Students will define the operation of electronic manual transmission/transaxle.**
Level 1: Recall	AB 11.1 Research Manual Transmission/Transaxle. ●Describe the operational characteristics of an electronically controlled manual transmission/transaxle

Brakes/Manual Drivetrain & Axles
Current Standards

	Indicator # AB 12 - Students will inspect, diagnose, and perform repair procedures for drive train components.
Level 2: Skills/ Concepts	AB 12.1 Inspect, diagnose, and repair drive shaft, half shafts, universal joints and constant-velocity (CV) joints Examples: Inspect, remove, and/or replace bearings, hubs, and seals. P-2 Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints. P-2 Inspect locking hubs. P-3 Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification. P-2

	Indicator # AB 13 - Students will inspect, diagnose, and perform repair procedures for the differential assembly.
Level 2: Skills/ Concepts	AB 13.1 Perform maintenance on differential case assembly Examples: Clean and inspect differential case; check for leaks; inspect housing vent. P-1 Check and adjust differential case fluid level; use proper fluid type per manufacturer's specification. P-1 Drain and refill differential housing. P-1 Inspect and replace drive axle wheel studs. P-1

Brakes/Manual Drivetrain & Axles
Proposed Standards

Webb Level	**AB 12: Students will inspect, diagnose, and perform repair procedures for drivetrain components.**
Level 1: Recall	AB 12.1 Inspect, diagnose, and repair drive shaft, half shafts, universal joints and constant-velocity (CV) joints. ●Inspect, remove, and/or replace bearings, hubs, and seals ●Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints ●Inspect locking hubs ●Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification

Webb Level	**AB 13: Students will inspect, diagnose, and perform repair procedures for the differential assembly.**
Level 2: Skill/Cor	AB 13.1 Perform maintenance on differential case assembly. ●Clean and inspect differential case; check for leaks; inspect housing vent ●Check and adjust differential case fluid level; use proper fluid type per manufacturer's specification ●Drain and refill differential housing ●Inspect and replace drive axle wheel studs

Webb Level	**AB 14: Students will understand and apply appropriate business practices.**
Level 3: Strategic	AB 14.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic	AB 14.2 Understand the concept and application of ethical business practices.
Level 3: Strategic	AB 14.3 Understand the concept and application of excellent customer relations practices.

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Current Standards

	Indicator # EEHVAC 1 - Students will demonstrate automotive technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements, for an automotive repair facility.
Level 2: Skill/Concept	EEHVAC 1.1 Demonstrate automotive technician safety practices Examples: Use protective clothing and safety equipment according to OSHA and EPA requirements. Summarize the proper use of safety data sheet (SDS) Demonstrate the proper use of hand and power tools Examine basic shop safety using OSHA standards Maintain a portfolio of successfully completed safety and equipment exams

	Indicator # EEHVAC 2 - Students will perform maintenance, diagnostic and repair procedures of electrical/electronic systems.
Level 3: Strategic Thinking	EEHVAC 2.1 Demonstrate knowledge of the vehicle electrical system Examples: Research vehicle service information including vehicle service history, service precautions, and technical service bulletins. P-1 Demonstrate knowledge of electrical/electronic series, parallel, and series and parallel circuits using principles of electricity (Ohm's Law). P-1 Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. P-1 Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. P-1 Identify electrical/electronic system components and configuration. P-1

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Proposed Standards

	Indicator # EEHVAC 1 - Students will demonstrate automotive technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements, for an automotive repair facility.
Level 2: Skill/Concept	EEHVAC 1.1 Demonstrate automotive technician safety practices. Use protective clothing and safety equipment according to OSHA and EPA requirements Summarize the proper use of safety data sheet (SDS) Demonstrate the proper use of hand and power tools Examine basic shop safety using OSHA standards Maintain a portfolio of successfully completed safety and equipment exams

	Indicator # IBM 2 - Students will understand ethical challenges unique to international marketing.
Level 3: Strategic Thinking	EEHVAC 2.1 Demonstrate knowledge of the vehicle electrical system. Research vehicle service information including vehicle service history, service precautions, and technical service bulletins Demonstrate knowledge of electrical/electronic series, parallel, and series and parallel circuits using principles of electricity (Ohm's Law) Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits Identify electrical/electronic system components and configuration

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Current Standards

Level 2: Skill/Concept	EEHVAC 2.2 Test and repair electrical problems Examples: Use a test light to check operation of electrical circuits. P-2 Use fused jumper wires to check operation of electrical circuits. P-2 Measure key-off battery drain (parasitic draw). P-1 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. P-1 Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair) P-1 Use wiring diagrams to trace electrical/electronic circuits. P-1
	Indicator # EEHVAC 3 - Students will perform maintenance, diagnostic and repair procedures of the battery systems.
Level 1: Recall	EEHVAC 3.1 Identify battery requirements Examples: Identify safety precautions for high voltage systems on electric, hybrid electric, and diesel vehicles. P-2 Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery. P-1 Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures. P-2

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Proposed Standards

Level 2: Skill/Concept	EEHVAC 2.2 Test and repair electrical problems. Use a test light to check operation of electrical circuits Use fused jumper wires to check operation of electrical circuits Measure key-off battery drain (parasitic draw) Inspect and test fusible links, circuit breakers, and fuses; determine necessary action Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair) Use wiring diagrams to trace electrical/electronic circuits
	Indicator # EEHVAC 3 - Students will perform maintenance, diagnostic and repair procedures while also identifying characteristics of high voltage battery systems.
Level 1: Recall	EEHVAC 3.1 Identify battery requirements. Identify safety precautions for high voltage systems on electric, hybrid electric, and diesel vehicles Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Current Standards

Level 2: Skill/Concept	EEHVAC 3.2 Service battery Examples: Perform battery state-of-charge test; determine necessary action. P-1 Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action. P-1 Maintain or restore electronic memory functions. P-1 Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. P-1 Perform slow/fast battery charge according to manufacturer's recommendations. P-1 Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. P-1
	Indicator # EEHVAC 4 - Students will perform maintenance, diagnostic and repair procedures of starting systems.
Level 1: Recall	EEHVAC 4.1 Explain starting system operation Examples: Demonstrate knowledge of an automatic idle-stop/start-stop system. P-3
Level 2: Skill/Concept	EEHVAC 4.2 Inspect and repair starting system Examples: Perform starter current draw test; determine necessary action. P-1 Perform starter circuit voltage drop tests; determine necessary action. P-1 Inspect and test starter relays and solenoids; determine necessary action. P-2 Remove and install starter in a vehicle. P-1 Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action. P-2

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Proposed Standards

Level 2: Skill/Concept	EEHVAC 3.2 Service battery. Perform battery state-of-charge test; determine necessary action Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action Maintain or restore electronic memory functions Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs Perform slow/fast battery charge according to manufacturer's recommendations Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply
	Indicator # EEHVAC 4 - Students will perform maintenance, diagnostic and repair procedures of starting systems.
Level 1: Recall	EEHVAC 4.1 Explain starting system operation. Demonstrate knowledge of an automatic idle-stop/start-stop system
Level 2: Skill/Concept	EEHVAC 4.2 Inspect and repair starting system. Perform starter current draw test; determine necessary action Perform starter circuit voltage drop tests; determine necessary action Inspect and test starter relays and solenoids; determine necessary action Remove and install starter in a vehicle Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Current Standards

	Indicator # EEHVAC 5 - Students will perform maintenance, diagnostic and repair procedures of the charging system.
Level 2: Skills/ Concepts	EEHVAC 5.1 Remove, inspect, and replace charging system components Examples: Perform charging system output test; determine necessary action. P-1 Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment. P-1 Remove, inspect, and/or replace generator (alternator). P-2 Perform charging circuit voltage drop tests; determine necessary action. P-2

	Indicator # EEHVAC 6 - Students will identify and perform repair procedures of electrical systems.
Level 2: Skill/Concept	EEHVAC 6.1 Identify and inspect lighting, instrument cluster, driver information, and body electrical systems and verify operation Examples: Identify system voltage and safety precautions associated with high-intensity discharge headlights. P-2 Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed. P-1 Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators. P-1 Verify windshield wiper and washer operation; replace wiper blades. P-1 Describe the operation of keyless entry/remote-start systems. P-3
Level 2: Skill/Concept	EEHVAC 6.2 Perform the following repair operations Aim headlights. P-2 Disable and enable supplemental restraint system (SRS) and verify indicator lamp operation. P-1 Remove and reinstall door panel. P-1

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Proposed Standards

	Indicator # EEHVAC 5 - Students will perform maintenance, diagnostic and repair procedures of the charging system.
Level 2: Skill/Concept	EEHVAC 5.1 Remove, inspect, and replace charging system components. Perform charging system output test; determine necessary action Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment Remove, inspect, and/or replace generator (alternator) Perform charging circuit voltage drop tests; determine necessary action

	Indicator # EEHVAC 6 - Students will identify and perform repair procedures of electrical systems.
Level 2: Skill/Concept	EEHVAC 6.1 Identify and inspect lighting, instrument cluster, driver information, and body electrical systems and verify operation. Identify system voltage and safety precautions associated with high-intensity discharge headlights Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators Verify windshield wiper and washer operation; replace wiper blades Describe the operation of keyless entry/remote-start systems
Level 2: Skill/Concept	EEHVAC 6.2 Perform the following repair operations. Aim headlights Disable and enable supplemental restraint system (SRS) and verify indicator lamp operation Remove and reinstall door panel

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Current Standards

	Indicator # EEHVAC 7 - Students will research and identify heating, ventilation, and air conditioning components.
Level 1: Recall	EEHVAC 7.1 Obtain vehicle service information on heating and air conditioning components Examples: Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins. P-1 Identify heating, ventilation and air conditioning (HVAC) components and configuration. P-1

	Indicator # EEHVAC 8 - Students will perform repair procedures for the refrigeration system.
Level 2: Skill/Concept	EEHVAC 8.1 Inspect and repair refrigeration system components Examples: Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action. P-1 Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions. P-2 Inspect A/C condenser for airflow restrictions; determine necessary action. P-1

	Indicator # EEHVAC 9 - Students will perform repair procedures for the heating and cooling system.
Level 2: Skill/Concept	EEHVAC 9.1 Analyze heating and engine cooling systems problem Example: Inspect engine cooling and heater systems hoses and pipes; determine necessary action. P-1

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Proposed Standards

	Indicator # EEHVAC 7 - Students will research and identify heating, ventilation, and air conditioning components.
Level 1: Recall	EEHVAC 7.1 Obtain vehicle service information on heating and air conditioning components. Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins Identify heating, ventilation and air conditioning (HVAC) components and configuration

	Indicator # EEHVAC 8 - Students will inspect and understand repair procedures for the refrigeration system.
Level 2: Skill/Concept	EEHVAC 8.1 Inspect and demonstrate understanding of repair procedures for refrigeration system components. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions Inspect A/C condenser for airflow restrictions; determine necessary action

	Indicator # EEHVAC 9 - Students will perform repair procedures for the heating and cooling system.
Level 2: Skill/Concept	EEHVAC 9.1 Analyze heating and engine cooling systems problems. Inspect engine cooling and heater systems hoses and pipes; determine necessary action

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Current Standards

	Indicator # EEHVAC 10 - Students will perform inspection and identification procedures for the heating, ventilation and air conditioning (HVAC) system.
Level 2: Skill/Concept	EEHVAC 10.1 Inspect and identify operating systems and related controls Examples: Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; determine necessary action. P-1 Identify the source of A/C system odors. P-2

Electrical/Electronic Systems and Heating Ventilation Air Conditioning (HVAC) - Proposed Standards

	Indicator # EEHVAC 10 - Students will perform inspection and identification procedures for the heating, ventilation and air conditioning (HVAC) system.
Level 2: Skill/Concept	EEHVAC 10.1 Inspect and identify operating systems and related controls. Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; determine necessary action Identify the source of A/C system odors

	Indicator # EEHVAC 11 - Students will understand and apply appropriate business practices.
Level 3: Strategic Thinking	EEHVAC 11.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic Thinking	EEHVAC 11.2 Understand the concept and application of ethical business practices.
Level 3: Strategic Thinking	EEHVAC 11.3 Understand the concept and application of excellent customer relations practices.

MLR Automatic Transmission/Transaxle & Suspension/Steering Current Standards

	Indicator # ATSS 1 - Students will demonstrate automotive technology safety practices, as identified in Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.
Level 1: Recall	ATSS 1.1 Demonstrate automotive technology safety practices

	Indicator # ATSS 2 - Students will demonstrate proper tool selection and usage.
Level 1: Recall	ATSS 2.1 Demonstrate proper tool selection and usage

Automatic Transmission/Transaxle and Suspension/Steering Proposed Standards

	Indicator # ATSS 1 - Students will demonstrate automotive technology safety practices, as identified in Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.
Level 1: Recall	ATSS 1.1 Demonstrate automotive technology safety practices. Identify general shop safety rules and procedures Identify and use proper procedures for safe jack and lift operations Utilize proper ventilation procedures for working within the lab/shop area Identify the location and the types of fire extinguishers and other fire safety equipment Identify the location and use of eye wash stations Identify the location of posted evacuation routes Locate and demonstrate knowledge of Safety Data Sheets (SDS) Properly dispose chemicals in accordance with applicable federal, state, and local law

	Indicator # ATSS 2 - Students will demonstrate proper tool selection and usage.
Level 1: Recall	ATSS 2.1 Demonstrate proper tool selection and usage. Identify tools and their usage in automotive applications Identify standard and metric designation Demonstrate safe handling and use of appropriate tools Demonstrate proper cleaning, storage, and maintenance of tools and equipment Demonstrate proper use of precision measuring tools (e.g. micrometer, dial-indicator, dial-caliper

MLR Automatic Transmission/Transaxle & Suspension/Steering Current Standards

	Indicator # ATSS 3 - Students will perform diagnostics and repair on the vehicle's automatic transmission and transaxle.
Level 2: Skill/ Concept	ATSS 3.1 Inspect and identify drivetrain components
Level 2: Skill/ Concept	ATSS 3.2 Perform maintenance on vehicle automatic transmission and transaxle while on the vehicle
Level 4: Extended Thinking	ATSS 3.3 Analyze the vehicle's automatic transmission and transaxle while off the vehicle

Indicator # ATSS 4 - Students will perform maintenance on vehicle suspension and steering systems.

Automatic Transmission/Transaxle and Suspension/Steering Proposed Standards

	Indicator # ATSS 3 - Students will perform diagnostics and repair on the vehicle's automatic transmission and transaxle.
Level 2: Skill/ Concept	ATSS 3.1 Inspect and identify drivetrain components. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins Check fluid level in a transmission or transaxle equipped with a dipstick Check fluid level in a transmission or transaxle not equipped with a dipstick Check transmission fluid condition; check for leaks Identify drive train components and configuration
Level 2: Skill/ Concept	ATSS 3.2 Perform maintenance on vehicle automatic transmission and transaxle while on the vehicle. Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch Inspect for leakage at external seals, gaskets, and bushings Inspect, replace and/or align power train mounts Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification
Level 4: Extended Thinking	ATSS 3.3 Analyze the vehicle's automatic transmission and transaxle while off the vehicle. Describe the operational characteristics of a continuously variable transmission (CVT) Describe the operational characteristics of a hybrid vehicle drive train

Indicator # ATSS 4 - Students will perform maintenance on vehicle suspension and steering systems.

MLR Automatic Transmission/Transaxle & Suspension/Steering Current Standards		Automatic Transmission/Transaxle and Suspension/Steering Proposed Standards	
Level 4: Extended Thinking	ATSS 4.1 Analyze and evaluate the suspension and steering system components Examples: Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. P-1 Identify suspension and steering system components and configurations. P-1	Level 2: Skill/ Concept	ATSS 4.1 Inspect, Identify, and repair wheels and tires. Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label Rotate tires according to manufacturer's recommendations including vehicles equipped with tire pressure monitoring systems (TPMS) Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor Inspect tire and wheel assembly for air loss; determine necessary action Repair tire following vehicle manufacturer approved procedure Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure
Level 3: Strategic Thinking	ATSS 4.2 Inspect and assess the suspension and steering system	Level 4: Extended Thinking	ATSS 4.2 Analyze and evaluate the suspension and steering system components Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins Disable and enable supplemental restraint system (SRS); verify indicator lamp operation Identify suspension and steering system components and configurations

MLR Automatic Transmission/Transaxle & Suspension/Steering Current Standards	
Level 2: Skill/ Concept	ATSS 4.3 Inspect and measure vehicle wheel alignment Examples: Perform pre-alignment inspection; measure vehicle ride height. P-1 Describe alignment angles (camber, caster and toe) P-1

Automatic Transmission/Transaxle and Suspension/Steering Proposed Standards	
Level 3: Strategic Thinking	ATSS 4.3 Inspect and assess the suspension and steering system. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots Inspect power steering fluid level and condition Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification Inspect for power steering fluid leakage Remove, inspect, replace, and/or adjust power steering pump drive belt. Inspect and replace power steering hoses and fittings Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper Inspect tie rod ends (sockets), tie rod sleeves, and clamps Inspect upper and lower control arms, bushings, and shafts Inspect and replace rebound bumpers Inspect track bar, strut rods/radius arms, and related mounts and bushings Inspect upper and lower ball joints (with or without wear indicators) Inspect suspension system coil springs and spring insulators (silencers) Inspect suspension system torsion bars and mounts Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links Inspect, remove, and/or replace strut cartridge or assembly; inspect mounts and bushings

MLR Automatic Transmission/Transaxle & Suspension/Steering Current Standards		Automatic Transmission/Transaxle and Suspension/Steering Proposed Standards	
			Inspect front strut bearing and mount Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings Inspect electric power steering assist system Identify hybrid vehicle power steering system electrical circuits and safety precautions Describe the function of suspension and steering control systems and components, (i.e. active suspension, and stability control)
Level 2: Skill/ Concept	ATSS 4.4 Inspect, Identify, and repair wheels and tires	Level 2: Skill/ Concept	ATSS 4.4 Inspect and measure vehicle wheel alignment. Perform pre-alignment inspection; measure vehicle ride height Describe alignment angles (camber, caster and toe)

Diesel Technology - Current Standards

	Indicator # DT 1 - Students will adhere to health and safety standards in the work place, including systems and procedures.
Level 1: Recall	DT 1.1 Apply skills and knowledge of health and safety practices and expectations to ensure a safe working environment for the individual and co-workers (fellow students) Examples: Identify and describe personal safety equipment, including eye, hair and hearing protection, clothing and footwear. Know and understand how to work safely around vehicles in the workplace. Identify, isolate and remove potential work place hazards, that is, fix the risks. Know and understand how to work safely with hoists and lifting equipment. Understand how to identify and manage potential and actual fires and fire hazards in the workplace. Know and understand evacuation procedures in the workplace, including personal and collective responsibilities. Know and understand how to work safely using hand and shop tools and equipment. Know and understand how to work safely with hazardous materials, including disposal and storage.

Diesel Technology - Proposed Standards

Webb Level	**DT 1: Students will adhere to health and safety standards in the workplace, including systems and procedures.**
Level 1: Recall	DT 1.1 Apply skills and knowledge of health and safety practices and expectations to ensure a safe working environment for the individual and co-workers (fellow students). ●Identify and describe personal safety equipment, including eye, hair and hearing protection, clothing and footwear ●Know and understand how to work safely around vehicles in the workplace ●Identify, isolate and remove potential work place hazards, that is, fix the risks ●Know and understand how to work safely with hoists and lifting equipment ●Understand how to identify and manage potential and actual fires and fire hazards in the workplace ●Know and understand evacuation procedures in the workplace, including personal and collective responsibilities ●Know and understand how to work safely using hand and shop tools and equipment ●Know and understand how to work safely with hazardous materials, including disposal and storage

Diesel Technology - Current Standards

	Indicator # DT 2 - Students will learn and understand basic electricity and electronics principles.
Level 2: Skill/Concept	DT 2.1 Understand and implement basic electricity and electronic principles that apply to diesel powered equipment, including starting, charging, lighting and accessories Examples: Understand basic electricity theory. Explain the basic fundamentals of electricity. Calculate values of resistance, current and voltage using Ohms Law. Explore series circuits. Investigate parallel circuits. Examine series-parallel circuits. Explore common electrical components. Investigate the starter, its related components and circuits. Explore the principles and components relating to the charging circuit.
Level 2: Skill/Concept	DT 2.2 Perform basic electrical repair techniques Examples: Make solder connections. Demonstrate the proper use of a digital multi-meter. Diagnose the condition of starter circuits, performing the necessary steps using a load tester and multi-meter. Analyze the function and condition of a lead-acid battery.

Diesel Technology - Proposed Standards

Webb Level	**DT 2: Students will learn and understand basic electricity and electronics principles.**
Level 2: Skill/Concept	DT 2.1 Understand and implement basic electricity and electronic principles that apply to diesel powered equipment, including starting, charging, lighting and accessories. ●Understand basic electricity theory ●Explain the basic fundamentals of electricity ●Calculate values of resistance, current and voltage using Ohms Law. ●Explore series circuits ●Investigate parallel circuits ●Examine series-parallel circuits ●Explore common electrical components ●Investigate the starter, its related components and circuits ●Explore the principles and components relating to the charging circuit
Level 2: Skill/Concept	DT 2.2 Perform basic electrical repair techniques. ●Make solder connections ●Demonstrate the proper use of a digital multi-meter ●Diagnose the condition of starter circuits, performing the necessary steps using a load tester and multi-meter ●Analyze the function and condition of a lead-acid battery

Diesel Technology - Current Standards

	Indicator # DT 3 - Students will demonstrate their understanding of basic aspects of diesel engines.
Level 2: Skill/Concept	DT 3.1 Understand the technical and nontechnical aspects of diesel engines Examples: Know and understand different types of hand, shop and measurement tools. Distinguish between different types of fasteners. Understand the role of the technician in the diesel industry. Identify, define and demonstrate basic diesel engine principles. Identify and define power formulas in diesel industry. Disassemble a diesel engine. Assemble a diesel engine per engine manual. Demonstrate the ability to rebuild a cylinder head. Start a diesel engine.

	Indicator # DT 4 - Students will apply principles of basic hydraulic systems.
Level 2: Skills/ Concepts	DT 4.1 Research and inspect basic mobile hydraulics Examples: Report how basic hydraulic systems have evolved and developed. Calculate the force of a given cylinder under given pressures. Inspect a hydraulic jack. Evaluate a gear pump for possible repairs. Evaluate a vane pump for possible repairs. Examine a piston pump for possible repairs. Examine a hydraulic cylinder. Flow rate a pump on the test stand (Megatech). Analyze the principles of circuits on the test stand (Amatrol). Explore the fundamentals of hydraulic ISO symbols.

Diesel Technology - Proposed Standards

Webb Level	**DT 3: Students will demonstrate their understanding of basic aspects of diesel engines.**
Level 2: Skills/Concepts	DT 3.1 Understand the technical and nontechnical aspects of diesel engines. ●Know and understand different types of hand, shop and measurement tools ●Distinguish between different types of fasteners ●Understand the role of the technician in the diesel industry ●Identify, define and demonstrate basic diesel engine principles ●Identify and define power formulas in diesel industry ●Disassemble a diesel engine ●Assemble a diesel engine per engine manual ●Demonstrate the ability to rebuild a cylinder head ●Start a diesel engine

Webb Level	**DT 4: Students will apply principles of basic hydraulic systems.**
Level 2: Skill/Concept	DT 4.1 Research and inspect basic mobile hydraulics. ●Evaluated different types of hydraulic pumps for possible repairs (e.g. gear, vane, and piston) ●Report how basic hydraulic systems have evolved and developed ●Calculate the force of a given cylinder under given pressures ●Inspect a hydraulic jack ●Examine a hydraulic cylinder ●Explore the fundamentals of hydraulic ISO symbols

Diesel Technology - Current Standards

	Indicator # DT 5 - Students will demonstrate how basic braking systems operate.
Level 2: Skills/ Concepts	DT 5.1 Identify and understand basic vehicle braking systems, including hydraulic and air brake systems Examples: Explore the principles of brakes. Demonstrate the hydraulic drum brake rebuild procedure. Demonstrate the hydraulic disc brake rebuild procedure. Understand different types of power brakes. Explain the operation of brake valves. Examine the fundamentals of the air system.

	Indicator # DT 6 - Students will apply principles of fuel systems on diesel engines.
Level 2: Skill/Concept	DT 6.1 Differentiate between, and identify components of, fuel delivery systems Identify principles, components, systems and circuits for fuel delivery systems Analyze fuel injection components and principle Demonstrate how to time an in-line fuel pump Demonstrate how to time a rotary fuel pump Analyze non-starting situations related to fuel and engine phasing

Diesel Technology - Proposed Standards

Webb Level	**DT 5: Students will demonstrate how basic braking systems operate.**
Level 2: Skill/Concept	DT 5.1 Identify and understand basic vehicle braking systems, including hydraulic and air brake systems. ●Explore the principles of brakes ●Demonstrate the hydraulic drum brake rebuild procedure ●Demonstrate the hydraulic disc brake rebuild procedure ●Understand different types of power brakes ●Explain the operation of brake valves ●Examine the fundamentals of the air system

Webb Level	**DT 6: Students will apply principles of fuel systems on diesel engines.**
Level 2: Skill/Conc	DT 6.1 Differentiate between, and identify components of, fuel delivery systems and electrical/hybrid technologies. ●Identify principles, components, systems and circuits for fuel delivery systems ●Analyze fuel injection components and principle ●Demonstrate how to time an in-line fuel pump ●Demonstrate how to time a rotary fuel pump ●Analyze non-starting situations related to fuel and engine phasing

Diesel Technology - Current Standards

Diesel Technology - Proposed Standards

Webb Level	**DT 7: Students will understand components and apply principles of undercarriage components and systems.**
Level 2: Skill/Concept	DT 7.1 Demonstrate knowledge of drivetrain components and function. ●Demonstrate knowledge of parts and components of an axle, u joints, driveshaft and other drivetrain components
Level 2: Skill/Concept	DT 7.2 Demonstrate knowledge of parts and components of the chassis. ●Identify suspension, steering, shocks, airbag, and other chassis components ●Demonstrate operation plus inspect and adjust fifth-wheel plate
Level 2: Skill/Concept	DT 7.3 Demonstrate knowledge of parts and components of differentials and transmissions. ●Identify knowledge of differential and transmission components
Level 2: Skill/Concept	DT 7.4 Demonstrate knowledge of tires and rims. ●Inspect and repair tires ●Identify tire and rim wear ●Understand tire markings (e.g. DOT numbers.)

ATV/SEM (All-Terrain Vehicle/Small Engine Mechanics) - Current Standards

	Indicator # SEM 1 Students will demonstrate shop and tool safety.
Level 1: Recall & Reproduction	SEM 1.1 Examine basic shop safety using Occupational Safety Health Administration (OSHA) standards Examples: Locate Fire extinguisher/ Fire Blankets/Exits Never have an open flame near flammable liquids Do not refuel engine while in operation Demonstrate proper start up and shutoff procedures (be aware of surroundings when pull-starting small gas engine (SGE)) Eye and hearing protection Clothing and shoe protection
Level 2: Skill/Concept	SEM 1.2 Demonstrate proper use of hand and power tools Examples: General tool test (Name and function of tool being used, proper use of each tool, care and storage) Review Torque wrench settings and usage Spark test tools (Use appropriate spark tester to check spark)
Level 2: Skill/Concept	SEM 1.3 Summarize the proper use of Safety Data Sheets (SDS) Examples: Handling and storage of related liquids to SGE (Small Gas Engine) Firefighting measures Hazards identification
Level 3: Strategic Thinking	SEM 1.4 Create safety portfolio Examples: Maintain records of written safety examinations Maintain records of equipment examinations for which the student has passed an operational checkout OSHA 10 certification Review SDS

Small Engine Mechanics Proposed Standards

	Indicator # SEM 1 - Students will demonstrate shop and tool safety.
Level 1: Recall & Reproduction	SEM 1.1 Examine basic shop safety using Occupational Safety Health Administration (OSHA) standards, including: Summarize the proper use of Safety Data Sheets (SDS) Create a safety portfolio Locate the fire extinguisher, fire blankets, and emergency exits Never have an open flame near flammable liquids Do not refuel engine while in operation Demonstrate proper start up and shutoff procedures (be aware of surroundings when pull-starting small gas engine (SGE)) Eye and hearing protection Clothing and shoe protection
Level 2: Skill/Concept	SEM 1.2 Demonstrate proper use of hand and power tools, including: Perform a general tool test (name and function of tool being used, proper use of each tool, care and storage) Review Torque wrench settings and usage Spark test tools (Use appropriate spark tester to check spark)

ATV/SEM (All-Terrain Vehicle/Small Engine Mechanics) - Current Standards

	Indicator # SEM 2 - Students will demonstrate independent and teamwork skills as well as explore career opportunities within the industry.
Level 3: Strategic Thinking	SEM 2.1 Participate in leadership activities Example: CTSO's (Career and Technical Student Organizations)
Level 4: Extended Thinking	SEM 2.2 Utilize guidance software to research and report on career opportunities
Level 3: Strategic Thinking	SEM 2.3 Develop a teamwork project Example: Tear down/Rebuild procedures

	Indicator # SEM 3 - Students will properly prepare customer documentation.
Level 3: Strategic Thinking	SEM 2.1 Complete work order form Examples: Utilize appropriate parts identification media Communicate with customer and/or supervisor to determine service requested Maintain work order records to account for parts and labor
Level 3: Strategic Thinking	SEM 2.2 Prepare customer bill/receipt Examples: Write a service order Identify work performed on work orders Calculate labor cost using a flat rate manual

	Indicator # SEM 4 - Students will apply communication, mathematics and science knowledge and skills to ATV/SEM.
Level 3: Strategic Thinking	SEM 4.1 Examine how physics concepts apply to small engine technology Example: Student will determine horsepower of any small engine using HP=W/(T*33,000). HP = Horse power, W = Work, T = Time

Small Engine Mechanics Proposed Standards

	Indicator # SEM 2 - Students will demonstrate independent and teamwork skills as well as explore career opportunities within the industry.
Level 3: Strategic Thinking	SEM 2.1 Participate in student leadership activities.
Level 4: Extended Thinking	SEM 2.2 Utilize career guidance tools to research and report on career opportunities.
Level 3: Strategic Thinking	SEM 2.3 Develop a teamwork project.

	Indicator # SEM 3 - Students will understand and apply appropriate business practices.
Level 3: Strategic Thinking	IVSM 3.1 Demonstrate the importance of, and the procedures for, maintaining accurate work documents and records.
Level 3: Strategic Thinking	IVSM 3.2 Apply concept and application of ethical business practices.
Level 3: Strategic	IVSM 3.3 Apply excellent customer relations practices.

	Indicator # SEM 4 - Students will apply communication, mathematics and science knowledge and skills to Small Engine Mechanics.
Level 3: Strategic Thinking	SEM 4.1 Determine horsepower of any small engine using HP=W/(T*33,000). (HP = Horsepower, W = Work, T = Time).

ATV/SEM (All-Terrain Vehicle/Small Engine Mechanics) - Current Standards

Level 3: Strategic Thinking	SEM 4.2 Explore the application of fundamental laws of hydraulics Examples: Student will demonstrate the principle that fluids cannot be compressed by building a basic hydraulic cylinder/motor device on a test bench.
Level 3: Strategic Thinking	SEM 4.3 Perform mathematical calculations and measurements commonly used in small engines Examples: Student will calculate displacement of any given engine based on the equation d=c*b2s c-constant 0.7584, b-bore, s-stroke, d-displacement The amount of work can be found with the equation w=f*d where w=work in lb/ft (ftlb), f=force in pounds, d=distance
Level 3: Strategic Thinking	SEM 4.4 Communicate findings as related to mathematics and science knowledge and skills to diagnosis problems in small engines Examples: Students will complete a written report given the findings of any lab activity (e.g. low horse power due to poor air exchange).
	Indicator # SEM 5 - Students will troubleshoot a small engine.
Level 4: Extended Thinking	SEM 5.1 Implement strategic diagnostic procedures Examples: Apply small engine trouble shooting procedures Diagnose and determine needed repair on small engine components Determine wear on internal engine parts using specialized tools
Level 2: Skill/Concept	SEM 5.2 Conduct preventative maintenance on a small engine Examples: Change oil and filter on small engine Inspect and change air filter Disassemble, clean, and inspect fuel pump Disassemble, clean, and inspect carburetor

Small Engine Mechanics Proposed Standards

Level 3: Strategic Thinking	SEM 4.2 Demonstrate the principle that fluids cannot be compressed by building a basic hydraulic cylinder/motor device on a test bench.
Level 3: Strategic Thinking	SEM 4.3 Perform mathematical calculations and measurements commonly used in small engines, such as: Calculate displacement of any given engine based on the equation d=c*b2s (c-constant 0.7584, b-bore, s-stroke, d-displacement) Find the amount of work with the equation w=f*d where w=work in lb./ft (ftlb), f=force in pounds, d=distance
Level 3: Strategic Thinking	SEM 4.4 Communicate findings related to mathematics and science knowledge and skills to diagnosis problems in small engines.
	Indicator # SEM 4 - Students will apply communication, mathematics and science knowledge and skills to Small Engine Mechanics.
Level 4: Extended Thinking	SEM 5.1 Implement strategic diagnostic procedures, including: Apply small engine trouble shooting procedures Diagnose and determine needed repair on small engine components Determine wear on internal engine parts using specialized tools
Level 2: Skill/Concept	SEM 5.2 Conduct preventative maintenance on an internal combustion engine. Change oil and filter on small engine Inspect and change air filter Disassemble, clean, and inspect fuel pump Disassemble, clean, and inspect carburetor

ATV/SEM (All-Terrain Vehicle/Small Engine Mechanics) - Current Standards

Small Engine Mechanics Proposed Standards

Level 3: Strategic Thinking	SEM 5.3 Analyze the functions and operations of a fuel system related to small engine technology. Complete fuel pressure test of system utilizing a fuel pump Set carburetor float height Adjust both low and high idle circuits on carburetor engines Complete fuel injector function test on fuel injected engines
Level 3: Strategic Thinking	SEM 5.4 Diagnose fuel system problem. Test and determine needed repair on fuel system Inspect and determine needed repair on air cleaner system
Level 3: Strategic Thinking	SEM 5.5 Perform fuel system service. Remove and replace the fuel tank, fuel lines and fuel filter system Service oil-bath or foam type air cleaner Reassemble and adjust a carburetor Reassemble and install fuel pump
Level 4: Extended Thinking	SEM 5.6 Analyze the function and operation of emission systems related to small engines. Research EPA emissions standards and requirements and report on how those laws affect the small engine service industry
Level 4: Extended Thinking	SEM 5.7 Diagnose emission systems relating to small engine technology. Use an exhaust gas analyzer to determine the amount of HC and NOx emissions contained in the exhaust from a small engine and determine repair strategies Complete electrical/electronic testing of manifold absolute pressure (MAP) sensor, O2 (Oxygen) or throttle position sensor and determine whether repair or replacement of parts is needed

ATV/SEM (All-Terrain Vehicle/Small Engine Mechanics) - Current Standards

	Indicator # SEM 6 - Students will properly test, diagnose, service, and repair charging and electrical systems related to small engines.
Level 3: Strategic Thinking	SEM 6.1 Illustrate the application of Ohm's law to charging and electrical systems related to small engines Examples: Complete the start amp draw test on a small engine with an electric start system. Compute amperage use of any circuit by using the equation amps=volts/ohms
Level 2: Skill/Concept	SEM 6.2 Interpret schematics, diagrams, and reference information used in small engine electrical systems Examples: Troubleshoot the charging circuit using a manufacturer's guide Read a multimeter
Level 3: Strategic Thinking	SEM 6.3 Use strategy-based diagnostics for determining the cause of a fault in an electrical circuit Examples: Test, diagnose, and service batteries and charging systems Test, diagnose, and service light systems Demonstrate the use of equipment and tools for electrical testing and diagnosis Troubleshoot and repair starting circuit

Small Engine Mechanics Proposed Standards

Level 3: Strategic Thinking	SEM 5.8 Perform emission system service on small engine. Replace a MAP sensor Replace a fuel pressure sensor Demonstrate or observe a fuel map in electronic format

	Indicator # SEM 4 - Students will apply communication, mathematics and science knowledge and skills to Small Engine Mechanics.
Level 3: Strategic Thinking	SEM 6.1 Illustrate the application of Ohm's law to charging and electrical systems related to small engines. Complete the start amp draw test on a small engine with an electric start system Compute amperage use of any circuit by using the equation amps=volts/ohms
Level 2: Skill/Concept	SEM 6.2 Interpret schematics, diagrams, and reference information used in small engine electrical systems. Troubleshoot the charging circuit using a manufacturer's guide Read a multimeter
Level 3: Strategic Thinking	SEM 6.3 Use strategy-based diagnostics for determining the cause of a fault in an electrical circuit. Test, diagnose, and service batteries and charging systems Test, diagnose, and service light systems Demonstrate the use of equipment and tools for electrical testing and diagnosis Troubleshoot and repair starting circuit

ATV/SEM (All-Terrain Vehicle/Small Engine Mechanics) - Current Standards

Small Engine Mechanics Proposed Standards

Level 2: Skill/Concept	SEM 6.4 Inspect and repair battery problems. Perform battery state-of-charge test; determine necessary action Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action Maintain or restore electronic memory functions Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps and hold-downs Perform battery charge Start a vehicle using jumper cables and a battery or auxiliary power supply
Level 2: Skill/Concept	SEM 6.5 Diagnose and repair starter. Perform starter current draw tests; determine necessary action Perform starter circuit voltage drop tests; determine necessary action Inspect and test starter relays and solenoids; determine necessary action Remove and replace starter
Level 2: Skill/Concept	SEM 6.6 Diagnose and repair charging system. Perform charging system output test; determine necessary action Remove and replace generator (alternator) Diagnose the cause of dim or no light operation; determine necessary action Inspect, replace, and aim headlights and bulbs

ATV/SEM (All-Terrain Vehicle/Small Engine Mechanics) - Current Standards

	Indicator # SEM 7 - Students will properly test, diagnose, service and repair fuel delivery systems as related to small engine technology.
Level 3: Strategic Thinking	SEM 7.1 Analyze the functions and operations of a fuel system related to small engine technology
Level 3: Strategic Thinking	SEM 7.2 Diagnose fuel system problem
Level 3: Strategic Thinking	SEM 7.3 Perform fuel system service

	Indicator # SEM 8 - Students will properly test, diagnose, service and repair emission systems related to small engine technology.
Level 4: Extended Thinking	SEM 8.1 Analyze the function and operation of emission systems related to small engines
Level 4: Extended Thinking	SEM 8.2 Diagnose emission systems relating to small engine technology
Level 3: Strategic Thinking	SEM 8.3 Perform emission system service on small engine

Small Engine Mechanics Proposed Standards

NA - new course

Powersports - Proposed Standards

	Indicator # PV 1 - Students will demonstrate shop and tool safety.
Level 1: Recall	PV 1.1 Examine basic shop safety using Occupational Safety and Health Administration (OSHA) standards. Summarize the proper use of Safety Data Sheets (SDS) Create a safety portfolio Locate the fire extinguisher, fire blankets, and emergency exits Never have an open flame near flammable liquids Do not refuel engine while in operation Demonstrate proper start up and shutoff procedures (be aware of surroundings when pull-starting small gas engine (SGE)) Wear appropriate eye and hearing protection Wear appropriate clothing and shoe protection
Level 2: Skill/Concept	PV 1.2 Demonstrate proper use of hand and power tools. Perform a general tool test (name and function of tool being used, proper use of each tool, care and storage) Review Torque wrench settings and usage Spark test tools (Use appropriate spark tester to check spark)

	Indicator # PV 2 - Students will demonstrate independent and teamwork skills as well as explore career opportunities within the industry.
Level 3: Strategic Thinking	PV 2.1 Participate in student leadership activities.
Level 4: Extended Thinking	PV 2.2 Utilize career guidance tools to research and report on career opportunities.
Level 3: Strategic Thinking	PV 2.3 Develop a teamwork project.

NA - new course

Powersports - Proposed Standards

	Indicator # PV 3 - Students will understand and apply appropriate business practices.
Level 3: Strategic Thinking	PV 3.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Level 3: Strategic Thinking	PV 3.2 Apply concept and application of ethical business practices.
Level 3: Strategic Thinking	PV 3.3 Apply excellent customer relations practices.

	Indicator # PV 4 - Students will troubleshoot an internal combustion engine.
Level 4: Extended Thinking	PV 4.1 Implement strategic diagnostic procedures.
Level 2: Skill/Concept	PV 4.2 Conduct preventative maintenance on an internal combustion engine. Inspect and change oil and oil filter Inspect and change air filter Disassemble, clean, and inspect fuel pump Disassemble, clean, and inspect carburetor
Level 3: Strategic Thinking	PV 4.3 Analyze the functions and operations of a fuel system related to powersports vehicles. Complete fuel pressure test of system utilizing a fuel pump Set carburetor float height Adjust both low and high idle circuits on carburetor engines Complete fuel injector function test on fuel injected engines
Level 3: Strategic Thinking	PV 4.4 Diagnose fuel system problems. Test and determine needed repair on fuel system Inspect and determine needed repair on air cleaner system
Level 3: Strategic Thinking	PV 4.5 Perform fuel system service. Remove and replace the fuel tank, fuel lines and fuel filter system Service oil-bath or foam type air cleaner Reassemble and adjust a carburetor Reassemble and install fuel pump

NA - new course

Powersports - Proposed Standards

Level 4: Extended Thinking	PV 4.6 Analyze the function and operation of emission systems related to powersports vehicles. Research EPA emissions standards and requirements and Explain how emissions regulations affect the small engine service industry
Level 4: Extended Thinking	PV 4.7 Diagnose emission systems relating to powersports vehicles.

	Indicator # PV 5 - Students will properly test, diagnose, service, and repair charging and electrical systems.
Level 2: Skill/Concept	PV 5.1 Inspect and repair battery problems. Perform battery state-of-charge test; determine necessary action Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action Maintain or restore electronic memory functions Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps and hold-downs Perform battery charge Start a vehicle using jumper cables and a battery or auxiliary power supply
Level 2: Skill/Concept	PV 5.2 Diagnose and repair starter. Perform starter current draw tests; determine necessary action Perform starter circuit voltage drop tests; determine necessary action Inspect and test starter relays and solenoids; determine necessary action Remove and replace starter
Level 2: Skill/Concept	PV 5.3 Diagnose and repair charging system. Perform charging system output test; determine necessary action Remove and replace generator (alternator) Diagnose the cause of dim, or no light operation; determine necessary action Inspect, replace, and aim headlights and bulbs
Level 2: Skill/Concept	PV 5.4 Understand safety aspects of supplemental restraint systems (SRS), electronic brake control systems and hybrid vehicle high voltage circuits.

NA - new course

Powersports - Proposed Standards

Level 2: Skill/Concept	PV 5.5 Understand and demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge [HID] lamps, ignition systems, injection systems, etc.).
Level 2: Skill/Concept	PV 5.6 Utilize safe procedures for operating electric vehicles and systems.

	Indicator # PV 6 - Inspect, diagnose and repair drivetrain, transmission, axles and final drive components.
Level 2: Skill/Concept	PV 6.1 Demonstrate understanding of drivetrain components to include primary transmission and final drive components. Drain transmission fluid Visually inspect the amount of debris in oil pan Remove filter and install new filter Install the proper fluid to the proper level
Level 2: Skill/Concept	PV 6.2 Diagnose and repair drive train and axles. Diagnose fluid loss, level, and condition concerns; determine necessary action Drain and fill transmission/transaxle and final drive unit Identify and inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine necessary action Identify and inspect hydraulic clutch slave and master cylinders, lines and hoses; determine necessary action Bleed clutch hydraulic system Inspect constant velocity (CV) joint boots Remove and replace rear wheel drive shaft

NA - new course

Powersports - Proposed Standards

	Indicator # PV 7 - Students will repair suspension and steering.
Level 2: Skill/Concept	PV 7.1 Diagnose suspension and steering; determine necessary action. Determine proper power steering fluid types Flush, fill and bleed power steering system Diagnose power steering fluid leakage; determine necessary action. Lubricate suspension and steering systems Inspect, remove and replace shock absorbers Inspect and install stabilizer bar bushings, brackets, and links. Inspect and install strut cartridge or assembly, coil spring, insulators (silencers), and upper strut mount Perform pre-alignment inspection and measure vehicle ride height; determine necessary action Demonstrate knowledge of the principles of steering geometry using caster, camber and toe
Level 2: Skill/Concept	PV 7.2 Inspect and repair tire and wheel assembly. Diagnose tire wear patterns; determine necessary action Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action Identify vehicles equipped with a tire pressure monitoring system (TPMS) Demonstrate knowledge of service considerations of vehicles equipped with a TPMS Rotate tires according to manufacturer's recommendations Balance wheel and tire assembly (static and dynamic) Dismount, inspect, and remount tire on wheel Repair tire using internal patch Reinstall wheel; torque lug nuts

Indicator # PV 8 - Students will inspect, diagnose and repair brake assembly.

NA - new course

Powersports - Proposed Standards

Level 2: Skill/Concept	PV 8.1 Diagnose and repair brake fluid system. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and support; determine necessary action Select, handle, and fill brake fluids to proper level Bleed brake system Test brake fluid for contamination; determine necessary action
Level 2: Skill/Concept	PV 8.2 Inspect and repair brake assemblies. Remove, clean, inspect and measure brake drums; determine necessary action Refinish brake drum; measure final drum diameter Remove, clean, inspect brake shoes, springs, pins, clips, levers, adjuster/self-adjuster, other related brake hardware, and backing support plates; lubricate and reassemble Inspect and install wheel cylinders Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings Install wheel, torque lug nuts, and make final checks and adjustments
Level 2: Skill/Concept	PV 8.3 Inspect and repair brake indicator light components. Check parking brake and indicator light system operation; determine necessary action Check operation of brake stop light system; determine necessary action Replace tapered roller wheel bearing and race Clean, inspect, lubricate, install and adjust wheel bearing Identify and inspect electronic brake control system components; determine necessary action Demonstrate knowledge of how the brake hydraulic failure warning light operates

NA - new course

Powersports - Proposed Standards

	Indicator # PV 9 - Students will inspect, diagnose and repair heating and air conditioning.
Level 2: Skill/Concept	PV 9.1 Identify and visually inspect A/C system components. Locate refrigerant label and identify specified refrigerant type (e.g., R-12, R-134a) Conduct preliminary performance test of A/C system and determine necessary action Conduct performance test of the heater/ventilation system Inspect and replace cabin air filter

	Indicator # PV 10 - Students will inspect, diagnose and improve engine performance.
Level 2: Skill/Concept	PV 10.1 Perform the necessary tests and repairs to improve engine performance. Perform engine cranking and running vacuum tests; determine necessary action Perform cylinder power balance test; determine necessary action Perform cylinder cranking compression test; determine necessary action Perform cylinder leakage test; determine necessary action Verify engine operating temperature; determine necessary action Retrieve and record stored diagnostic trouble codes, On-Board Diagnostics (OBD) monitor status and freeze frame data; clear codes when applicable Obtain and interpret scan tool data Remove and replace secondary ignition components Remove and replace thermostat and gasket/seal Perform common fastener and thread repair, to include: removing broken bolt, restoring internal and external threads, and repairing internal threads with a threaded insert.